APPROPRIATE ASSESSMENT REPORT

Appropriate Assessment Report

for the

Proposed Gathabawn Windfarm

Stage 1: Screening for AA
Stage 2: Natura Impact Statement

INIS Environmental Consultants Ltd

Planning and Environmental Consultants

INIS Environmental Consultants Ltd., Suite 11, Shannon Commercial Properties,

Information Age Park, Ennis, County Clare, Ireland.

Web. www.inisenvironmentalservices.com

f. www.facebook.com/inis.env

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1. INTRODUCTION

1.1 Background

A key measure to protect nature and biodiversity in the EU is the establishment of a network of nature protection areas under the Habitats Directive and the Birds Directive. The areas designated under these two pieces of legislation are known collectively as Natura 2000 sites, also referred to as European Sites under national legislation.

In Ireland, the Natura 2000 network of European Sites comprises Special Areas of Conservation (SACs, including candidate SACs), and Special Protection Areas (SPAs, including proposed SPAs):

- SACs are selected for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds).
- SPAs are selected for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats.

The annexed habitats and species for which each site is selected correspond to the Qualifying Interests (QIs) of Special Areas of Conservation (SACs) or Special Conservation Interests (SCIs) of Special Protection Areas (SPAs); from these the conservation objectives of the site are derived.

1.1.1 Appropriate Assessment Process

Under Article 6(3) of the Habitats Directive, an Appropriate Assessment of the implications of any plan or project on any protected site (SAC or SPA) within the Natura 2000 network is required before a project is approved. This must include all the aspects of the plan or project which can, either individually or in combination with other plans or projects, affect the conservation objectives of any Natura 2000 site, in the light of the best scientific knowledge available. The competent national authorities are to authorise a plan, project or activity only if they have made certain that it will not adversely affect the integrity of any Natura 2000 site.

1.1.2 Stages of the Appropriate Assessment Process

Appropriate Assessment involves a number of steps and tests that are applied using a stage-by-stage approach. Each step or stage in the assessment process precedes and provides a basis for the subsequent steps:

Stage 1 – screening

Stage 2 – appropriate assessment

Stage 3 – derogation procedure

The stages in an Appropriate Assessment (AA), as outlined in EC Guidance on Assessment of Plans and Projects (2001), are illustrated in the following flow chart (see over).

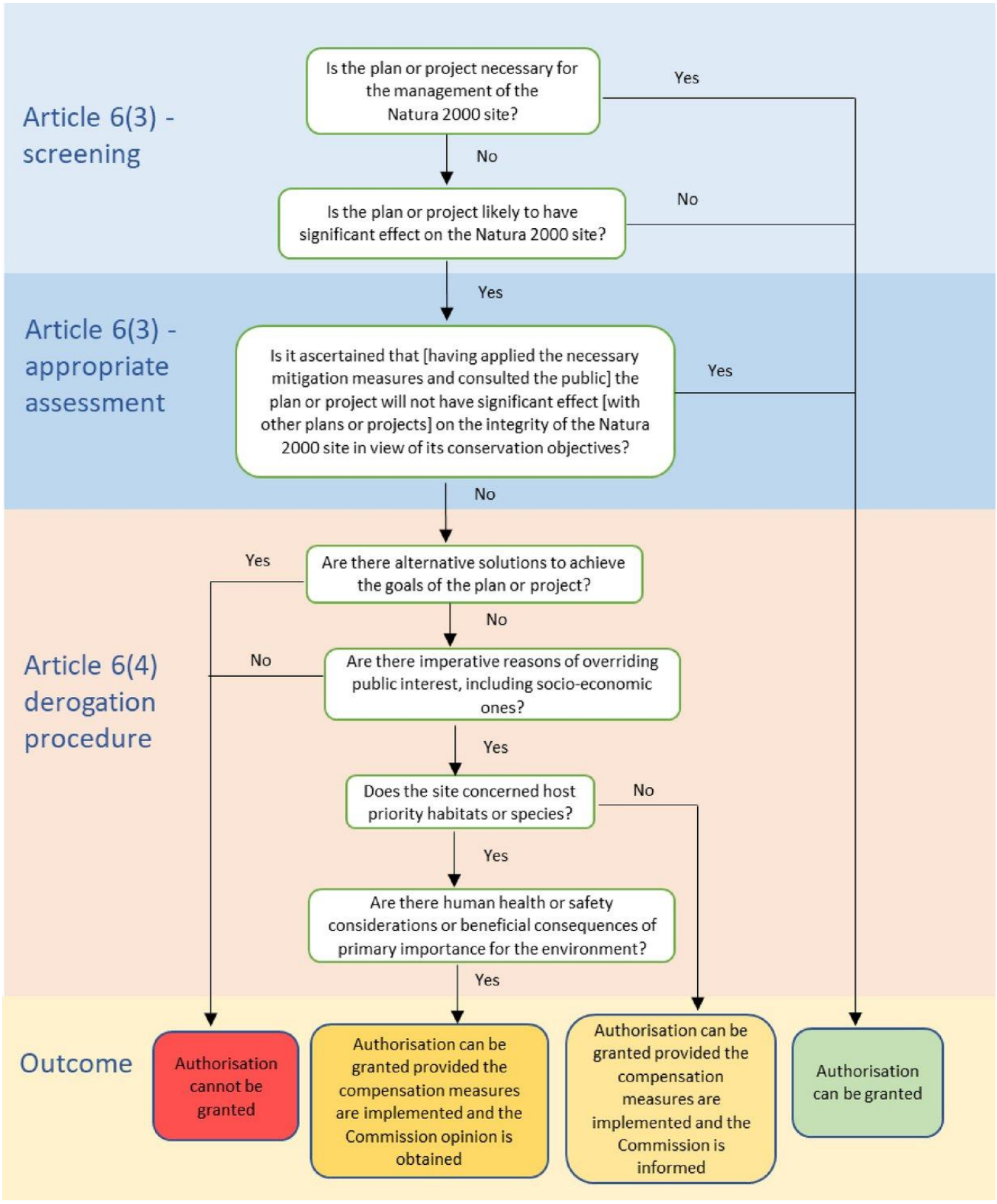


Figure 1: Assessing plans and projects in relation to Natura 2000 sites - Three stages of the Article 6(3) and (4) procedure

Source: Commission Notice - Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (2021/C 437/01), (EU, 2021)

1.2 Introduction to the Appropriate Assessment Report

This Appropriate Assessment Report has been prepared by Inis Environmental Consultants Ltd. to determine whether Stage 2 of the Appropriate Assessment process is likely to be required by the Planning Authority for the subject Gathabawn Windfarm application.

This Report provides:

- Section 2: specific descriptions and illustrative Figures of the proposed Gathabawn Windfarm;
- Section 3: description of European Sites under consideration, including the location of the proposed development in relation to these Sites
- Section 4: preliminary screening statement
- Section 5: details of consultation, sources of information and methodology
- Section 6: descriptions of the receiving environment
- Section 7: Stage 1 Screening evaluation, and
- Section 8: Stage 2 Natura Impact Statement

The preparation of this Appropriate Assessment Report has had regard to;

- EU Habitats Directive (92/43/EEC) and EU Birds Directive (Council Directive (2009/147/EC)
- Part XAB of the Planning and Development Act 2000
- European Communities (Birds and Natural Habitats) Regulations 2011
- Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission, 2001)
- European Commission (2021) Commission notice - Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC
- European Commission (2026) Technical Guidelines for assessing and monitoring the condition of Annex I habitat types under the Habitats Directive (92/43/EEC);
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government (DoEHLG, 2010); and
- Managing Natura 2000 Sites: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC (EC, 2018).

A description of the methodology used to identify European Sites is provided in Section 4.1, and a description of desktop research and fieldwork survey methodology is included in Section 4.2.1.

1.3 Authors and Contributors to the present report

This report has been prepared by:

Andrew Whitfield BA. MA. C. Ecol. C. Env prepared this report. Andrew Whitfield has over 30 years' experience in ecological consultancy. He is a full member of the Chartered Institute of Ecology and Environmental Management (MCIEEM), a Chartered Ecologist and Chartered Environmentalist. Andrew has extensive experience of undertaking Appropriate Assessment throughout the UK and Ireland on a variety of major infrastructure projects including nuclear power stations, road schemes, housing developments, renewable energy developments and new railways. He has particular expertise in habitat, butterfly, bird and mammal survey and assessment. Andrew also has extensive experience of coordinating multi-disciplinary teams for environmental assessment, authoring AA, EIA and EcIA and providing Expert Witness testimony.

Dr Alex Copland BSc PhD MIEnvSc MCIEEM is Technical Director with INIS and reviewed this report. Alex has over 30 years of professional experience working in both statutory and private companies, in third-level research institutions and with environmental NGOs. He is a full member of the Institute of Environmental Sciences (IES) and the Chartered Institute of Ecology and Environmental Management (CIEEM). He is proficient in experimental design and data analysis and has managed several large-scale, multi-disciplinary ecological projects, managing staff and resources to meet budgetary constraints and the successful delivery of projects on time. These have included research and targeted management work for species of conservation concern, ecological assessments (including fieldwork and reporting) for large-scale infrastructure projects (including Strategic Infrastructure Developments) and delivering successful planning outcomes, the design and delivery of practical conservation actions with a range of stakeholders and end-users, education and interpretation on the interface between people and the environment and the development of coordinated, strategic plans for birds and biodiversity. He has written numerous scientific papers, developed and contributed to evidence-based position papers, visions and strategies on birds and habitats in Ireland. He also sits on the Editorial Panel of the scientific journal, *Irish Birds*, which publishes original ornithological research relevant to Ireland's avifauna, and CIEEM'S *Irish Policy Group*.

Howard Williams BSc CEnv MCIEEM CBiol MRSB MIFM (Principal Ecologist and CEO Inis Environmental Consultancy) signed off on this report. He is a Chartered Environmentalist and a Chartered Biologist and has written many, Article 6 Appropriate Assessments and Ecological Impact Assessments for over 50 wind farm projects and managed many Construction Environmental Management Plans. Howard is an expert in the field of avian ecology in addition to having considerable knowledge and experience producing management strategies/prescriptions for a range of protected species, both terrestrial and aquatic.

Conor Daly MSc BSc ACIEEM (Report Team Lead, Inis Environmental Consultancy) contributed to this report. Conor is an Ecologist with INIS who reviewed and edited this report and was awarded an MSc in Biodiversity and Conservation and an Honours BSc in Zoology. Conor has been conducting ecological surveys for projects since 2021 for a variety of projects, including industrial estates and Windfarms (Small-Large). Conor has experience in Raptor conservation, with ample experience with bird-of-prey pressures and threats to protected species and has provided reports for EIAR and NIS reports while working with Inis Environmental Ltd. Conor has experience writing PEA, AA, NIS and EIA reports since 2021 for small urban developments across Ireland involving sensitive receptors such as Lesser Horseshoe Bat (*Rhinolophus hipposideros*), active Badger setts and riverine habitats. They have also contributed to the drafting, finalising and issuing of EcIA, EIA and NIS reports since 2021 on renewable energy and smaller development projects, including wind farms in Counties Kilkenny, Tipperary, Waterford, Clare, Donegal and Roscommon.

Cillian Burke BSc (Ecologist, Inis Environmental Consultancy) contributed to this report. Cillian is an Ecologist with Inis Environmental Consultants Ltd., with a BSc (Hons) in Environmental Science from Galway University. Cillian has experience in undertaking multi-disciplinary surveys including habitat classification, ornithology vantage point surveys, breeding wader surveys, Ecological Clerk of Works and bat surveys. Cillian has also completed aquatic invertebrate surveys, including kick-sampling surveys for water infrastructure projects. Cillian has experience writing AA Screening, EIA, IAS and baseline ecology reports, as well as ISMP, BEMP, SHMP since 2021. They have also contributed to the drafting, reviewing and amending of AA, EIA, IAS and NIS reports over three years for renewable energy projects, including wind farms in Counties Waterford, Clare, Donegal and Roscommon.

Ross Macklin B.Sc. (Hons) MCIEEM., MIFM, HDip GIS, PDip IPM is an ecologist with over 16 years' professional experience in Ireland and conducted the aquatic surveys to inform the aquatic baseline of the Gathabawn Windfarm. He specialises in freshwater fisheries ecology, biology and water quality. He has considerable experience in a wide range of ecological and environmental projects including EIAR, EcIA, AA/NIS, CEMP reporting, as well as biodiversity, water quality monitoring, invasive species and fisheries management. He also has expert identification skills in macrophytes, freshwater invertebrates, protected aquatic habitats and protected aquatic species including freshwater pearl mussel. His diverse project list includes work on renewable energy developments, flood relief schemes, road schemes, blueways/greenways, biodiversity projects, fisheries

management projects and catchment-wide water quality management. He is currently completing his Ph.D. on the ecology and impact of Common Carp (Cyprinus carpio) in Irish waters.

Bill Brazier B.Sc. (Hons) MIFM is an aquatic ecologist with over 10 years' professional experience in Ireland and conducted the aquatic surveys to inform the aquatic baseline of the Gathabawn Windfarm. He specialises in freshwater fisheries ecology, biology and water quality. He has considerable experience in a wide range of ecological and environmental projects including EIAR, EcIA and AA/NIS reporting, as well as biodiversity, invasive species and fisheries management. His diverse project list includes work on renewal energy developments, flood relief schemes, road schemes, blueways/greenways and biodiversity projects. He is currently completing his Ph.D. on the genetics, reproductive biology and invasive potential impact of Common Carp (Cyprinus carpio) in Irish waters. Additionally, Bill runs the highly respected Off the Scale magazine, Ireland's most-read recreational angling publication and is the national coordinator for the novel Anglers National Line Recycling Scheme (ANLRS).

1.4 Stage 1 - Screening Evaluation Process

The Screening stage examines the likely or potential effects of a project, alone and in combination with other plans or projects, upon a Natura 2000 site and considers whether it can be objectively concluded that these effects will not be significant.

According to the 2021 Commission Notice "Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC", the Screening process comprises the following four steps:

Step 1: ascertaining whether the plan or project is directly connected with or necessary to the management of a Natura 2000 site;

Step 2: identifying the relevant elements of the plan or project and their likely impacts;

Step 3: identifying which (if any) Natura 2000 sites may be affected, considering the potential effects of the plan or project alone or in combination with other plans or projects;

Step 4: assessing whether likely significant effects on the Natura 2000 site can be ruled out, in view of the site's conservation objectives.

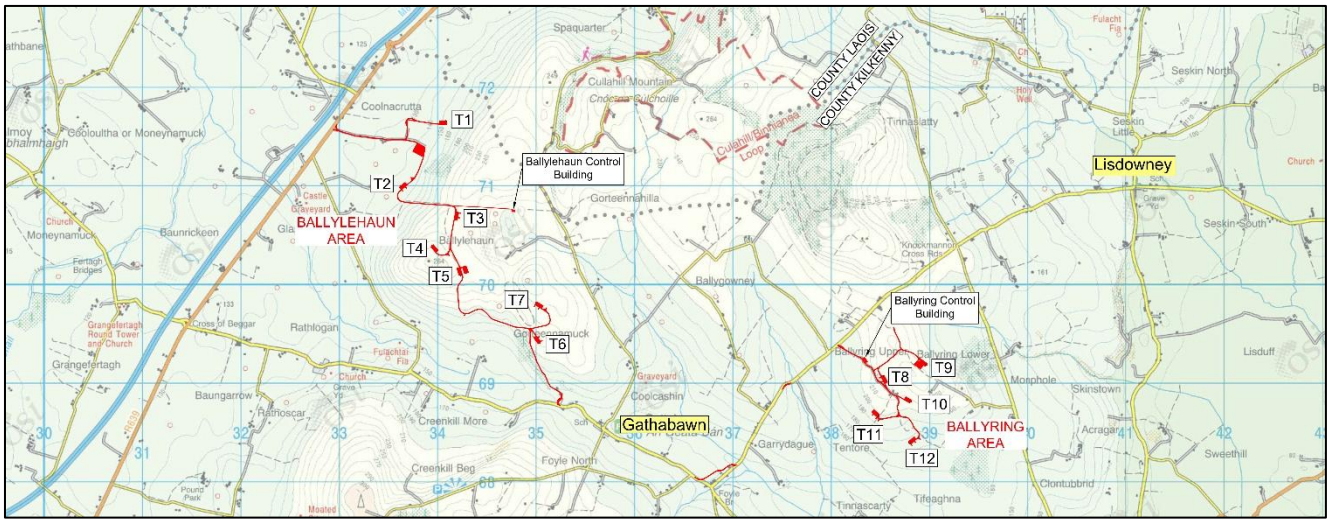
2. Screening Step 1 - Screening to ascertain whether the project is directly connected with or necessary to the management of a Natura 2000 site

No, the proposed Gathabawn Windfarm development is not directly connected with, or necessary to, the management of any Natura 2000 site.

3. Screening Step 2 - Description of Gathabawn Windfarm and its impact factors

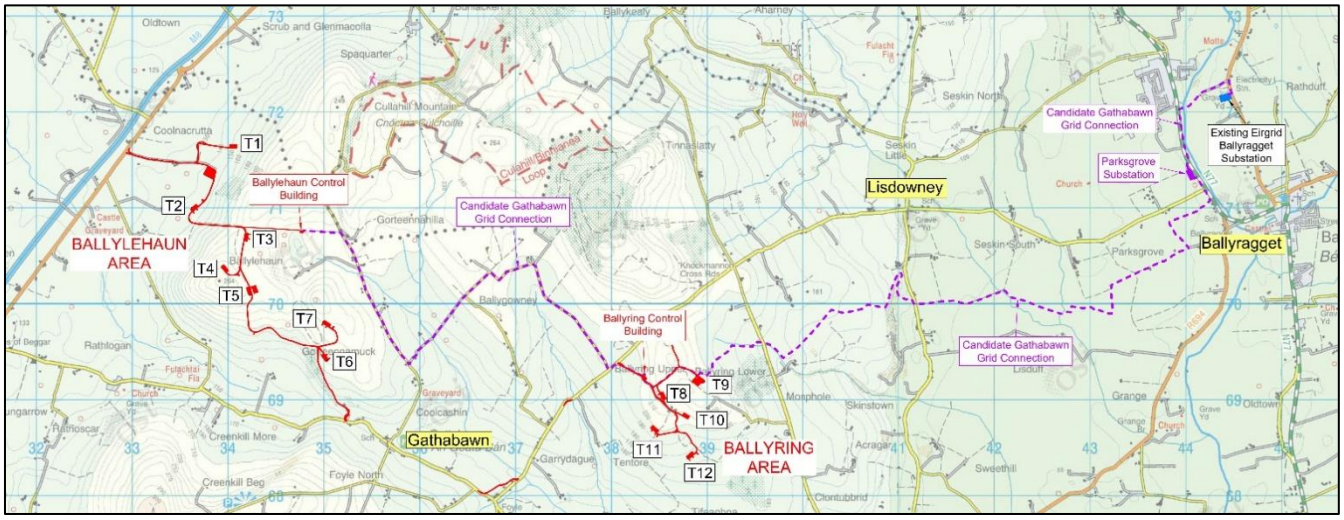
3.1 Gathabawn Windfarm and Whole Gathabawn Windfarm Project

The Proposed Gathabawn Windfarm, the subject of this 2026 Planning Application, comprises 12 turbines which are proposed for 2 areas – Ballylehaun area (7) and Ballyring area (5). In addition to the turbines and their hardstanding areas, the windfarm development also includes site access roads, 2 Control Buildings; 1 met mast, underground cabling, temporary works to facilitate turbine deliveries, and other associated and ancillary works.



The Whole Gathabawn Windfarm Project also includes a connection to the national electricity grid. The grid connection is not included as part of this 2026 Planning Application, and it will be subject to a separate Planning Application, at a future date. While the ultimate grid connection point is subject to a separate process with Eirgrid, a candidate grid connection to the closest connection point at Eirgrid Ballyragget Substation, has been identified, and is examined in this 2026 EIA Report to facilitate the evaluation of the cumulative whole project impact.

The Candidate Gathabawn Grid Connection includes a new substation in Parksgrove townland (Parksgrove Substation) and underground cabling (UGC) from Ballylehaun to Ballyring (Ballylehaun-Ballyring UGC), from Ballyring to Parksgrove Substation (Ballyring-Parksgrove UGC), and from Parksgrove Substation to the existing Eirgrid Ballyragget Substation in Moatpark (Parksgrove-Moatpark UGC).



See AA Figure 1: Proposed Gathabawn Windfarm – Location on Discovery Mapping (over)

AA Figure 2: Whole Gathabawn Windfarm Project – Location on Discovery Mapping (over)

The Whole Project also includes some minor off-site activities at the M7/N77 interchange at Portlaoise.

Appropriate Assessment Report

AA Figure 1 - Proposed Gathabawn Windfarm - Location on Discovery Mapping

Legend:

- Proposed Gathabawn Windfarm
- L1806 Public Road Identification Number
- Cullahill Towns/Villages

T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12

Ballylehaun Control Building

Ballyring Control Building

BALLYLEHAUN AREA

BALLYRING AREA

Cullahill

Gathabawn

Lisdowney

Johnstown

COUNTY LAOIS

COUNTY KILKENNY

Cullahill/Binnanea Loop

Cullahill Mountain

Cnocsna Cúlchoille

Scrub and Glenmacolla

Gorteennahilla

Ballylehaun

Ballygowney

Coolnacrutta

Cooloultha or Moneynamuck

Baunrickeen

Moneynamuck

Rathlogan

Grangefertagh

Baungarrow

Rathoscar

Creenkill More

Creenkill Beg

Foyle North

Foyle South

Frankford or Ballykieran

Ballyspellan

Ballycuddihy

Spahill

Garranamanagh

Killoshulan

Newtown

Knockdav

Donaghmore Upper

Glebe

Cross of Beggar

Fertagh Bridges

Grangefertagh Round Tower and Church

Barrackquarter or Ross

Castlequarter

Bunlacken

Spaquarter

Oldtown

Ballinfrase

Shanbally

Ballydavin

Srahbaun

Graigueagarran

Srahleagh

Aghmacart

Graigueavoice

Ballykealy

Aharney

Archerstown

Tinnaslatty

Knockmannon Cross Rds

Seskin North

Seskin Little

Seskin South

Graigueswood

Lodge Demesne East

Lodge Demesne West

Tinnascarty

Tifeaghna

Clontubbrid

Garrydague

Tentore

Coolcashin

Graveyard

Gortnamuck

Ballyring Upper

Ballyring Lower

Monphole

Skinstown

Acragar

Sweethill

Lisduff

Clone

Blackwood

Moneenaun

Belville

Lodge

Baunmore or Balleen Upper

Balleen Lower

Balleen Little

Tobercoe or Killenny More

Holy Well

Fulachtai Fia

Church

Castle

Graveyard

Priory

Grave Yd

Aghmacart Cross Rds

Aghmacart Br

Maynebog Br

Foyle Br

Ballyglider Br

Moated Site

Megalithic Tomb

Burial Ground

Cairn

Pound Park

Sch

PO

M8

R639

R694

N

Appropriate Assessment Report

AA Figure 2 - Whole Gathabawn Windfarm Project - Location on Discovery Mapping

Legend:

- Proposed Gathabawn Windfarm
- Candidate Gathabawn Grid Connection
- Parksgrove Substation
- Existing EirGrid Ballyragget Substation
- L1806 Public Road Identification Number
- Cullahill Towns/Villages

T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12

BALLYLEHAUN AREA

BALLYRING AREA

Ballylehaun Control Building

Ballyring Control Building

Candidate Gathabawn Grid Connection

Candidate Gathabawn Grid Connection

Candidate Gathabawn Grid Connection

Existing Eirgrid Ballyragget Substation

Parksgrove Substation

Cullahill

Gathabawn

Lisdowney

Ballyragget

Newtown
Derreen Cross Rds
Knocknagrally or Killenny Beg
Clonageera
The Ballagh
Tinwear
Tallyno Br
Grenan
River An Fheoir More
Raheenleagh
Maynebog
Ballynevin
River Goul An Ghabhail
Rapla
Addergoole
Aghmacart
Aghmacart Cross Rds
Maynebog Br
Priory
Grave Yd
Castle
Ballydavin
Shanbally
Aghmacart Br
Church
Holy Well
Toberboe or Killenny More
Capponellan
253
Ballynaslee
Archerstown
Seskin
Graigueavoice
An Chulchoill
Barrackquarter or Ross
Castlequarter
Bunlacken
Castle
Ballykealy
Aharney
Oldtown
Scrub and Glenmacolla
M8
Spaquarter
Fulacht Fia
Seskin North
Motte
Electricity Stn.
Rathduff
Cullahill Mountain
Chocóna Cúlchoille
Culahill/Binhanea Loop
Coolnacrutta
Tinnaslatty
Seskin Little
Gorteennahilla
Knockmannon Cross Rds
Ballygowney
Seskin South
Parksgrove
Rathlogan
Fulachtai Fia
Ballyring Upper
Ballyring Lower
Monphole
Skinstown
Grange
Lisduff
Oldtown
Coolcashin
Creenkill More
Rathoscar
Garrydague
Tentore
Acragar
Sweethill
Foyle North
Creenkill Beg
Clontubbrid
Tifeaghna
Tinnascarty
Frankford or Ballykieran
Foyle South
Baunmore or Balleen Upper
Balleen Lower
Balleen Little
Lodge Demesne East
Lodge Demesne West
Clone
Rathbeagh
Knockroe
Spahill
Moated Site
Graveyard
Castle
Church
Ballyguider Br
Foyle Br
Grange Br
N77
R694
N

3.2 Purpose of the proposed Gathabawn Windfarm

The purpose of the Gathabawn Windfarm project is to generate renewable electricity from the wind.

The development of the proposed Gathabawn Windfarm is aligned with National and International policy to transition to a carbon neutral future, necessitated by an ever increasing imperative to ameliorate climate change. The generation of electricity from a clean, renewable source like the wind is a core component of these policies.

The renewable electricity (RE-E) generated at Gathabawn Windfarm will contribute positively to climate action targets by generating electricity without polluting greenhouse gas (GHG) emissions which are the primary cause of accelerated climate change.

The value of this contribution is set out in the following table:

AA Table 1 Gathabawn Windfarm Contribution to Climate Action

Predicted Production (kWh per annum) from Gathabawn Windfarm		
150,000,000 kWh	Kilowatt hours (kWh) of electricity per annum which will be generated by 12 No. Gathabawn turbines	Source: WindFarmer wind resource assessment software calculation for 12 No. turbines with rotor diameter of 136m, and hub heights of 82m (T6, T7, T9) and 102m for all others.
CO_2e Offsets		
CO_2e offsets: Gathabawn Windfarm will generate circa 150,000,000 kWh of RE-E every year without emitting greenhouse gases (GHG) or ash pollution and this will avoid an equal amount of electricity being generated from gas, coal or oil, which does emit GHG. The gases in a GHG bundle (carbon dioxide, methane, nitrous oxide and ozone) are represented by CO_2e (Carbon Dioxide equivalent) when discussing offsets.		
Saving of **38,250 tonnes of CO_2e per annum**	CO_2e tonnes per annum that would otherwise be emitted if the kWh generated by Gathabawn Windfarm, was instead generated by gas, coal and oil	Source: Based on the energy intensity of the Irish electricity generation mix of 255g CO_2/kWh (EPA, 2024)
Homes Supplied		
33,237 homes in **Kilkenny and Laois** per annum	Based on the average electricity use in Irish homes each year	Source: According to the SEAI Website the energy per dwelling statistics for 2022, homes in Ireland use an average of 4,513kWh electricity per annum per dwelling (SEAI, n.d. a)
Forestry carbon sequestration Equivalent		
Equivalent to **3,102 ha (31 square kilometres)** of forestry	Equivalent hectares of forestry required to sequester the same amount of CO_2e as the offsets from the Gathabawn Windfarm	Source: COFORD estimate that Irish forests sequester on average 3.36 tonnes of carbon per hectare per year (COFORD, 2006) 1 tonne of Carbon = 3.67 tonnes of CO_2. Therefore 1 hectare of Irish forest sequesters 12.33 tonnes of CO_2 per annum.
Diesel/Petrol Cars 'switching to Electric Car' Equivalent		
Equivalent to **22,238 cars switching to Electric Vehicle (EV)**	Number of diesel/petrol cars that would emit the equivalent amount of CO_2e per annum as that offset by the proposed Gathabawn Windfarm.	Source: CO_2 emissions per kilometre for private cars was 114g CO_2/km in 2022 (SEAI, n.d. b). The average car in Ireland travels c.15,800km per annum (CSO, 2024) and therefore the average car in Ireland emits 1.8 tonnes of CO_2 per annum.

3.2.1 Duration

A period of 10-years during which Gathabawn Windfarm can be constructed is herein requested to allow for additional judicial review challenges of any grant of permission and also to allow for the complexity of financing and construction of windfarm and grid infrastructure.

The proposed Gathabawn Windfarm is expected to have a lifespan of at least 35-40 years, and therefore planning permission is sought for a 35-year operational period. At the end of the 35-year period, the windfarm could continue operating as is or be repowered using the latest wind turbine technology at the time – subject to planning approval at that time; or the turbines and apparatus can be decommissioned and dismantled.

3.3 Location and Landcover

3.3.1 Proposed Gathabawn Windfarm

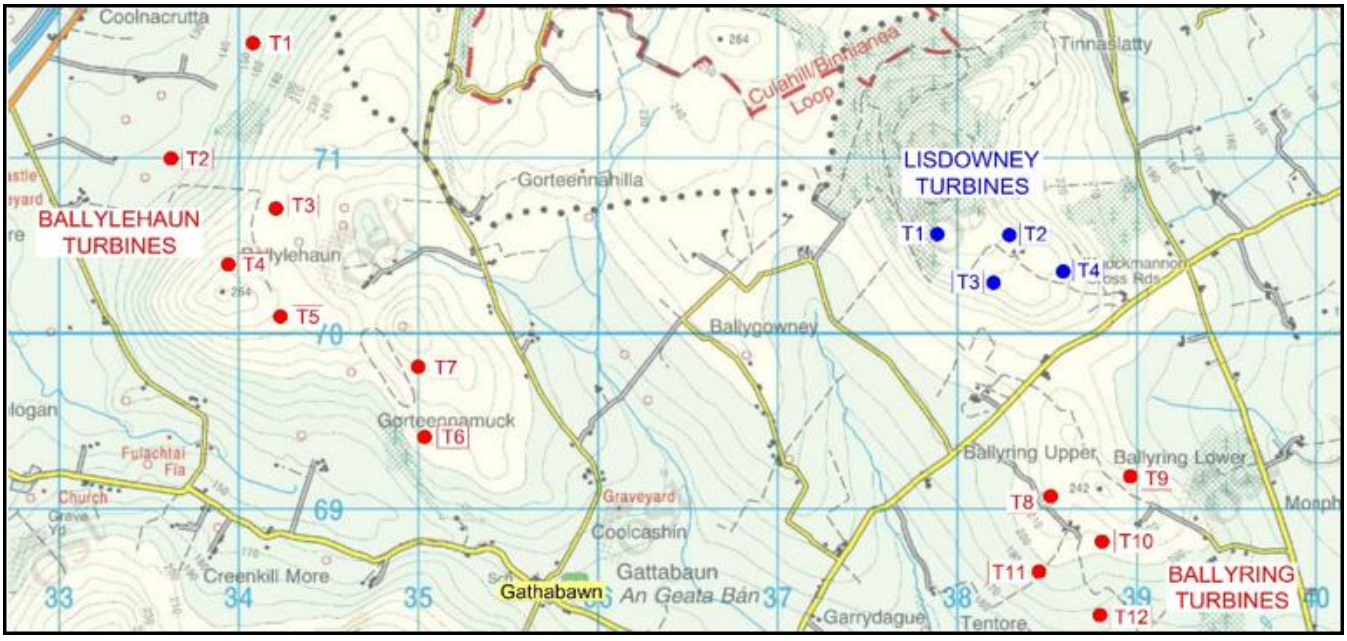
The Proposed Gathabawn Windfarm is located entirely within County Kilkenny, with the wind turbines located on two areas of high ground – at Ballylehaun and at Ballyring. The nearest village is Gathabawn village which is 1km southeast from the nearest Ballylehaun turbine and 3km west from the nearest Ballyring turbine. Lisdowney village is also located 3km to the northeast of the nearest Ballyring turbine, while in neighbouring County Laois, Cullahill village is located 3km north of the Ballylehaun turbines. The larger settlements of Ballyragget, Freshford, Johnstown, Urlingford and Durrow occur in the wider surrounding area. See AA Figure 1 and AA Figure 2.

The proposed Gathabawn Windfarm site is located in the townlands of Coolnacrutta, Glashare, Ballylehaun, Gorteennamuck, Rathlogan, Ballyring Lower, Ballyring Upper, Tentore, Foyle South, Coolcashin and Garrydague.

The project location is characterised as rural open countryside with farmlands enclosed mainly by hedgerows. There are farmsteads and one-off housing located along the local roads and generally the commercial, civic and community services are in the surrounding small towns and villages. Farming in the area is predominantly grassland supporting dairy and beef cattle and to a lesser degree sheep farming and tillage. The majority of the landuse at the whole project site consists of improved agricultural grassland as part of dairy farming operations.

Site photos of the various parts of the Proposed Gathabawn Windfarm are presented in the accompanying EIA Report - see EIAR Appendix 5.1: Site Photos and Drone Captures of the Gathabawn Windfarm.

The existing 4-turbine Lisdowney Wind Farm is located 1.25km to the north of the proposed turbines in Ballyring.



The location, elevation and landuse or cover associated with various parts of the proposal are provided in the table below.

Table 3-1: Location of the various parts of the Proposed Gathabawn Windfarm

Gathabawn Windfarm	Townland	Elevation (m)	Landuse /Land cover
Windfarm - Ballylehaun Site			
Turbine T1	Coolnacrutta	153	Agricultural grassland
Turbine T2	Glashare	143	Agricultural grassland
Turbine T3	Ballylehaun	224	Agricultural grassland
Turbine T4	Ballylehaun	246	Agricultural grassland
Turbine T5	Ballylehaun	236	Agricultural grassland
Turbine T6	Gorteennamuck	210	Agricultural grassland
Turbine T7	Gorteennamuck	231	Agricultural grassland
Met mast	Rathlogan	194	Agricultural grassland
Ballylehaun Control Building	Ballylehaun	199	Agricultural grassland
Windfarm - Ballyring Site			
Turbine T8	Ballyring Upper	222	Agricultural grassland
Turbine T9	Ballyring Lower	224	Agricultural grassland
Turbine T10	Ballyring Upper	208	Agricultural grassland
Turbine T11	Tentore	198	Agricultural grassland
Turbine T12	Ballyring Upper	178	Agricultural grassland
LiDAR unit	Ballyring Upper	226	Agricultural grassland
Ballyring Control Building	Ballyring Upper	202	Existing hardcore area
Turbine Delivery Facilitating Works			
Temporary Access Road and Temporary Road Widening	Foyle South, Coolcashin, Garrydague	130 - 160	Agricultural grassland

The layout of the Proposed Gathabawn Windfarm is illustrated on AA Figure 3.1 – AA Figure 3.4: Proposed Gathabawn Windfarm Site Layout (4 maps, over), Site Photos in EIAR Appendix 5.1.

3.3.2 Candidate Gathabawn Grid Connection

Similar to the proposed windfarm, the **Candidate Gathabawn Grid Connection** is also located in County Kilkenny. The Candidate Gathabawn Grid Connection is routed along public road between Ballylehaun and Ballyring, and across agricultural farmlands between Ballyring and the existing Eirgrid Ballyragget Substation in Moatpark. A new substation is located beside the N77 national road in Parksgrove townland.

The locational context of the various parts of the candidate grid connection is outlined in the table below.

Table 3-2: Location of the various elements of the Candidate Grid Connection for Gathabawn Windfarm

Candidate Grid Connection	Townland	Elevation (m)	Landuse /Land cover
Parksgrove Substation	Parksgrove	70	Agricultural grassland
Ballylehaun – Ballyring UGC	Ballylehaun, Gorteennamuck, Ballygowney, Ballyring Upper	170 - 230	Existing Farm Track, Public Road, Agricultural grassland
Ballyring – Parksgrove UGC	Ballyring Lower, Lisdowney, Seskin South, Grange, Ballyconra, Parksgrove	70 - 220	Existing Farm Track, Public Road, Agricultural grassland
Parksgrove – Moatpark UGC	Parksgrove, Ballyconra, Moatpark	70 - 85	N77 road, Agricultural grassland, HDD at River Nore

See EIAR Appendix 5.1: Site Photos of the Candidate Gathabawn Grid Connection works locations.

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AA Figure 3.1 - Proposed Gathabawn Windfarm Layout (Map 1 of 4)

Legend:

- Turbine Foundation
- Turbine Hardstanding Area
- Ballylehaun Control Building
- New Windfarm Site Road
- Upgraded Existing Private Roads
- Public Road Widening Works
- Public Road
- Existing Private Road
- Windfarm Cabling
- Temporary Borrow Pit
- Ballylehaun Construction Compound
- Temporary Deposition Area
- Temporary Blade Set Down Area
- Biodiversity Area: New Connectivity Corridor
- Biodiversity Area: Protection of Existing Hazel Wood
- Construction Works Area Boundary
- EPA Watercourse
- FW6 — Facilitating Works Identification Number
- L-5818 — Public Road Identification Number

R639
FW1
L-58141
FW2 - Public Road Widening Works along the L-58141
FW5
T1
FW3
Site Entrance No.1
FW4
Site Entrance No.2
Ballylehaun Construction Compound
FW6 - Temporary Blade Set Down Area
T2
T3
T4
L-5818
Site Entrance No.4
Ballylehaun Control Building
Biodiversity Area: New Connectivity Corridor
Biodiversity Area: Protection of Existing Hazel Wood
Temporary Borrow Pit No.1
N

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AA Figure 3.2 - Proposed Gathabawn Windfarm Layout (Map 2 of 4)

Biodiversity Area: New Connectivity Corridor

Biodiversity Area: Protection of Existing Hazel Wood

T4

Temporary Borrow Pit No.1

T5

Met Mast

T7

T6

FW7

L-1803

Site Entrance No.3

N

Legend:

- Turbine Foundation
- Turbine Hardstanding Area
- New Windfarm Site Road
- Upgraded Existing Private Roads
- Public Road
- Windfarm Cabling
- Met Mast
- Temporary Borrow Pit
- Temporary Deposition Area
- Biodiversity Area: New Connectivity Corridor
- Biodiversity Area: Protection of Existing Hazel Wood
- Construction Works Area Boundary
- EPA Watercourse
- FW6 Facilitating Works Identification Number
- L-5818 Public Road Identification Number

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AA Figure 3.3 - Proposed Gathabawn Windfarm Layout (Map 3 of 4)

Legend:

- New Windfarm Site Road
- Construction Works Area Boundary
- EPA Watercourse
- FW6 — Facilitating Works Identification Number
- L-5818 — Public Road Identification Number

FW9

L-1806

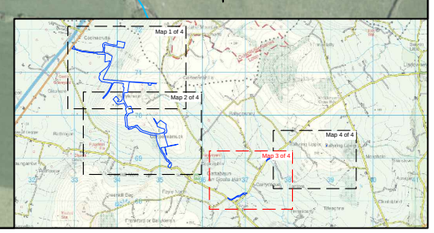
FW8

L-1804

L-1806

Foyle Bridge

N



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AA Figure 3.4 - Proposed Gathabawn Windfarm Layout (Map 4 of 4)

Legend:

- Turbine Foundation
- Turbine Hardstanding Area
- Ballyring Control Building
- New Windfarm Site Road
- Upgraded Existing Private Roads
- Public Road Widening Works
- Public Road
- Windfarm Cabling
- Diverted Wet Drainage Channel
- LiDAR
- Temporary Borrow Pit
- Ballyring Construction Compound
- Temporary Deposition Area
- Biodiversity Area: Habitat Creation
- Construction Works Area Boundary
- EPA Watercourse
- FW6 Facilitating Works Identification Number
- L-5818 Public Road Identification Number

L-1806
FW10
D01
L-18062
FW11 - Public Road Widening Works along the L-18062
Site Entrance No.5
Ballyring Control Building
Ballyring Construction Compound
LiDAR
Biodiversity Area: Habitat Creation
T9
Temporary Borrow Pit No.2
Site Entrance No.6
T8
FW12
Site Entrance No.7
D02: Diverted Wet Drainage Channel
T10
Biodiversity Area: Habitat Creation
T11
T12
N

3.4 Size and Design of the Proposed Gathabawn Windfarm development

3.4.1 Wind Turbines

The proposed turbines will have a hub height of 82m and an overall tip height of 150m for T6, T7 and T9, and a hub height of 102m and an overall tip height of 170m for T1, T2, T3, T4, T5, T8, T10, T11 and T12. All turbines will have a turbine rotor of 136m.

The turbines will be of generic three-bladed up-wind rotor, horizontal axis, tubular tower turbine design with active pitch regulated variable speed operation. The nacelle at the top of each turbine tower which contains the generator, gearbox and the control unit will have effective sound insulation which will ensure minimal noise emissions.

See Figure 5.3: Wind Turbine – Elevation (2 hub heights and tip heights proposed), in Chapter 5, of the EIA Report with the planning application

3.4.1.1 Turbine Foundations

Each of the proposed wind turbine will require a reinforced concrete foundation of circa 20m diameter and circa 3.2m in depth. The foundations will be designed in accordance with the Original Equipment Manufacturers' (OEM) engineering specifications, once the turbine supplier is chosen prior to construction. Based on the findings of the ground investigation across the site, gravity type foundations will be suitable for turbines of the sizes proposed and it is anticipated that a suitable load bearing stratum, will be encountered within 4m of the ground surface.

See EIAR Figure 5.4: Turbine Foundation, in Chapter 5, of the EIA Report 2026 with the planning application.

3.4.1.2 Turbine Hardstands

Each wind turbine will require a hardstand area adjacent to the foundation. The hardstands will be 77m by 35m, with a total area of 2700m^2. The proposed hardstands will also include temporary 'blade finger' areas which will be used to lay the blades on profiles for set up after delivery to site and prior to erection of the blades with temporary turning heads to facilitate the delivery vehicles.

See EIAR Figure 5.5: Turbine Hardstand in Chapter 5 of the EIA Report which accompanies the planning application.

3.4.2 Meteorological Mast & LiDAR unit

At Ballylehaun, it is proposed to erect 1 no. met mast 30m in height with meteorological equipment attached. The Met Mast will be erected upon a 5m x 5m x 1m deep concrete foundation.

At Ballyring, it is proposed to install a small LiDAR unit which will also measure the wind and meteorological conditions. The LiDAR unit will be installed within a small 3m x 3m fenced hardcore area on a small concrete plinth.

See EIAR Figure 5.7: Met Mast Elevation and LiDAR Unit, in Chapter 5 of the EIA Report which accompanies the planning application.

3.4.3 Windfarm Control Buildings

Two electrical control buildings are proposed – one at Ballylehaun and one at Ballyring. The Control Buildings will gather and regulate the electricity from the wind turbine cable strings (Windfarm Cabling) at Ballylehaun and at Ballyring. These Control Buildings will comprise a 600m2 compound containing a control building, measuring 20m x 10m, with a height of 7m. The Control Buildings will contain electrical and communications equipment, along with a storage room, canteen and welfare facilities comprising a self-contained toilet with an integrated rainwater harvesting system.

See EIAR Figure 5.8: Windfarm Control Buildings – Plan View and Elevations, in Chapter 5 of the EIA Report which accompanies the planning application.

3.4.4 Windfarm Cabling

8km of underground electrical cabling will link the turbines together into a turbine 'string' and ultimately connect these strings to the on-site electrical Control Buildings. The trenches for the Windfarm Cabling will be 1.3m deep, while the width of the trench will vary between 0.6m wide for single cable string and 0.75m wide for a double cable string. The cabling will installed be under windfarm roads.

See EIAR Figure 5.6: Windfarm Cabling & Windfarm Site Roads, in Chapter 5, of the EIA Report 2026 with the planning application.

3.4.5 Windfarm Site Roads

The site roads, 8.3km in total, will mainly comprise the construction of 6.5km of new roads and the upgrading and widening of 1.8km of existing private farm tracks. The site roads will comprise crushed stone over a layer of geotextile material, capped with a layer of hardwearing stone such as limestone. The site roads will be completed to 4.5m in width. Widened bends will be provided to facilitate turbine component delivery.

See EIAR Figure 5.6: Windfarm Cabling & Windfarm Site Roads, in Chapter 5 of the EIA Report with the planning application.

3.4.6 Site Drainage System

An integrated drainage system will be installed to manage surface water run-off during all phases of the proposed development. Drainage features which will be used to control and attenuate flow and to settle and capture suspended solids in site runoff, will include check dams, swales, level spreaders, settlement ponds and silt fences.

Two existing farm drains at Ballyring will interact with windfarm works – labelled D01 and D02 on AA Figure 3.4. D01 will be permanently reinstated beyond the new boundary along the L18062 public road widening section, and D02 will be permanently incorporated into the windfarm drainage network in the vicinity of T11.

Following the completion of the construction works, any temporary drainage at temporary works areas, such as borrow pits or at hardstands will be removed, settlement ponds will be partially infilled, while the remainder of the drainage system will be left in place for the operational and decommissioning phases of the windfarm.

3.4.7 Site Entrances

It is proposed that the windfarm site will be accessed from the public road, through both existing and newly created entrances. These entrances are identified as Site Entrance No.1 to No.7 on AA Figure 3.1 – AA Figure 3.4.

The entrances will be setback 2.4m from the road and existing hedgerow on either side will be removed/pruned as required in order to provide sightlines in either direction.

See EIAR Figure 5.9: Typical Details for Site Entrances, in Chapter 5 of the EIA Report with the planning application.

3.4.8 Turbine Delivery Facilitating Works

The turbines will be delivered from the port of entry using the motorway network as far as Portlaoise. Some temporary street furniture removal will be required on the M7/N77 interchange at Portlaoise. These off-site activities do not form part of the subject application but are considered herein for in-combination effects.

From the Portlaoise M7/N77 interchange, the turbines will be transported down the N77, straight through Abbeyleix and Durrow towns, onto the R639 and straight through Cullahill village before turning left off the R639 onto the L58141 at Coolnacrutta. No works or activities are required in Abbeyleix, Durrow or Cullahill to facilitate the movement of the turbine components through these towns and village.

Temporary works in the vicinity of the windfarm site are proposed to facilitate the transport of the large components to the turbine locations. These works include the construction of:

Access into the Ballylehaun site

- FW1: Temporary access road (630m^2) in the townlands of Coolnacrutta and Glashare. This temporary road will provide access off the R639 road onto the L58141 local road;
- FW2: Permanent widening of 495m on the southern side of the L58141 by 0.5m to 2m. A new hedgerow will be planted along the new alignment of the roadside boundary; and Further down the L58141, permanent widening of 80m into the northern verge by 0.5m to 2m, and the removal of two trees.
- FW3 and FW4: Temporary widened site entrance at Site Entrance No. 1 (220m^2), No.2 (35m^2)
- FW5: Temporary site access roads before turbine T1.
- FW6: A temporary hardstanding area (4090m^2) will be constructed in an agricultural grassland field at the Ballylehaun site, close to Site Entrance No.2 and the Temporary Construction Compound. This area will provide a temporary set down area for turbine blades for Turbines T1, T4 and T5 as no turbine set down areas are proposed at these turbine locations.

Access to the Ballyring site

- FW7: Temporary widening of Site Entrance No.3 in Gorteenamuck (2410m^2), existing the Ballylehaun site to turn onto the L1803 local road
- FW8: Temporary access road 2840m^2 in the townlands of Foyle South and Coolcashin. This temporary road will provide access from the L1804 to the L1806 local road.
- FW9: Temporary widening of 800m^2 of the L1806 local road into a grassland field in Garrydague
- FW10: Temporary hardcore area (610m^2) in a grassland field at the junction of the L1806 and L18062 to facilitate turning into the Ballyring site.
- FW11: Permanent widening of 620m of the L18062 by up to 1m into a grassland field on the eastern boundary. Establishment of a new field drain and roadside boundary.
- FW12: Temporary site access roads to Turbine T8 coming from the south.

Most of the facilitating works are temporary and the land and road boundaries will be reinstated following the completion of the turbine transportation. However, the proposed widening of the public road will be permanent and will involve the permanent removal of roadside verge/boundary bank or hedge and underlying soils on one side of the existing road carriageway, and the laying of hardcore followed by surface dressing along the excavated verges to create a suitable load-bearing surface. An existing field drain along the L18062 will be reinstalled along the newly widened roadside boundaries.

See EIAR Appendix 5.3: Turbine Delivery Route Assessment.

3.4.9 Temporary Construction Compound

2 No. temporary construction compounds will be set up at the beginning of the construction stage – Ballylehaun Construction Compound (5410m2) in Glashare townland, accessed via Site Entrance No. 2, and Ballyring Construction Compound (1100m2) in Ballyring Upper townland, accessed via Site Entrance No. 5.

The compound will be excavated and finished in stone, and will accommodate:

- Staff and visitor parking;
- Site offices, canteen and welfare facilities;
- Designated storage areas for construction materials; waste and for oils and fuels.
- Toilet block with integrated sealed wastewater holding tank.

See EIAR Figure 5.12: Temporary Construction Compound, in Chapter 5 of the EIA Report which accompanies the planning application.

3.4.10 Temporary Borrow Pits

In order to provide an on-site source for the majority of construction aggregate, it is proposed that stone will be won from 2 No. on-site borrow pits. Due to the characteristics of bedrock at the site (i.e. limestone and siltstone – See EIAR Chapter 7 Soils), rock will be extracted from the borrow pits using rock breaking methods. Blasting is not expected to be required. Suitable rock won from the borrow pits will be used for constructing the Windfarm site roads and the hardstanding areas at turbines and compounds on the windfarm site.

Approximately 28,000m^3 is expected to be excavated from the on-site borrow pits, c.26,000m^3 of which is expected to be suitable for use at the hardstand areas and windfarm site roads.

AA Table 2: Borrow Pit Plan Area and Expected Rock Removal

Borrow Pit #	Location (townland)	Plan Area m^2	Suitable Rock m^3
1	Ballylehaun	Limestone	3000
2	Ballyring Lower	Siltstone	3800

It is noted that suitable rock and fill material will also be extracted from turbine foundation and hardstanding locations and this suitable rock and fill material will be used to construct the base layers of windfarm road and hardstands. Therefore, the volumes of stone required to be won from the borrow pits may be lower than 26,000m^3.

Once the required rock has been extracted from each borrow pit, the borrow pits will be reinstated using the unsuitable material extracted from the borrow pits and from the windfarm construction areas. The borrow pits will be reinstated to the same level as the surrounding ground level and a vegetative cover established through seeding and planting of native plant species.

See EIAR Figure 5.13.1: Temporary Borrow Pits No.1 and EIAR Figure 5.13.1: Temporary Borrow Pits No.2, in Chapter 5 of the EIA Report which accompanies the planning application.

3.4.11 Permanent Overburden Storage Berms

Overburden, mainly comprising topsoil, will be permanently stored in berms alongside the turbine hardstands and along some of the access roads. Both temporary and permanent storage will be required.

Most of the overburden storage will be temporary with subsoil and topsoil being used to reinstate the temporary construction works areas at the end of the construction phase.

Permanent berms will be sown with native grass and flowering plant species in order to provide pollinator corridors throughout the windfarm site. During decommissioning of the windfarm, the soil in these berms will be used to reinstate the turbine hardstand and foundation areas.

3.4.12 Fencing

During the construction phase, temporary livestock proof fencing will be installed ahead of construction works around the boundaries of construction works. The fencing will protect the adjoining lands in the vicinity of the construction works by preventing the encroachment of personnel, machinery, or materials onto lands outside of the construction works area boundary and will prevent livestock from entering the works areas. The construction works area boundary will be c.10m to 20m from the construction works, as illustrated on AA Figure 3.1 – AA Figure 3.4.

Following the completion of construction, a permanent fence will be erected around the turbines.

3.4.13 Post Construction Reinstatement Works

Following the completion of construction works, the construction facilities will be removed along with any temporary works areas and associated temporary drainage networks and the lands reinstated using soil from adjacent overburden storage berms.

The construction works area fencing will be left in place until the land has revegetated. The permanent operational phase fencing will be installed alongside the windfarm site roads and around the turbines. The operational phase footprint of the Gathabawn Windfarm is illustrated on Figure 5.15.1 – Figure 5.15.4.

3.4.14 Vegetation Removal

In addition to the grass cover in excavation areas, 3,700m of hedgerow and 10 trees will be removed during the construction works to provide bat buffer zones around the turbines, or to facilitate the delivery of the large turbine components. 8 of these 10 trees relate to veteran solitary hawthorn trees on the Ballylehaun hill. One of the objectives during the design of the windfarm was the minimise the removal of these solitary hawthorn trees.

3.4.15 Hedgerow Reinstatement and Enhancement

To replace the 3,700m of hedgerow and 10 mature trees which will be removed during construction works, new hedgerows and trees will be planted at the Gathabawn Windfarm site. The location of these hedgerows and trees has been agreed with the project ecologists, to provide alternative foraging habitat, restore habitat connectivity to bat species, and will enhance and create habitat for other faunal species.

The following hedgerow planting will be carried out within the windfarm site (but beyond the bat buffer zones imposed):

- 3,700m of new hedgerow will be planted. These new hedgerows will include 100 no. trees (i.e. a tree will be planted at 35-40m intervals in new hedges).
- 1,300m of existing hedgerow will be improved by interplanting new hedging into gaps in the existing field boundary.

A mix of native fruiting hedge species will be used for any new hedges and will predominantly comprise of hawthorn, along with blackthorn, holly, hazel, guelder rose, spindle, crab apple, and bird cherry. New trees will comprise a mix of native species such as oak, alder, birch, crab apple, bird cherry and rowan. Hedging and trees will be of Irish provenance. Hedging plants will be sourced from Department of Agriculture approved nurseries.

The location of these new /improved hedgerows is identified on AA Figure 4.1 – AA Figure 4.3: Biodiversity Areas.

3.4.16 Biodiversity Areas at the Windfarm site

The total permanent hardstanding footprint of the windfarm will be 6.6ha, which would have previously comprised agricultural lands, hedgerows and other semi-natural habitats. It is proposed to provide new and enhanced Biodiversity Areas at the windfarm site through the protection, enhancement and creation of habitats for the benefit of local flora and fauna and to replace the habitat lost with at least the same amount of habitat gain.

To this end, in addition to the planting of 3.7km of new hedgerow (including 100 no. native trees) and the improvement of 1.3km of existing poor cover hedgerows, new Biodiversity Areas totalling 7ha will form part of the proposed Gathabawn Windfarm development and will be protected and managed for the duration of the development. These Areas comprise 1.7ha of agricultural lands and 5.3ha of hazel woodland, which have been secured for the operational lifetime of the Gathabawn Windfarm under a long-term lease agreements with the landowners. These areas will be managed as follows in order to increase the biodiversity resource at the windfarm site:

- At the Ballyring Area, two areas of agricultural land, 1ha in total, will be planted with high biodiversity value native tree and plant species in order to create pockets of higher value habitat at the Ballyring site.
- At the Ballylehaun site, a Biodiversity Connectivity Corridor will be created on 0.7ha of lands and will comprise a 15m wide and 500m long corridor linking two areas of hazel woodland – (i) the 5.3ha of hazel wood which will be leased for the lifetime of the windfarm, and (ii) the hazel woodland which is owned by the NPWS and forms part of the Gales Hill Nature Reserve. The 5.3ha hazel wood will be protected for the lifetime of the windfarm to prevent any felling or removal of trees;
- The Biodiversity Areas will be fenced to ensure that they allow wildlife free passage while preventing access by livestock;
- The Biodiversity Areas will be maintained through regularly removing invasive species and managing tree densities and ground cover within the wood and within the connectivity corridor.
- A Habitat Management Plan will be developed and implemented throughout the operational phase of the Gathabawn Windfarm, to ensure that these areas provide a functioning high level biodiversity resource for local flora and fauna communities. The management of the Biodiversity Area will be under the supervision of an Ecologist.

See AA Figure 4.1 – AA Figure 4.3: Biodiversity Areas, over

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AA Figure 4.1 - Biodiversity Areas (Map 1 of 3)

Legend:

- Turbine
- Hardcore Area
- Hedgerow Removal
- Hedgerow Replant
- Hedgerow Improvement
- Bat Buffer Area
- Biodiversity Area: New Connectivity Corridor
- Biodiversity Area: Protection of Existing Hazel Wood
- Cullahill Mountain SAC and pNHA
- Gales Hill Nature Reserve

R639

L-58141

Bat Buffer Area

T1

Gales Hill Nature Reserve

Cullahill Mountain SAC and pNHA

T2

T3

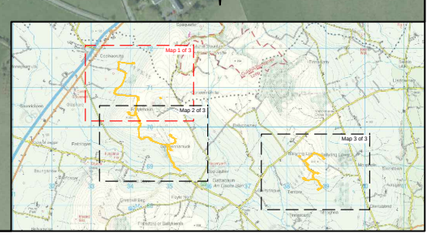
L-5818

Biodiversity Area: New Connectivity Corridor

T4

Biodiversity Area: Protection of Existing Hazel Wood

N



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AA Figure 4.2 - Biodiversity Areas (Map 2 of 3)

Legend:

- Turbine
- Hardcore Area
- Hedgerow Removal
- Hedgerow Replant
- Hedgerow Improvement
- Bat Buffer Area
- Biodiversity Area: New Connectivity Corridor
- Biodiversity Area: Protection of Existing Hazel Wood

Biodiversity Area: New Connectivity Corridor

Biodiversity Area: Protection of Existing Hazel Wood

T4

T5

T6

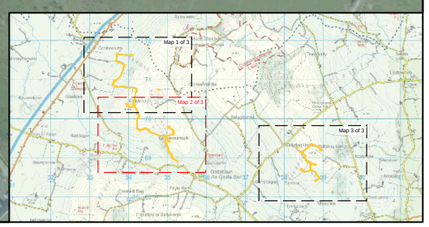
T7

Bat Buffer Area

L-5818

L-1803

N



Appropriate Assessment Report

AA Figure 4.2 - Biodiversity Areas (Map 3 of 3)

Legend:

- Turbine
- Hardcore Area
- Hedgerow Removal
- Hedgerow Replant
- Hedgerow Improvement
- Bat Buffer Area
- Biodiversity Area: Habitat Creation

L-1806

L-18062

L-1806

T8

T9

T10

T11

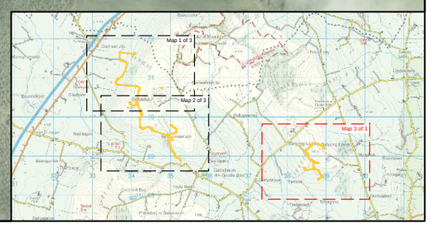
T12

Biodiversity Area: Habitat Creation

Biodiversity Area: Habitat Creation

Bat Buffer Area

N



3.5 Size and Design of Other Elements of the Whole Gathabawn Windfarm Project

While the Proposed Gathabawn Windfarm forms the main part of the Whole Gathabawn Windfarm Project, the whole project also encompasses the following:

- Candidate Gathabawn Grid Connection; and
- Off-Site Activities along the Turbine Delivery Route.

3.5.1 Candidate Gathabawn Grid Connection

The Candidate Gathabawn Windfarm Grid Connection includes the construction of a new substation compound at Parksgrove, and underground cables between Ballylehaun and Ballyring, underground cable between Ballyring cross country to Parksgrove, c.5.5km to the northeast, and then a further 1.5km of underground cabling from Parksgrove cross-country to the Eirgrid Ballyragget Substation at Moatpark.

See AA Figure 5: Layout of the Candidate Gathabawn Grid Connection (over).

3.5.1.1 Parksgrove Substation

The electricity from the Gathabawn turbines will be cabled into a new substation at Parksgrove where it will be transformed, metered and regulated for export to the national electricity system at the EirGrid substation at Ballyragget, c.1.5km further to the east.

This new substation, referred to as Parksgrove Substation herein, is proposed for an area of scrubland/vacant land, and will comprise a hardcore compound yard containing control buildings, lightning protection monopoles 18m in height, underground cabling and overhead wire and other electrical equipment and apparatus. The compound yard will be 6450m² in plan area (111m x 58m), surrounded by a perimeter palisade security fencing (2.6m in height) with entrance gates. The compound will contain two control buildings – 1) EirGrid control building 450m² in plan area (25m x 18m) and 8.69m in height and 2) IPP Control Building 217m² in plan area (20m x 10.7m) and 6.92m in height. Welfare facilities will be self-contained with wastewater being collected in tanks. All outdoor apparatus within the compound yard which contain oils, will be adequately bunded and connected to interceptors to prevent hydrocarbon leaking into the surrounding environment. The compound will be serviced by an integrated drainage system.

See AA Figure 6: Parksgrove Substation – Plan and Elevations (over).

3.5.1.2 Underground Cabling

Ballylehaun-Ballyring UGC: Underground cabling, 5.6km in length, between Ballylehaun Control Building and Ballyring Control Building, where it then becomes part of the Ballyring-Parksgrove UGC. This cabling will be installed under the Windfarm Site Roads (160m); and under public roads (5.5km). The relevant public roads are the L5818, L5821, L5820 and L1806, and L18062.

Ballyring-Parksgrove UGC: From the Ballyring Control Building, underground cabling, 8.8km in length, will connect the Gathabawn Windfarm (via the Control Buildings) to Parksgrove Substation. To minimise impacts to the local road network and local road users, a cross-country route is the preferred option for the cabling. This cabling will be installed under agricultural lands (6.5km); hardcore areas including farm tracks (1.4km); hardcore area within the Ballyring site (600m); with just 200m along the public road corridor where the cable route crosses the L1808, L1811 and L1807 public roads.

Parksgrove-Moatpark UGC: The Parksgrove Substation will be connected to the Eirgrid Ballyragget Substation by underground 110kV cabling, c.1.5km in length, which will cross the N77 National Road using Horizontal Directional Drilling (HDD) techniques, within the receptor pit in the verge of the N77, the UGC will then be installed under the verge of the N77, and then into agricultural lands where a second HDD will install the UGC under the River Nore

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AA Figure 5: Layout of the Candidate Gathabawn Grid Connection

Legend:

- Underground Cabling
- Temporary Site Entrance
- Existing EirGrid Ballyragget Substation
- W4 Watercourse Crossing
- Parksgrove Substation
- Proposed Gathabawn Windfarm
- EPA Watercourse
- L-1807 Public Road Identification Number

Parksgrove - Moatpark UGC

W6

Existing Eirgrid Ballyragget Substation

Parksgrove Substation

Site Entrance No.8

L-1807

BALLYRAGGET

Ballyragget
Béal Átha Ragad

Ballyragget - Parksgrove Underground Cabling

W5

W4

L-1811

L-1808

W3

Ballyring - Parksgrove UGC

LISDOWNEY

Ballyring Control Building

Ballylehaun - Ballyring UGC

L-5821

L-5820

W2

W1

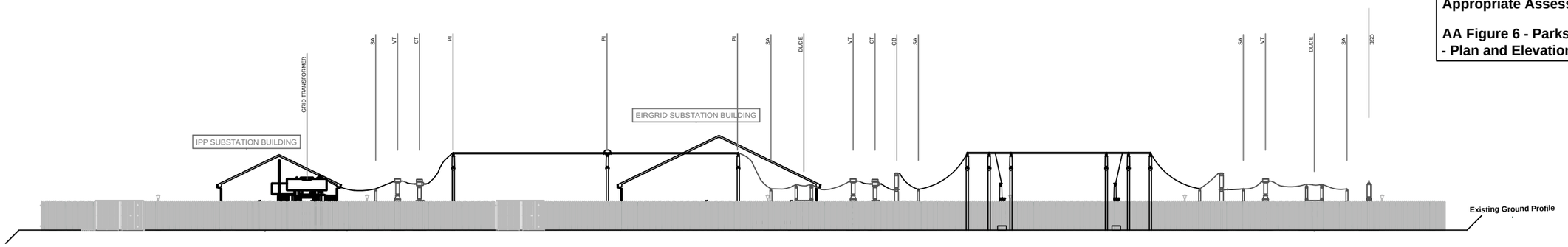
Ballylehaun Control Building

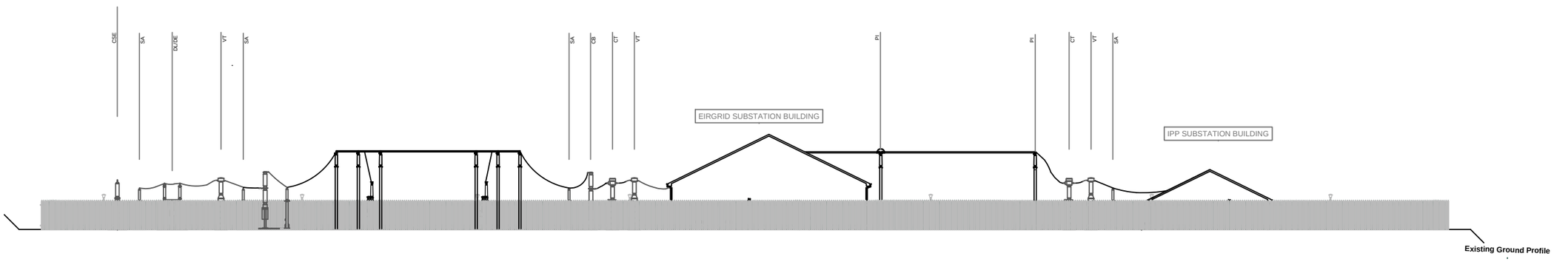
GATHABAWN

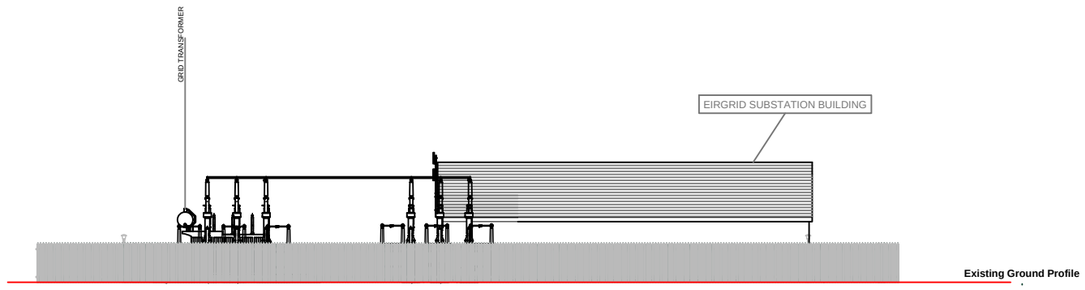
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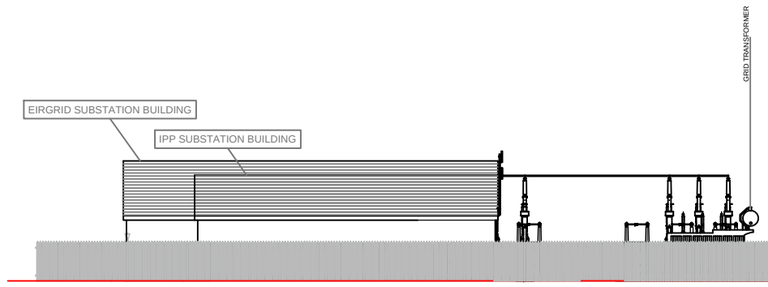
Appropriate Assessment Report

AA Figure 6 - Parksgrove Substation - Plan and Elevations







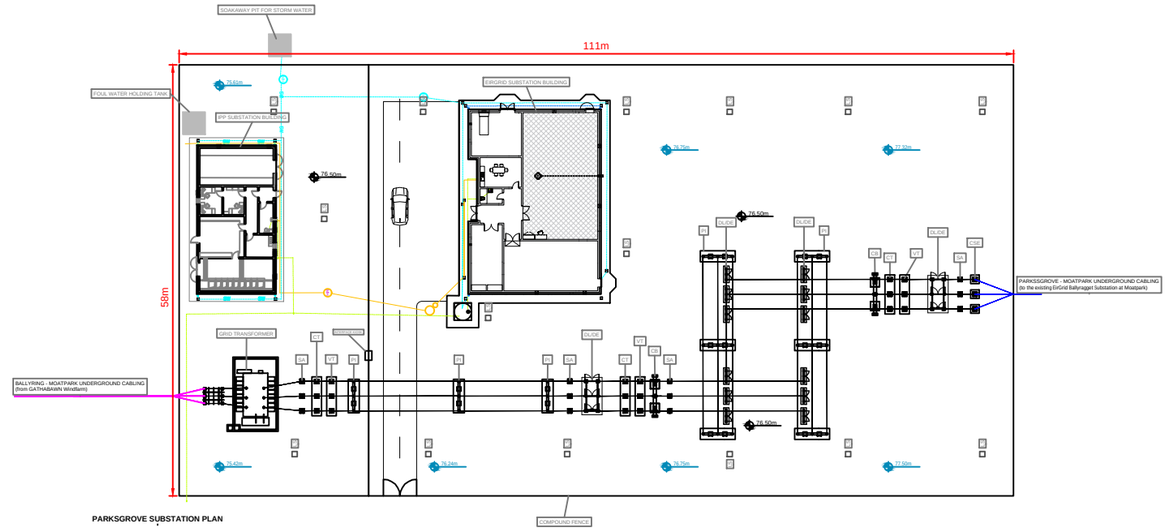


Notes:
1. Layout and arrangements of substation buildings and electrical equipment are as per current Eirgrid specifications at the time of submission. Final specifications and siting of buildings and electrical equipment within the compound will be as per latest Eirgrid and ESB specification at the time of construction.
2. Dimensions shown are in meters. Dimensions may vary at time of construction to reflect any revisions to Eirgrid Specifications.

Code	Description
SA	Surge Arrester.
DI/DE	Line / Earth Disconnect.
VT	Voltage Transformer.
CT	Current Transformer.
CB	Circuit Breaker.
PI	Post Insulator.
LM	Lighting Mast.
CSE	Cable Chair
LS	Lamp

Legend

- 76.75m — Existing Ground Elevations
- 76.50m — Proposed Compound Elevations
- Water Supply
- Storm Water
- Foul Water



PARKSGROVE SUBSTATION PLAN

(HDD pits set back at least 30m from River Nore), and then go through agricultural lands and a short length of public road as far as the EirGrid Substation at Moatpark, north of Ballyragget town. The Parksgrove-Moatpark UGC is located within the verge of the N77 national road in order to avoid works in the agricultural field beside the River Nore, for as far as practicable. The roadside boundary mesh fence will remain in place during the works.

Cable Trenches: The Underground Cabling (UGC) will comprise cables, ducts and other apparatus installed in a trench, 1.3m deep. The trench would be laid with 5 cable ducts through which the 3 electrical cables, communications cables, and copper cables (if required), would be pulled. The trenches will be0.6m wide for single ducts, and 0.75m wide for double ducts.

Joint Bays: It is expected that there will be 6 No. underground Joint Bay locations along the Ballylehaun-Ballyring UGC route, 11 No. along the Ballyring-Parksgrove UGC, and 2 No. along the Parksgrove-Moatpark UGC. These Joint Bays will comprise cable jointing chambers placed at c.800m intervals, and will facilitate cable installation, commissioning and maintenance. The electric cable jointing chambers between Ballylehaun and Parksgrove will be 4.5m long x 2.5m wide and 2.25m deep, and 6m long, 2.5m wide and 2.25m deep between Parksgrove and Moatpark. Smaller communication cable jointing chambers will be installed alongside the main jointing chambers.

3.5.1.2.1 Facilitating Future Connection Needs

It should be noted that the Parksgrove-Moatpark UGC element of the Candidate Gathabawn Grid Connection can be designed as a double duct design if required – meaning a future grid connection could connect to the Ballyragget Eirgrid Substation via the Parksgrove Substation and connect using the extra set of ducts in the Parksgrove-Moatpark UGC trench. This would result in the reduction of excavation works required for a future project connection. Alternatively, a heavier cable could be installed in a single duct design which could transport both the Gathabawn project production and the additional electricity from a potential future project.

3.5.1.3 Ancillary Works for the Candidate Gathabawn Grid Connection

Ancillary works for the candidate grid connection, include:

- Works in the Eirgrid Ballyragget Substation – installing underground cables and additional electrical plat and apparatus in the compound yard and within the existing GIS building.
- Site entrance at Parksgrove off the L1806 local road to provide construction and operation access to the new substation.
- Temporary construction compound beside the location of the Parksgrove Substation.
- Permanent overburden storage adjacent to the Parksgrove Substation location.
- Temporary overburden storage alongside cable trenches in agricultural lands, except where these trenches occur within the boundary of the SAC. All temporary overburden storage areas are located outside the SAC.
- Instream works to install the cables under the bed of the Lismaine Stream (W3), Lisdowney Stream (W4) and Ballyconra Stream (W5)
- No instream works to install the cables under the bed of the Gorteenamuck Stream (W1, install under existing pipe culvert), Gorteenahill Stream (W2, install cables by HDD) or at the River Nore (W6, install cables by HDD).
- Crossing of existing farm drainage channels, using 'dam and overpump' methods is water present.
- Crossing N77 National Road (install cables by HDD, launch pit in lands to the west of the road, reception pit in the verge on the eastern (river) side of the road.
- Crossing other underground services, in accordance with best practice.
- Short sections (4m) of hedgerow to be removed along cable routes c. 20 locations.
- Fencing of construction works areas along cabling routes, until construction completed and works areas revegetated with pasture grasses.

See EIAR Figures in Chapter 5 of the EIA Report which accompanies the application:

Figure 5.19: Watercourses W1, W2 - Crossing Details

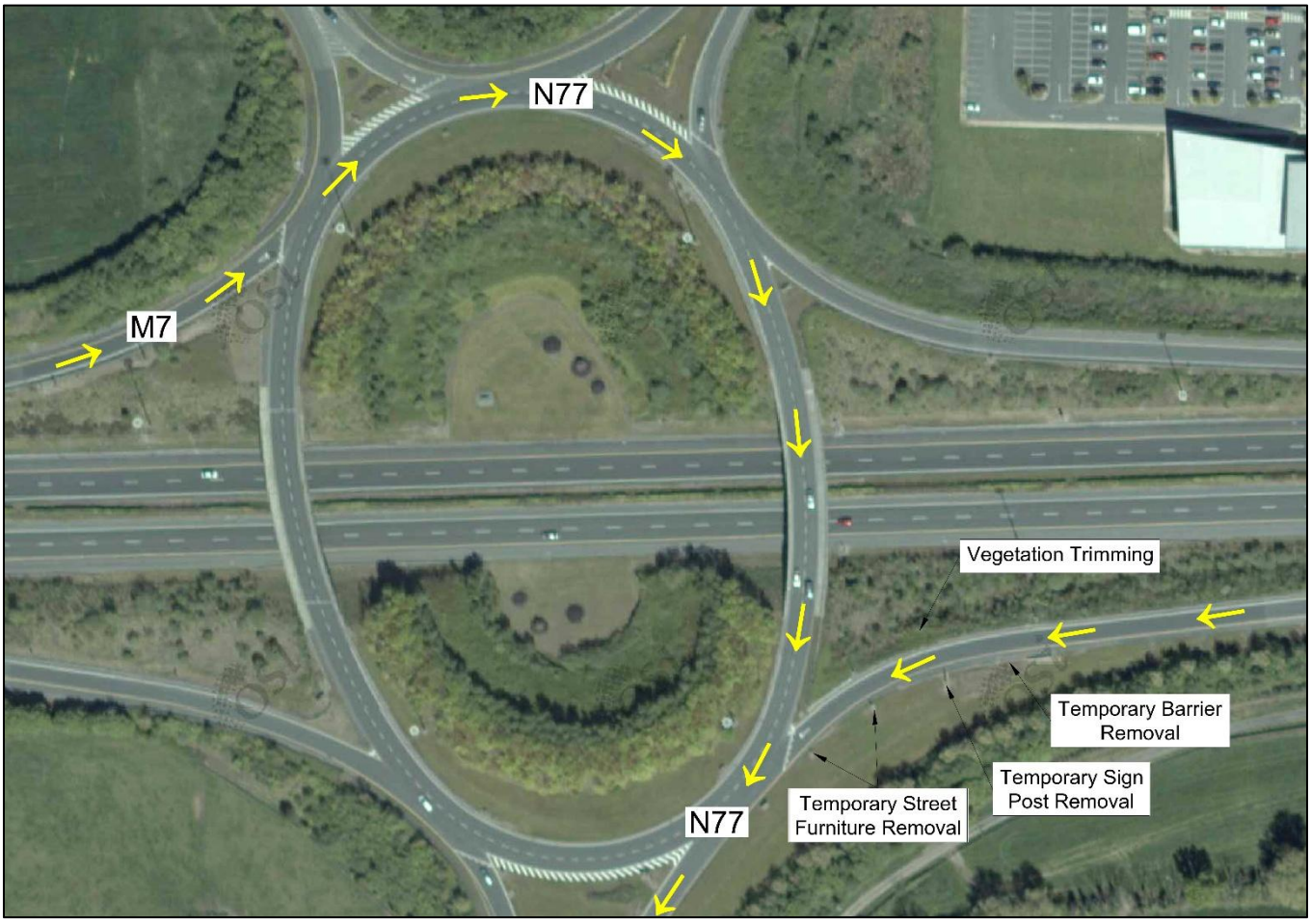
Figure 5.20: Watercourses W3, W4, W5 - Crossing Detail Figure 5.21: Horizontal Directional Drilling under the N77 and under the River Nore (W6)

Figure 5.22: Layout of the Parksgrove-Moatpark UGC in relation to the N77 & River Nore

3.5.2 Off-Site Activities along the Turbine Delivery Route

In addition to the Turbine Delivery Facilitating Works described in Section 3.4.8 above, some minor facilitating activities within the public road corridor will be required to facilitate the movement of the components from the Junction 17 offramp on the M7 Motorway at Portlaoise Central roundabout, where the M7 intersects with the N77 in County Laois

At this location, street furniture, mainly comprising barriers and signage will need to be temporarily removed/demounted prior to component deliveries, with the replacement of same in sockets. Some vegetation trimming may also be required along the roadside verges.



3.6 Use of Natural Resources

3.6.1 Land

The Whole Gathabawn Windfarm Project site is proposed for agricultural lands.

Proposed Gathabawn Windfarm: The total footprint of the development within agricultural lands will be 59ha during the construction phase, predominantly comprised of permanent grassland (53.5ha), with one landholding under arable cropping (4.5ha), along with farm tracks (1ha).

During operation, the works boundary of the operational windfarm on agricultural lands will comprise 18ha in total (17ha of land use change from agriculture – these are the lands within the operational fences) along with 1ha along existing farm tracks (which will be upgraded to windfarm site road). The permanent hardcore footprint will be 6.6ha during the operational phase.

Candidate Gathabawn Grid Connection: Permanent change of landcover will occur at the Parksgrove Substation, this location is not used for productive agricultural use at the moment, and currently covered by scrub.

Activities along the Turbine Delivery Route will not involve any use of lands or result in any land cover change.

3.6.2 Soils and Rock

Proposed Gathabawn Windfarm:

Borrow Pits: Stone will be won from 2 No. on-site borrow pits proposed for locations in the eastern and northwestern parts of the windfarm site. The excavated area at each of the borrow pits will be c.3000m² and 3800m² in plan area. Approximately 26,000m^3 of suitable material will be won from the 2 No. borrow pits. The Borrow Pits will be reinstated at the end of construction.

Windfarm Excavations: Based on trial hole investigations, ground conditions and Geological Survey Ireland mapping for the Gathabawn Windfarm site and taking into account the results of topographical surveys and the size and design of the windfarm, the construction of Gathabawn Windfarm is expected to require the excavation of approximately 85,000m^3 of soils (made up of topsoil, subsoil and rock) from the construction works areas. It is expected that most of the excavations will be suitable for use as construction material, and any unsuitable material will be used to reinstate construction works areas and the borrow pits.

Imported Rock: Smaller amounts (c.8,000m^3) of higher-grade rock will be required for road capping and surface finishing, which will be imported from local quarries such as Cemex in Dunmore, Wholesale Suppliers Limited Coolbawn, Castlecomer or Roadstone Bennettsbridge, all in County Kilkenny.

Candidate Gathabawn Grid Connection is expected to require the excavation of approximately 14,200m^3 of soils (made up of topsoil, subsoil and rock) from cable trenches and jointing chamber excavations along the cable routes and 6,800m^3 of soils excavated at the Parksgrove Substation site. Approximately, 4,000m^3 crushed stone will be imported to backfill cable trenches and for the Parksgrove Substation compound

Activities along the Turbine Delivery Route will not involve any excavations or use of soils.

3.6.3 Water

Proposed Gathabawn Windfarm:

During construction non-potable water for welfare facilities will be imported from a local municipal supply and stored in water holding tanks at the welfare facilities at the temporary construction compound. Bottled drinking water will be stored in the canteen at the temporary construction compound.

During operation, non-potable water will be supplied from a rainwater harvesting system on the control buildings for welfare facilities for maintenance personnel during the operational phase. Demand for potable water during the operational or decommissioning phases will be very low, and bottled drinking water will be brought onto the windfarm site by operation and maintenance personnel as required.

Candidate Gathabawn Grid Connection: similar to the windfarm, non-potable water for welfare facilities will be sourced from a local municipal supply. Bottled drinking water will be brought onto site as required.

Activities along the Turbine Delivery Route will not involve any use of water.

3.6.4 Biodiversity

Proposed Gathabawn Windfarm:

During construction, works will take place on 58ha of agricultural lands. In addition, 3,700m of hedgerows and 10 no. trees will be removed, while 3,700m of new hedgerow, including 100 no. immature trees will be planted to replace the hedgerow resource lost. In addition, in order to increase the biodiversity value of existing hedgerows at the windfarm site, hedgerow species will be planted into gaps along 1,300m of existing field boundaries at the windfarm site during construction works.

During operation, once the proposed development is constructed, the requirement for lands reduces and the permanent hardstanding footprint (including the turbines) will be 6.6ha on what was previously agricultural land. To offset this loss of habitat, 7ha of Biodiversity Areas have been identified at the windfarm site where high value habitat will be created, managed and protected, as outlined at Section 3.4.16 above.

Candidate Gathabawn Grid Connection: along those parts of Underground Cabling routed through agricultural lands, there will be a temporary loss of grassland habitat (14ha) along the works areas. However, this area will revegetate and return to agricultural use within 4-6 months of the works. Permanent change of landcover will occur at the Parksgrove Substation, this location is not used for productive agricultural use at the moment, and currently covered by scrub.

Activities along the Turbine Delivery Route may require trimming of roadside vegetation/treelines.

3.7 Emissions

3.7.1 Greenhouse Gases

The potential for greenhouse gas emissions to air arises during the manufacturing, operation, service and ultimate decommissioning of the wind turbines (full life cycle).

3.7.1.1 Turbine Energy Payback (Full Life Cycle)

Energy Balance: The energy balance of a wind turbine is the relationship between the energy requirement over the full life cycle of the turbine (manufacture, operation and decommissioning) versus the energy generated by the wind turbine over its operating life. This is called the energy payback. The energy payback period is measured in '*months to achieve payback'*. The turbines will reach 'payback' and be energy-neutral within 6 months of operating.

3.7.1.0 Offset of Greenhouse Gases Emissions During Operation

The 8 No. wind turbines at Gathabawn Windfarm have the potential to generate c.150,000,000 Kilowatt hours (kWh) of electricity per annum. This electricity will be generated without emitting greenhouse gases (GHG) or ash pollution and this will avoid an equal amount of electricity being generated from gas, coal or oil, which do emit GHGs and in the case of coal, ash. The electricity produced at Gathabawn Windfarm will avoid emission of c.38,250 tonnes of CO_2e.

3.7.1.1 Vehicular Emissions and Embodied Carbon Emissions

Proposed Gathabawn Windfarm:

Construction Phase: The largest number of deliveries and greatest use of machinery, plant, equipment and vehicles is associated with the construction phase of the windfarm. Nitrogen Dioxide and other GHGs will be emitted from non-electric powered vehicles on site. Embodied carbon will also be emitted from the concrete which will be required for the turbine and meteorological mast foundations and the windfarm substation compound and from c.113,000m^3 of soils, subsoils and rock (including from borrow pits) which will be excavated during construction works, and from 8,000m^3 of stone and c.6,090m^3 of concrete imported onto the site. Nitrogen Dioxide and other GHGs will be emitted from vehicles on-site, in the worst-case scenario that no electric vehicles (Evs) are used and construction plant and machinery use c.430,000L of diesel.

Operational Phase: If electric vehicles are not used, nitrogen dioxide and other greenhouse gas emissions will be emitted from vans/4WD vehicles involved in operation & maintenance on site, and from larger machinery used during major maintenance works. Soil excavations will be minimal, limited to drainage maintenance.

Decommissioning Phase: If electric vehicles are not used, nitrogen dioxide and other greenhouse gas emissions will be emitted from vans/4WD vehicles and larger machinery involved in decommissioning the windfarm. There will be no excavations required, the turbine bases will be left in situ, however there is potential for GHG emissions from bare soils on newly reinstated turbine hardstanding areas until the area has started to revegetate.

Candidate Gathabawn Grid Connection: Embodied carbon will also be emitted from c.21,000m^3 of soils, subsoils and rock which will be excavated during construction works, from 4,000m^3 of imported stone, and from c.3,330m^3 of concrete which will be required for the cable trenches and for the Parksgrove Substation foundations and blockwork. Nitrogen Dioxide and other GHGs will be emitted from vehicles on-site, with an estimated 130,000L of diesel to be used by the construction contractor in the worst-case scenario that no electric vehicles are used

Activities along the Turbine Delivery Route will result in no embodied carbon and negligible vehicular emissions.

3.7.2 Other Emissions to Air

3.7.2.1 Dust

Proposed Gathabawn Windfarm:

The potential for dust emissions mainly relates to the Gathabawn Windfarm due to the scale of the works and the volume of vehicular and machinery movements at and onto the site. The potential for dust emissions is related to the weather conditions, stage of construction and the intensity of vehicular and machinery movement at the site.

Construction Phase: Dust will arise from the transportation of aggregate, movement of delivery vehicles and the movement of excavated materials and from bare soils at excavated areas and overburden storage areas.

Operational Phase: There will be minimal excavation required during operation – limited to civil works maintenance such as maintenance of roads and drainage system twice per year. As excavations will be limited, vehicular movements will be limited to c.6 No. visits per month, and the roads will be capped during construction with hardwearing stone, dust emissions will be negligible during the operational phase.

Decommissioning Phase: There is potential for some dust due to the movement of soils and the presence of bare soil (until revegetation commences) at the turbine foundation and hardstands areas. Dust may also arise from vehicular and machinery movement along roads.

Candidate Gathabawn Grid Connection: The potential for dust relates to the construction phase of the grid connection, arising from the transportation of aggregate, movement of delivery vehicles and the movement of excavated materials and from bare soils at excavated areas and overburden storage areas. However, due to the much smaller scale of works, the shorter duration and the linear nature of trenching works, the dust potential from grid connection works is much less than windfarm works. Negligible levels of dust are expected during the operation or partial decommissioning of the grid connection due to the nature of the operational and decommissioning works.

Activities along the Turbine Delivery Route will not result in dust emissions.

3.7.2.2 Noise

Proposed Gathabawn Windfarm:

Construction phase: Noise will be emitted from certain construction activities such as excavations, rock extraction and rock breaking at the construction works areas. Noise will also be emitted from heavy machinery, equipment and vehicles at works areas. Typical construction noise levels associated with the type of construction machinery at the Gathabawn Windfarm site are outlined in the table below:

Operational phase: The operating turbines will emit noise. Turbines of the size proposed for Gathabawn Windfarm have a typical sound power level of 103.9dB(A).

Decommissioning phase: Noise will be limited to the operation of machinery and vehicles to dismantle and remove the turbines from the windfarm site over a 3-4 month period, mainly at turbine locations.

Candidate Gathabawn Grid Connection: Noise will be emitted from certain construction activities such as excavations and from heavy machinery at construction works areas. The operating windfarm substation will also emit noise - in the order of 93 dB(A) L_{a90}.

Activities along the Turbine Delivery Route will not result in noise emissions.

3.7.2.3 Vibration

Proposed Gathabawn Windfarm:

Construction phase: The use of heavy machinery and rock breaking equipment will cause negligible levels of ground vibration in the immediate vicinity of groundworks and no blasting will be required at the works areas, including the borrow pits.

Operational phase: Once operational there are no significant vibrations from a windfarm - the level of vibrations from wind turbines are so small that they are almost impossible to detect.

Decommissioning phase: Negligible vibrations from decommissioning works, in the immediate vicinity of groundworks.

Candidate Gathabawn Grid Connection: During construction works, negligible levels of vibration are expected from cable trench excavations, and very low levels of localised vibration will arise from heavy groundworks, and compaction works at the Parksgrove Substation. No vibration is expected from the operational grid connection.

Activities along the Turbine Delivery Route will not result in vibration emissions.

3.7.2.4 Light

Proposed Gathabawn Windfarm:

Construction and decommissioning phase: Motion-sensored lighting will be used at the temporary construction compound and at the windfarm substation compound. Lights will not be left turned on overnight. Occasionally lights will be used at works areas if required to complete a work task.

Operational phase: For security purposes, motion-sensored lighting will be used at the windfarm Control Buildings. Lights will not remain turned-on overnight. Selected turbines will also have aviation lights directed upwards and installed according to Irish Aviation Authority recommendations. Motion-sensor lights will also be fitted over the turbine doors.

Candidate Gathabawn Grid Connection: For security purposes, motion-sensored lighting will be used at the windfarm substation compound. Lights will not remain turned-on overnight.

Activities along the Turbine Delivery Route will not result in light emissions.

3.7.2.5 Electromagnetic Fields

Electrical objects and anything connected to them produce two types of fields - electric fields and magnetic fields.

Proposed Gathabawn Windfarm:

Construction and decommissioning phase: Negligible electromagnetic fields will be generated during the construction or decommissioning phase.

Operational phase: Similar to all operating indoor and outdoor electrical equipment, the operational wind turbines, underground cabling and control buildings will be an additional source of electromagnetic fields in the environment. Levels of EMF will be substantially below International threshold limits.

Candidate Gathabawn Grid Connection: underground cabling and the substation will be additional sources of electromagnetic fields in the environment. Levels of EMF will be substantially below International threshold limits.

Activities along the Turbine Delivery Route will not result in EMF emissions.

3.8 Wastes

The greatest potential for waste arises during the construction phase of the project. All wastes will be removed offsite by an appropriately licenced waste contractor for disposal at an appropriately licenced waste facility.

3.8.1 Waste water

Proposed Gathabawn Windfarm:

During construction, welfare facilities including self-contained toilets and washing areas, with integrated waste water storage tanks, will be provided for construction workers at the temporary construction compounds. The tanks will be emptied on a regular basis, by a licence waste contractor.

Operational and decommissioning phase welfare facilities will be provided at the windfarm control buildings. These welfare facilities will be self-contained and will use a closed wastewater system. The wastewater storage tanks will emptied on a regular basis and removed to a licensed wastewater treatment facility. Water for the welfare facilities will be obtained from a rainwater harvesting system installed at the Control Buildings.

Candidate Gathabawn Grid Connection: Similar to the construction, wastewater from welfare facilities will be in self-contained portaloo units at works locations and at the construction compound at Parksgrove. Operational wastewater relates to the storage tanks associated with the welfare facilities at Parksgrove.

Activities along the Turbine Delivery Route will not result in any waste water being produced.

3.8.2 General and Chemical Waste

Proposed Gathabawn Windfarm:

Construction phase: Materials such as pallets, packaging, excess construction and building materials and small quantities of chemical waste, such as solid waste oils and oily rags will be generated at windfarm works areas. All individual waste streams will be stored in a designated and secure area at the temporary construction compound.

Operational phase: General and chemical waste will arise in small quantities during the operational phase, including empty containers, packaging, materials, oil and grease etc. All individual waste streams will be stored in a designated and secure area at the windfarm substation.

Decommissioning phase: General and chemical waste will arise during decommissioning activities. The turbines, electrical equipment and oils to be removed from the site and will enter reuse/recycle economy.

Candidate Gathabawn Grid Connection: Construction waste will be similar to the windfarm, but with smaller volumes produced. During operation, waste production will be negligible. Waste will be stored at the Parksgrove Substation compound. At road works locations along the Underground Cabling for the Candidate Gathabawn Grid Connection, approximately 250m3 of subsoils and road surfacing will be removed to a licenced facility.

Activities along the Turbine Delivery Route will not result in any waste being produced.

3.8.3 Waste Management Plan

Any wastes which result from the construction of the Whole Gathabawn Windfarm Project will be managed under a Waste Management Plan (WMP). The WMP is included in the Environmental Management Plan (EMP) for the Project which accompanies the planning application

3.9 Project Life Cycle – Construction Phase

3.9.1 Construction Timeframe

The commencement of construction culminates from what can be a lengthy process typical of wind energy development in Ireland. In that context, the Applicant is seeking a 10-year duration of planning period during which the Gathabawn Windfarm development can be constructed.

3.9.2 Construction Duration & Personnel

3.9.2.1 Duration of Construction Works

The construction of Gathabawn Windfarm will take approximately 12-18 months to complete. It is planned to construct all elements of the whole Gathabawn Windfarm project concurrently, i.e. including the final grid connection, using multiple specialist crews.

The duration of works may be slightly shorter or longer, depending on the final number of crews used, weather conditions etc. A formal programme of works will be prepared prior to the commencement of construction.

3.9.2.2 Construction Personnel

In total, approximately 120 persons will be engaged in the civil, electrical, project management, legal and financial services and material supply for the whole project – 80 people for the windfarm, 40 people for the grid connection.

3.9.2.3 Construction Hours of Work

Normal construction times will be 07.00 to 19.00hrs Monday - Friday, and 08:00 to 16:00hrs on Saturdays.

3.9.3 Imported Construction Materials

In total, c.2,719 HGV loads of materials and 124 specialised abnormal loads will be required for the Whole Project.

AA Table 3: Materials and Quantities for Construction

Materials	Quantity	Loads
Concrete for Turbine Foundations *(The majority of concrete at the windfarm site is for turbine foundations, and the maximum loads/day for concrete deliveries are associated with these foundation pours)*	5,040m³	636 No. loads *to the turbine location.* 53 loads per day, 1 day per week, over 12 weeks
Other Deliveries (e.g. concrete blocks), and waste removal		300 No. loads *to the works location*
Aggregate for windfarm	8,000m³	800 No. loads *to the works location*
Specialist Abnormal Load Deliveries		123 No. loads
Other materials for the windfarm		96 loads
Concrete for the Candidate Gathabawn Grid Connection	4,000m³	400 No. loads *(to the works locations)*
Aggregate for the Candidate Gathabawn Grid Connection	4,000m³	400 No. loads *(to the works locations)*
Other Materials for the Candidate Grid Connection		87 No. loads
Specialist Abnormal Load Deliveries		1 No. load *(to Parksgrove Substation)*

3.9.4 Construction Traffic Haul Routes

General construction traffic is outlined below. Peak periods are expected during concrete pours at the turbines.

3.9.4.1 Aggregates, concrete and general building materials and supplies

Stone aggregates and concrete will be imported from local suppliers, such as Wholesale Suppliers Limited Coolbawn, Cemex Dunmore and Roadstone Bennettsbridge. Other materials and general building supplies will be sourced from the wider regional area and delivered by way of the national road network, before following regional roads and local roads to the works areas, as detailed below:

Proposed Gathabawn Windfarm:

- Ballylehaun Area – from the R639, turning onto the L58141 local road at Coolnacrutta/Glashare,
- Ballylehaun Control Building – through the Ballylehaun Area of the windfarm, exiting at Site Entrance No.3 onto the L1803, then turning onto the L5818 in Gathabawn village, travelling along this road to Site Entrance No.4;
- Ballyring Area – from the N77 road, turning onto the L1807 road at Parksgrove, through Lisdowney village and continuing along the L1806 and turning onto the L18062 at Ballyring Upper to Site Entrances 5, 6, and 7.

See AA Figure 7: Construction Materials Haul Route for the Proposed Gathabawn Windfarm (over)

Candidate Gathabawn Grid Connection:

- Parksgrove Substation/Construction Compound – from the N77 road, turning onto the L1807 road at Parksgrove, to Site Entrance No.8;
- Ballylehaun-Ballyring UGC works locations: from the L1806 and through Gathabawn village onto the L5818, L5821 and L5820, on the L1806 and L18062;
- Ballyring-Parksgrove UGC works locations: from the N77 road, turning onto the L1807 road at Parksgrove, travelling along the L1807 to temporary site entrances on the L1807, L1811 and L1808;
- Parksgrove-Moatpark UGC works locations: from the N77 turning onto the L1807 to Site Entrance no.8, and from the N77 road turning into the temporary site entrance on the eastern side of the N77, and from the N77 turning in Ballyragget onto the R432 as far as the temporary entrances at Moatpark.

See AA Figure 8: Construction Materials Haul Route for the Candidate Gathabawn Grid Connection (over)

3.9.4.2 Specialised Abnormal wide / long load deliveries

Proposed Gathabawn Windfarm: Delivery of turbine components and large crane components will require abnormal (wide/long) loads. Special extendable flatbed semi-trailers are used to transport turbine components by road using the motorway, national and local road networks. The the turbine component transportation vehicles will utilise the motorway network as far as Portlaoise, at which point they will leave the M7 motorway and then travel along the N77 through Abbeyleix town as far as Durrow, Co. Laois. The components will be transported straight through Durrow following the R639 south through Cullahill village before accessing the Ballylehaun Area via the local road L58141, using the temporary access road at Site Entrance No.1, and accessing the turbine locations via Site Entrances No.2 and No.3. See AA Figure 9: Specialised Abnormal Load Routes (over).

The Ballyring turbines will first be delivered to the Temporary Blade Storage Area (beside Ballylehaun Construction Compound) where they will be unloaded and stored. Once ready to be transported to the Ballyring Area, the blades will travel along the Ballylehaun site roads to Site Entrance No.3, turning onto the L1803, travelling through Gathabawn village and continuing on the L1804, and then turning left onto the L1806 via a new temporary access road, travelling along the L1806 as far as the junction with the L18062 in Ballyring Upper, utilising the temporary widening at the junction to turn onto the L18062, and accessing the Ballyring turbines from Site Entrance No.7 along the L18062 public road.

Candidate Gathabawn Grid Connection: the transformer will be delivered from national road network, to the N77, then onto the L1807, and through Site Entrance No.8 to the Parksgrove Substation location.

Appropriate Assessment Report

AA Figure 7 - Construction Materials Haul Route for the proposed Gathabawn Windfarm

Legend:

- Proposed Gathabawn Windfarm
- Construction Materials Haul Route
- L-1806 Public Road Identification Number
- Cullahill Towns/Villages

Cullahill
Lisdowney
Ballyragget
Gathabawn
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
Site Entrance No.1
Site Entrance No.2
Site Entrance No.3
Site Entrance No.4
Site Entrance No.5
Site Entrance No.6
Site Entrance No.7
L58141
L5818
L5821
L5820
L1806
L18062
L1803
L1804
L1807
R639
R432
R694
N77
N

Appropriate Assessment Report

AA Figure 8 - Construction Materials Haul Route for the Candidate Gathabawn Grid Connection

Legend:

- Proposed Gathabawn Windfarm
- Candidate Gathabawn Grid Connection
- Parksgrove Substation
- Existing EirGrid Ballyragget Substation
- Construction Materials Haul Route
- L-1806 Public Road Identification Number
- Cullahill Towns/Villages

Cullahill
Lisdowney
Gathabawn
Ballyragget
Candidate Gathabawn Grid Conenction
Parksgrove Substation
Site Entrance No.1
Site Entrance No.2
Site Entrance No.3
Site Entrance No.4
Site Entrance No.5
Site Entrance No.6
Site Entrance No.7
Site Entrance No.8
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
L58141
L5818
L5821
L5820
L1806
L18062
L1803
L1804
L1807
L1808
L1811
R639
R432
N77
R694
M8
Cullahill/Binnianea Loop
N

Appropriate Assessment Report

AA Figure 9 - Specialised Abnormal Load Routes

Legend:

- Proposed Gathabawn Windfarm
- Turbine Delivery Route
- FW6 — Facilitating Works Identification Number
- L-1806 — Public Road Identification Number

Cullahill
Lisdowney
Gathabawn
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
FW1
FW2
FW3
FW4
FW5
FW6
FW7
FW8
FW9
FW10
FW11
FW12
R639
L58141
L1803
L1804
L5818
L5821
L5820
L1806
L18062
COUNTY LAOIS
COUNTY KILKENNY
Culahill/Binnanea Loop
M8
Addergoole
Aghmacart
Aghmacart Cross Rds
Maynebog Br
Graigueagarran
Priory
Grave Yd
Castle
Shanbally
Ballydavin
Aghmacart Br
Ballinfrase
Oldtown
Scrub and Glenmacolla
Spaquarter
Cullahill Mountain
Chòcna Cùlchoille
Castlequarter
Barrackquarter or Ross
Bunlacken
Graigueavoice
An Chúlchoill
Church
Holy Well
Toberboe or Killenny More
Ballykealy
Aharney
Fulacht Fia
Seskin
Seskin Little
Tinnaslatty
Ballygowney
Knockmannon Cross Rds
Ballyring Lower
Monphole
Skinstown
Acragar
Clontubbrid
Tifeaghna
Tinnascarty
Garrydague
Tentore
Coolcashin
Graveyard
Gorteennahilla
Ballylehaun
Glashare
Baunrickeen
Rathlogan
Cross of Beggar
Grangefertagh Round Tower and Church
Fulachtai Fia
Baungarrow
Rathoscar
Creenkill More
Creenkill Beg
Foyle North
Foyle South
Foyle Br
Frankford or Ballykieran
Baunmore or Balleen Upper
Balleen Lower
Ballyspellan
Pound Park
Moated Site
Castle
Graveyard
Church
Sch
Holy Well
Fulacht Fia
Lodge Demesne East
N

3.9.5 Construction Works & Activities

3.9.5.1 Overview of the Construction Methodologies — Gathabawn Windfarm

The main works and activities at the Proposed Gathabawn Windfarm will include:

- preparation of the site entrances and the temporary construction compounds;
- opening of the borrow pits;
- upgrade of the existing farm roads and construction of new roads;
- construction of the turbine hardstanding areas and excavation of the turbine foundations;
- construction of the temporary facilitating works for turbine deliveries;
- installation of structural steel, concrete pouring and backfilling of the turbine foundations;
- delivery of the turbine components and cranes;
- erection of the turbines;
- construction and installation of underground cable circuits;
- construction and erection of the meteorological mast & LiDAR unit hardstanding;
- construction of the control buildings and associated hardcore compounds;
- installation of electrical equipment and apparatus at the turbines and at the Control Buildings;
- commissioning the turbines and underground cabling;
- reinstatement of the borrow pits, and reinstatement of temporary works areas;
- removal of temporary construction and drainage works, and completion of the final drainage regime.

A brief description of the main works and activities is provided hereunder. A description of all works associated with construction of the Gathabawn Windfarm is provided in EIA Report, Chapter 5, Section EIAR 5.9.7.

3.9.5.1.1 Construction compound

The construction of the temporary compounds will involve the excavation of vegetation, topsoil and subsoils from the area to formation level and the excavation of adjacent drainage channels and surface water controls. Geotextile matting will be laid out where necessary. A subbase will be laid and then the compound will be surfaced with Clause 804 material or similar. Steel container units comprising site offices, canteen, drying room and welfare units, along with a mobile solar powered unit, waste management skips and Control of Substances Hazardous to Health (COSSH) units will be delivered and installed at the site compound. Areas within the compound will be designated for waste storage, materials storage and car parking. Lighting will be installed.

3.9.5.1.2 Borrow Pits

The vegetation, subsoil and topsoil will be excavated as far as suitable rock from the surface of the borrow pit and stored separately in the adjacent temporary deposition area for reinstatement use. The rock will then be extracted for use in the foundations and hardstanding areas. The borrow pits will be reinstated using the soils excavated from the borrow pits and from other excavations within the windfarm site. The reinstated borrow pit will be graded by the excavator to match in with the surrounding topography. The area will be reseeded.

3.9.5.1.3 Windfarm Site Roads

The site access roads will comprise the construction of new site access roads and the widening of existing local public roads and farm tracks to 4.5m (wider at bends). All organic material and soft subsoil will be removed to formation level and surface water controls including silt curtains, drainage channels, cross drains and berms will be installed. The excavated subsoil and topsoil will be placed adjacent to the works in overburden storage berms – which will be compacted to seal the surface and minimise erosion potential.

Geotextile matting will be laid along the excavated road area to provide extra bearing support, if required. A sub-base will be laid and compacted in layers. A surface consisting of hard-wearing granular fill will then be laid

and compacted. The surface of the new road will be finished with a 2% gradient to allow water run-off. Before the delivery of concrete for turbine foundation pours, the access roads will be finished with a layer of hard-wearing capping stone across the full width of the road.

3.9.5.1.4 Drainage Network

In order to isolate the construction works from the surrounding natural drainage regime – a 'clean water' drain will be excavated on the upslope side of the construction works, while a 'dirty water' drain will be excavated on the downslope side to capture all runoff from construction works areas. Sealed berms will also be used to manage and control water run-off. Cross drains to maintain the existing drainage regimes will be installed to enable the flow of clean water from the upslope to the downslope side of the construction works. Silt curtains will be installed along downslope preferential flow paths. Settlement ponds will be excavated and set up, and drainage features such as level spreaders, outfall weirs, check dams and silt fencing or curtains will be installed.

3.9.5.1.5 Existing drainage

The existing drainage regime where present will be maintained and isolated from works. Any existing drainage channels which will interact with the construction works area will be incorporated into 'clean water' drains of the windfarm works. However, there are two existing drainage channels within the boundary of construction works in the Ballyring Area which cannot be avoided – D01 and D02:

D01 will be removed during public road widening works and reinstated along the new public road boundary.

D02 will be realigned to divert this drain around the hardstanding works at Turbine T10. A new culvert to facilitate the construction of the access road will be installed in this drain.

Any water present in these drainage channels during the works will be isolated from the works by damming the drain and pumping any water present around the work to the downslope side. To protect water quality in these existing drains, a silt curtain will be installed between the windfarm works and this new drain to prevent dirty water from the adjacent works areas entering the drain.

3.9.5.1.6 Wind Turbine Hardstands

Hardstanding areas consisting of levelled and compacted hardcore, will be constructed at the location of each turbine. The hardstanding area at each turbine is extended to cover the turbine foundations once the foundation construction is completed.

The turbine hardstanding areas will be excavated to remove vegetation, topsoil and subsoils until competent strata such as rock or other suitable bearing stratum are reached. Excavations will include areas for the main crane, the support cranes, for blade set down and turning areas. Geotextile matting will be laid out on the excavated footprint. A sub-base of crushed stone, and then a hard-wearing surface layer consisting of compacted granular fill will be laid. It may be required to construct a thicker sub-base layer to achieve crane plate bearing test requirements ahead of turbine erection. This will depend on local ground conditions at the hardstands. A vibrating roller will compact the stone in layers. The surface of the new hardstanding area will be finished with a 2% gradient to allow water run-off.

Material for the hardstand will be sourced predominantly from the on-site borrow pits and from suitable excavations at the hardstands and turbine foundation excavations, with mainly just higher-grade hard wearing surfacing material to be imported from local quarries.

3.9.5.1.7 Wind Turbine Foundations

Construction of turbine foundations will involve excavations to remove vegetation, topsoil and subsoils to competent strata and excavations of rock to the required width and depth. Any rock excavated which is suitable for use as construction material will be reused for the construction of the hardstands. At the base of the turbine

foundation, ducting for the internal windfarm cables is installed and a layer of structural up-fill (class 6N/6P - in accordance with TII requirements) will be laid and compacted and a blinding layer of concrete poured to provide a clean and level area to install the turbines bolt basket and reinforced steel anchor cage, which will be later encased in the concrete foundation.

The steel bolt basket of the turbine tower is installed and the anchor cage made up of reinforcing steel is then built up around the steel base and through the excavated area. The outside of the foundation is shuttered to allow the pouring of concrete. The concrete is delivered and poured into the turbine foundation (concrete required for the foundation is poured within the same day). The concrete foundation will be covered to protect it from the weather and left to cure for 28 days.

Once cured, the foundation will be backfilled to the top of the bolt basket, ready for turbine erection.

3.9.5.1.8 Windfarm Control Buildings

Topsoil and subsoil (including rock) will be excavated from the footprint of the building, and the excavated material will be deposited in an overburden storage berms or used in borrow pits restoration. A layer of geotextile material will be laid over the excavated footprint and a sub-base layer of crushed stone material will be laid. The foundations for the control building will be excavated and poured with concrete. The control building will be constructed and electrical equipment and apparatus installed according to EirGrid specifications. The construction of the control buildings will include the installation of a rainwater harvesting system, wastewater holding tanks and welfare facilities.

3.9.5.1.9 Windfarm Cabling Works

The internal windfarm cabling will connect the wind turbines to the windfarm control buildings and will be located under the access roads. A cable trench will be excavated from the road to the required depth and width and the trench floor will be graded, smoothed and trimmed. The ducts, through which the electrical cables and fibre optic cables will be pulled, will be installed by hand. Warning strips will be placed in the trench and the trench will be backfilled with excavated material and reinstated with the same aggregate used for the road.

Electrical and fibre optic cables will be pulled through the ducts and connected to the electrical infrastructure at the windfarm substation.

3.9.5.1.10 Met Mast installation

Access to the met mast site will be from windfarm site road. A small foundation is constructed and the meteorological mast base is set in concrete foundations and the area backfilled with aggregate. The mast will be delivered in sections, and erected and assembled using a small crane. Meteorological measuring equipment and communications equipment will be installed on the mast. Security fencing will be erected.

3.9.5.1.11 Wind Turbine Delivery

Component delivery is a highly controlled activity, and the transport delivery plan and schedule for the turbine components from port to site will be coordinated with Kilkenny County Council and An Garda Síochána. The delivery of the larger turbine components is expected to take place overnight or during off-peak hours due to the oversize nature of some of the components such as the blades and tower sections. The delivery will be fully escorted. One of the escorts will precede the convoy and request any oncoming traffic to pull into the nearest convenient passing locations.

Along the public road at the M7/N77 interchange at Portlaoise, street furniture, such as road signs and crash barriers, will be removed immediately prior to the passing of the turbine component convoy, and will be replaced to their original sockets/location once the delivery vehicles have passed through**.**

3.9.5.1.12 Wind Turbine Erection

Once the turbine components are delivered to the turbine locations, specialist crane crews will erect cranes (large crane and assist crane) and associated equipment on the hardstanding areas. The tower sections, nacelle and finally blades are then lifted into place and affixed in position by specialist crews. Following turbine erection, ducting is installed and connected to the internal windfarm cable network, and the turbine internal fittings and fixtures are installed, and commissioning works can commence.

3.9.5.1.13 Reinstatement

Following the completion of construction works and the commissioning of the turbines, reinstatement of the construction site will begin. The temporary areas at the windfarm site, such as the turning heads and blade set down areas, the temporary Blade Storage Area, temporary access roads or widened locations, and the temporary construction compounds will be levelled and the soils in overburden storage berms will be spread over these areas to tie back in with the surrounding agricultural lands. Pasture grass seed will be sown on the reinstated areas. The construction fencing will remain in place until these lands have revegetated and will then be removed. The operational phase windfarm fence will be erected around the turbine hardstand and along the site roads. Gates will be erected to maintain landowner access to fields.

3.9.5.2 Construction Methodologies – Candidate Gathabawn Grid Connection

The main works and activities at the Candidate Gathabawn Grid Connection will include:

Parksgrove Substation

- construction of temporary construction compound at Parksgrove, including site entrance works;
- excavation and construction of the compound footprint, including earthing, ducting and building, transformer bund and plinth foundation works;
- construction and fit out of control buildings, delivery and installation of the main transformer, installation of outdoor electrical equipment and apparatus;
- Electrical works and installation at the substation compound, testing and commissioning;

Underground Cabling (UGC);

- cable trenching and jointing chamber installations;
- installation of underground cable across watercourses and drainage networks along cable routes;
- construction of new access road in Parksgrove and Moatpark
- horizontal directional drilling under the N77 and under the River Nore;
- duct proofing, cable pulling and jointing, and commissioning.
- reinstatement of temporary works areas.

3.9.5.2.1 Parksgrove Substation

A drainage system will be installed around the Parksgrove Substation compound area. Topsoil and subsoil (including rock) will be excavated from the footprint of the compound, and the excavated material will be permanently stored in an adjacent berm. A layer of geotextile material will be laid over the excavated footprint of the compound and then a sub-base layer of crushed stone will be laid on top of the geotextile followed by a capping stone layer which will provide the finished surface. Each layer will be compacted. The foundations for the control buildings, transformer bund, and outdoor plinths will be excavated, reinforced steel will be laid out, shuttering erected and concrete poured to form the foundations for these structures. Excavations will also be carried out within the compound to install the earthing grid, drainage network and ducting for cables. The area for the rainwater harvesting system holding tank and the wastewater holding tank will be excavated, and these tanks installed. Blockwork, insulation, roofing and painting of the control buildings will get underway. The internal access roads within the compound will be constructed. The concrete bund for the transformer will be tested for leaks, and the transformer will be delivered and installed. The lightening protection monopoles will

be installed. The outdoor and indoor electrical plant and apparatus and communication equipment and systems will be installed. Welfare facilities and site offices will be fitted out. A piped mains water supply will be installed from the local public mains

3.9.5.2.2 Underground Cabling (UGC) Works

The trenches will be excavated ahead of the ducting works in 50m sections, so that only 100m of trench is open per crew at any one time along the cable routes. A trenching crew will complete approximately 100 linear meters of trench per day depending on the site conditions.

A cable trench will be excavated to the required depth and width. In addition, along public road sections, before any excavation works begin, a surface check will be carried out for underground services with appropriate equipment. Service owners will also be contacted to confirm service locations. The road surface will be saw cut to the depth of existing asphalt/bitmac layers.

Once excavated, the trench floor will be graded, smoothed and trimmed. The ducts, through which the electrical cables and fibre optic cables will be pulled, will be installed by hand, using profiles to attain the correct spacing between the ducts. The trench will be backfilled with material suitable for the location, and warning strips will be placed within the backfill layers over the cable ducts, with each backfill layer carefully compacted. The top of the trench will be reinstated according to the prevailing conditions: in agricultural lands the top of the trench will be reinstated with topsoil and reseeded with pasture grass species; along the public road, the top of the trench will be reinstated with road surface dressing; and under windfarm site roads the top of the trench will be reinstated with the same aggregate used for the access road

3.9.5.2.3 Watercourse & Drainage Channel Crossing Works

Cable ducting across existing crossing structures: At watercourse crossing W1 on the L5818 (existing pipe culvert), and at existing drain crossings along the public road section of the Ballylehaun-Ballyring UGC, the ducting will be installed either under or over the existing crossing, and may also be laid in flat formation rather than trefoil formation, depending on the depth of cover over the existing culvert. During works, the location of the crossing point will be marked prior to trenching works in that section, and excavation of the trench will proceed carefully in close proximity to the crossing, with hand digging at the culvert location to expose the existing HDPE, concrete or masonry culvert. The ducting, warning tape and backfill materials will be installed, and the road built up around or over the existing culvert once again. Where a damaged or collapsed culvert is encountered during works, the entire culvert will be replaced in the drain under the road. Precast concrete or double skinned HDPE 90mm pipes will be used, with the pipe bedded into the drain. The ducting will be installed, and the trench backfilled using the standard construction methods described above.

3.9.5.2.4 Horizontal Directional Drilling

At watercourse crossing W2 on the L5821 along the Ballylehaun-Ballyring UGC, and at W6 River Nore along the Parksgrove-Moatpark UGC the cables will be installed under the bed of the watercourse using horizontal directional drilling technique (HDD). This will avoid any interaction with the watercourses at this location. The N77 national road will also be crossed using HDD technique to avoid trenching works in the road pavement. The HDD will be carried out as follows; a launch pit and reception pit will be excavated within the public road, both kept a minimum 25m from the watercourse. An experience drilling operator will drill a pilot bore from the launch pit, below the watercourse and bridge, to the reception pit. A reamer will then be fitted and pulled back through the pilot hole to enlarge the hole to the required size. Bentonite will be used during drilling operations to lubricate and cool the cutting tool. Ducting will then be pulled through the bore and cables installed within. Drill pits will then be reinstated according to the road opening license conditions. Dewatering of these pits will be required during drilling operations and will be pumped into a silt bag or suitable treatment train such as a siltbuster, depending on the amount of water coming into the drilling pits. All water will be passed through a

silt sock or silt bag before being released to ground vegetation. Sediment from the pits will be removed off site to a licenced facility.

The horizontal directional drilling under the N77 road and under the River Nore will follow the same methodology as that outlined for W2 HDD in Section EIAR 5.9.7.7.2.1 above.

3.9.5.2.5 Watercourse Crossing Works – Instream Works

The Ballyring-Parksgrove UGC crosses three EPA watercourses, these are the Lismaine Stream at W3, the Lisdowney Stream at W4 and the Ballyconra Stream at W5. Instream works will be required at all three watercourses in order to install the ducting. This will be carried out in the months of July, August or September and will involve the following works: water in the stream will first be isolated from the construction works, should the water levels be very low it may be possible to install a dam and pump the water around the works to the downstream site. Otherwise, a flume pipe(s) will be set out on the bed of the watercourse, a dam constructed using sandbags so that all the flow is diverted through the flume pipe(s). A splash plate will be placed at the downstream end of the flume pipe where the water re-enters the watercourse in order to prevent erosion of the stream bed. Silt traps, such as geotextile membrane, will be placed downstream of the instream works location to minimise sedimentation. The works will be carried out under/around the flume pipe(s). A cable trench will be excavated in the dry stream bed, under the flume, and cable ducts will be laid, and the trench backfilled with existing material.

If required, a temporary sump will be established and used to collect any additional water. This water will be removed by pumping to an infiltration trench or a water treatment train (such as a Siltbuster) and sediment allowed to settle before the water is released to vegetation via a silt sock or silt bag.

Following the completion of works at the watercourse, the dam and flume pipes will be removed and the watercourse reinstated. Watercourse reinstatement will involve: The reinstating of the bank slopes and character and stabilizing the banks using boulder armour or willow/brush bank protection, and reinstating instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and planting will be carried out along the riparian margins. Then the flow will be reinstated by the removal of the dam and flume, followed by the removal of the deflector plate once flow is reestablished.

No new crossing structures will be required across any of these natural watercourses.

3.9.5.2.6 Jointing Chambers

Every c.0.8km along the cable routes, the ground will be excavated to accommodate the installation of the underground jointing chambers. These jointing chambers will be pre-cast concrete, and the trench will be excavated to the required depth and width to fit the chambers. Once in place, any gaps between the jointing chambers and the walls of the excavation will be backfilled and the adjacent cable trench ducting will be fitted into the chambers. The cover will be placed back over the jointing chamber as a period of time will elapse before there are further cable pulling and jointing works going on at the jointing chamber.

3.9.5.2.7 Cable Pulling, Jointing, Testing and Commissioning

Once the majority of cable ducting and jointing chambers are installed, the cover over the jointing chambers is removed, and the ducts are proved using a test mandrel to confirm that there are no crushed sections and that there is no dirt or water blocking the ducts. Cable pulling follows, with the cables pulled through each line of ducting from one jointing chamber to the next, using heavy duty cable rollers and pulling machines. The chambers are covered for a period once again while cabling is pulled through the other jointing chambers along the route. The cables are then joined together in the jointing chambers – the cover is once again removed, and a temporary climate-controlled clean room is lifted into place over the jointing chamber. The cables prepared and connected, the joint is covered with an insulation sleeve and the cables are sealed. The cabling will also be connected to the electrical equipment in the Control Buildings.

3.10 Project Life Cycle – Operational Phase

3.10.1 Duration of Operational Phase

Gathabawn Windfarm is expected to have a lifespan of at least 35-40 years, and therefore planning permission is sought for a 35-year operational period.

3.10.2 Operational Works & Activities

In the operational stage, wind turbines operate automatically, responding by means of anemometry equipment and control systems to changes in wind speed and direction. Turbine output, performance, wind speeds and fault alarms are monitored off-site continuously by the Windfarm Asset Manager who also co-ordinates the turbine, electrical plant and civil works maintenance programme.

3.10.2.1 Routine Maintenance

Routine maintenance works will include regular scheduled inspection, testing and scheduled and unscheduled servicing of the wind turbines; regular inspection and annual maintenance of the Windfarm Control Buildings, and of the Parksgrove Substation; inspection and maintenance (half-yearly) of the windfarm site roads and underground cabling, and of the windfarm drainage network.

3.10.2.2 Major Component Replacement

As the windfarm ages, component replacement becomes more common, albeit still an infrequent occurrence. The gearbox and generator are likely to be changed at least once during the operational lifetime of a turbine. Blade replacement is less common, conservatively worst case 1 No. blade per turbine during the operational life. Major component replacements will take place from the hardcore turbine hardstand.

3.10.3 Operational Personnel

Proposed Gathabawn Windfarm: Operation & Maintenance activities at Gathabawn Windfarm will require 3-4 electrical and mechanical wind turbine and high voltage technicians. The Windfarm Control Buildings will be serviced by specialist electrical high voltage contractors. The civil works on site i.e. roads and drains will be maintained twice yearly by a civil contractor, under the supervision of the windfarm site manager. The windfarm site manager will also have responsibility for the environmental management of the windfarm in accordance with the planning conditions. The operation of the Gathabawn Windfarm will also involve Asset Managers who will mainly work remotely.

Candidate Gathabawn Grid Connection: Eirgrid will maintain part of the Parksgrove Substation and the additional equipment and apparatus in the Eirgrid Ballyragget substation. The windfarm operator will maintain the windfarm part of the substation. Testing of the Underground Cables will involve biennial testing carried out at the jointing chambers, likely to be carried out by the windfarm operator

3.10.4 Imported Operational Materials

Proposed Gathabawn Windfarm: Minimal materials will be imported during the operation stage. The technical crews will bring all equipment and plant on-site including tools, spare/replacement parts or consumables (oils, greases etc). The civil maintenance contractor will use approx. 1 load of aggregate and replacement silt fencing/traps per annum or as required to maintain the windfarm site roads, hardstands and drainage network.

Candidate Gathabawn Grid Connection: Minimal materials will be imported during the operation stage. The technical crews will bring all equipment and plant on-site including tools, spare/replacement parts or consumables (oils, greases etc).

3.10.5 Gathabawn Windfarm – Major Maintenance Traffic

During the operational lifetime of the proposed Gathabawn Windfarm, it will be necessary, albeit infrequently, to change-out major turbine components i.e. gearbox, generator and blades. These are all positioned at the top of the tower and will require specialist lifting and ground crew and an 800-tonne crane and 200-tonne support crane on-site. Similarly, the blades will require very infrequent maintenance such as blade cleaning, during their operation. Lifting equipment, cranes, and major components will be delivered to site, on a just-in-time basis, by HGVs for use during blade maintenance and major component replacement works.

Access to the windfarm site will follow the same route as the construction phase Turbine Component Haul route- i.e. via the motorway network to the N77 turning onto the R639, and turning on the L58141 towards the Gathabawn Windfarm site. The gearbox and generator replacement deliveries and cranes can use the operational entrances without any remedial works. They will be delivered on long trailers with back-axle steering capabilities which makes the vehicle highly manoeuvrable. Replacement blades can be delivered on blade lifter trailers which will negate the need for reopening for temporary facilitating works. However, should a Ballyring turbine require blade replacement, the temporary access road in Foyle South and Coolcashin townlands would be constructed once again to facilitate the delivery, and will provide access from the L1804 to the L1806 local road, thereby avoiding the L1804/L1806 junction before Foyle Bridge.

3.11 Changes to the Project – Decommissioning/Repowering

3.11.1 Envisaged life of the Proposed Gathabawn Windfarm

The operation lifespan of windfarms in Ireland is currently limited by planning condition, generally to 35 years, after which the windfarm operating will either (1) decommission the windfarm at the end of the permitted period (i.e. after 35 years of operation); or (2) seek new planning permission to continue operating either the as-built windfarm or to repower the site with the latest renewable generation technology.

3.11.2 Decommissioning the Windfarm

Where the windfarm is to be decommissioned, decommissioning would take between 3 and 4 months, completed by multiple specialist crews working in tandem. There would be 16 No. personnel on-site altogether. The Plant and Machinery required would include a large 800-tonne crane and smaller 200-tonne assist crane for dismantling the turbines and HGVs and specialist extendable trailers to remove the turbines and electrical equipment from the site. Also required would be small excavators, dump trucks, front loaders, tractor and trailers, fencing machinery and equipment for reinstatement works.

3.11.2.1 Decommissioning Works & Activities

Works and activities to decommission the windfarm would take place predominantly from the hardcore windfarm footprint. The decommissioning process would involve;

- Decommissioning and dismantling electrical equipment, plant and apparatus;
- Removal of underground cables;
- Dismantling and removing the turbines;
- Removing equipment from the Windfarm Control Buildings;
- Reinstatement and restoration of the windfarm site.

Compared to fossil fuel or nuclear power stations, the decommissioning of a windfarm is a relatively straightforward dismantling of structures and reinstatement of the land over subterranean structures. There are no toxic residues from the windfarm process and therefore there would be no requirement for site clean-up or rehabilitation and no legacy waste to be considered.

3.11.2.1.1 Decommissioning and Dismantling Electrical Plant and Apparatus

Most electrical plant and apparatus are composed of steel and cast iron with some metals for wiring and rare earths for magnets. All the electrical plant and apparatus in the turbines and the Windfarm Control Buildings would be decommissioned, drained of hydrocarbon fluids, if present, and transported to be re-used as second-hand plant or to be segregated into materials and repurposed into other electrical plant or parts or recycled and recast in its original form.

The windfarm operator side of the Parksgrove Substation would be decommissioned, and electrical plant and apparatus removed. The EirGrid side of the Parksgrove Substation would remain in place as a permanent asset on the national electricity system

3.11.2.1.2 Removal of Underground Cables

The cables would be pulled from the underground ducts. The ducting itself which is a stable plastic material, would be left in the ground. The cabling comprises aluminium, copper and steel cabling surrounded by polymers. Cables would either be re-used as second-hand or segregated into materials and re-purposed into other cabling or parts or recycled and recast in its composite-part original forms.

3.11.2.1.3 Dismantling the turbines, met mast and LiDAR unit

Turbines would be dismantled by crane using the same process as erecting the turbines.

Dismantling would involve removal of the blade sets and rotor bearings, removal of the gearbox and generator from the nacelle, removal of the nacelle itself and finally, the removal of the tower sections.

The meteorological mast would be similarly dismantled by crane and either reused or recycled.

Dismantled wind turbines are a valuable source of resources which can be reused in the circular economy. Eighty-five to ninety per cent of a dismantled wind turbine can be recycled because the towers, generators and gearboxes are mostly made up of metals, mainly steel and iron, which is easy to recycle and for which there is an active circular economy market in Ireland and Europe.

Wind turbine blades are made of composite material of fibreglass and epoxy resins and cannot be reused in their original form but can be recycled. Three main methods of fibreglass recycling are:

1. **Grinding** – waste fibreglass is cut up and then mechanically shredded into even smaller pieces or powder. The process leaves little to no waste, but the process damages the glass fibres so they can't be used in the same way as new glass fibre. The shredded fibreglass is reused as filler in cement, artificial wood or asphalt.
2. **Incineration** – burning or thermal oxidation uses the waste fibreglass to generate heat for other uses, generally creating steam to power turbines generating electricity or to heat cement kilns.
3. **Repurposed** - Blades are also being repurposed for street furniture, bicycle shelters, bridges and walkways on cycle paths; in playgrounds as ramps, slides and tunnels; and for reefs and motorway sound barriers. These uses will be expanded in the coming years as part of the turbine manufacturer's environmental, social, governance (ESG) and sustainability programmes.

Operating fluids or lubricants are used in turbines in the generator, converter, gearbox, hydraulic system, rotor bearings and transformer. During the preparatory work for dismantling, the operating fluids would be drained off by trained specialist personnel with the aid of special machines. The fluids would be collected in special containers for recycling, usually by refining and reconditioning as base oil.

The Met Mast is a mainly metal structure, which will be dismantled on-site. The tower can be reused at another site, or the metal components can be recycled. The LiDAR unit can be removed for use at another site.

3.11.2.1.4 Transporting Turbine Components Off Site

During decommissioning it may be necessary to transport turbine components (at their full size for reuse) from the site, therefore the transportation of the tower sections and blades may require (depending on the transport size) the same temporary facilitating works which were put in place during the construction phase, and may also require street furniture to be temporarily removed once again. Once all of the large loads have been transported off site, these temporary facilitating works would be permanently reinstated and any temporarily removed roadside boundaries would also be reinstated.

3.11.2.1.5 Restoration of the Windfarm Site

The new and widened site roads would be left in place if they are of use to the agricultural landowners at the site. The windfarm control building would be decommissioned, and electrical plant and apparatus removed, however the building and hardstanding area would remain in place for farm use.

The subterranean concrete i.e. turbine foundations, would be left in situ because their removal would require extensive excavations and set and cured concrete is a stable material. Foundations have a cylindrical steel ring which incorporates the bolt basket protruding from the foundations slightly above ground level, onto which the turbine tower was bolted. This ring/upper bolt basket would be cut away and sent for recycling.

The site would be restored after all decommissioning works have been completed. All turbine areas would be restored, this would involve covering the turbine foundation and hardstanding areas with topsoil stored in the permanent overburden storage berms alongside the hardstands, filling in drainage channels at turbine locations, and reseeding the area with pasture grass species. All restored areas will be graded and landscaped sympathetically with the site contours. Restoration and revegetation of the site will be carried out under the supervision of a suitably qualified ecologist.

The works will be carried out in consultation with Kilkenny County Council. However, as noted in the Scottish Natural Heritage report (SNH) Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms (SNH, 2013) reinstatement proposals for a wind farm are made approximately 30-years in advance and within the lifespan of the wind farm technological advances and preferred approaches to reinstatement are likely to change. According to the Scottish Natural Heritage guidance (2013) Research and guidance on restoration and decommissioning of onshore wind farms, it is therefore:

"best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the wind farm".

The works will be carried out in consultation with Kilkenny County Council.

3.11.2.2 Decommissioning Costs

At present commodities prices, decommissioning costs are fully covered by the scrap value of the plant and equipment. There is also a market for second-hand turbines although this is very variable and would depend on condition and technology use. At present commodities prices, the sale of the steel, aluminium and copper recovered from a dismantled turbine exceeds the cost of dismantling the turbine and reinstatement of the site.

3.12 Vulnerability to Major Accidents, Natural Disasters, Climate Change

3.12.1 Vulnerability to Major Accidents

There are no Seveso sites in proximity to the Whole Gathabawn Windfarm Project, the nearest being Grassland Fertilizers on the outskirts of Kilkenny City, which is c.15km from the windfarm site. Therefore, it is considered that the Whole Gathabawn Windfarm Project is not vulnerable to Major Accidents due to separation distances from the nearest Seveso site.

Furthermore, the Gathabawn Windfarm itself will not cause a Major Accident from the use of Dangerous Substances during construction, operation or decommissioning, because of the minimal volumes of such substances which will be used on site - limited to petrol and diesel used by vehicles; oils and grease/lubricants required by the wind turbines and at the control buildings and substations during operation; and very small amounts of SF6 gas which will be used for the switch gear inside the Parksgrove Substation and at the existing EirGrid Ballyragget Substation during operation.

3.12.2 Vulnerability to Natural Disasters and Climate Change

The vulnerability of the Whole Gathabawn Windfarm Project to extreme weather and natural disasters such as flooding and land-slippage, is examined below.

3.12.2.1 Extreme Weather –Storms

Vulnerability of the Proposed Gathabawn Windfarm: The turbines to be installed at Gathabawn Windfarm will be designed in accordance with the IEC 61400 standard to ensure the structures are appropriately engineered against damage from hazards (including high winds) during the planned lifetime of the structures. Before installation, turbine manufacturers also carry out computerised wind flow models of the windfarm site to ensure turbulence and fatigue loading is not exceeded. The Beaufort Scale classes a Force 12 storm with speeds in excess of 32m/s (or in excess of 117km/h) as Hurricane Force. The wind turbines which will be installed at the Gathabawn Windfarm site will be designed to withstand at least 60 m/s (215km/h).

Vulnerability of the Candidate Gathabawn Grid Connection: The underground cabling, electrical apparatus and equipment will not be affected by wind storms because the cables will be underground under access roads, while the type of electrical apparatus and equipment which will be installed at the substation will be designed to withstand exposure in the open countryside.

Therefore the likelihood of the Gathabawn Windfarm project being affected by wind storms is considered to be Extremely Unlikely.

3.12.2.2 Extreme Weather – Temperature Variations

Vulnerability of the Proposed Gathabawn Windfarm: In relation to extremes of temperature, the turbines to be installed at Gathabawn Windfarm will be designed in accordance with the IEC 61400 standard to ensure the structures are appropriately engineered against damage from hazards (including temperature) during the planned lifetime of the structures. The Gathabawn turbines will be designed to operate within temperature ranges between -20°C and +50°C. The turbines can be fitted with a de-icing system which will thaw ice from the blades using fans installed inside each blade root.

Vulnerability of the Candidate Gathabawn Grid Connection: The type of electrical apparatus and equipment to be installed at Parksgrove Substation will be designed to withstand temperature variability.

Overall, the likelihood of the Whole Gathabawn Windfarm Project being affected by temperature extremes is considered to be Extremely Unlikely.

3.12.2.3 Extreme Weather –Flooding and Rainfall

Vulnerability of the Proposed Gathabawn Windfarm: Examination of the Office of Public Works & Flood Relief mapped fluvial (river), pluvial (rainfall) or groundwater flooding zones as per the http://www.floodinfo.ie/ website, shows that the Proposed Gathabawn Windfarm site is not located within any mapped fluvial, pluvial or groundwater flooding zone, and there is not vulnerable to flooding due to the elevated nature of the location and the minimal amount of water on the site.

Extreme rainfall events at a location have the potential to damage infrastructure through high volumes of rainwater runoff. The windfarm drainage system will prevent rainwater runoff from collecting or ponding on the upslope side of windfarm infrastructure by collecting this upslope runoff and directing it via the site drainage network to the downslope side at regular intervals via cross drains and outfall weirs. The design of windfarm site roads and hardstanding areas will ensure that rain falling onto the footprint of the windfarm will be directed into the downslope drainage network and attenuated to reduce the erosion potential of the runoff through the provision of check dams, swales and settlement ponds as part of the drainage network, and by releasing the runoff to surrounding land at regular intervals via outfall weirs. The settlement ponds at outfall locations have been sized according to the size of the area they will be receiving water from and are large enough to accommodate a 10-year return rainfall event. The windfarm drainage system will be installed during the construction phase and remain in place and regularly maintained for the operational lifetime of the windfarm. Therefore, it is considered that the proposed Gathabawn Windfarm will not cause flooding.

Vulnerability of the Candidate Gathabawn Grid Connection: The Parksgrove Substation is not located within any mapped flood area, and due to the use of aggregate within the compound and the underground nature of the cabling, it is considered that the Candidate Gathabawn Grid Connection will not cause flooding to occur.

While the Candidate Gathabawn Grid Connection does pass through a mapped flood zone at two locations: (i) to the north of Ballyragget town where the Parksgrove-Moatpark Underground Cabling crosses the River Nore and its floodplain, and (ii) where the Ballyring-Parksgrove Underground Cabling is routed across the Lisdowney Stream and through its floodplain. These parts of the Candidate Gathabawn Grid Connection relate to underground cabling and as these cables will be installed underground, within protective ducts in a trench surrounded by concrete, it is considered that once constructed, that they will not be vulnerable to flooding or saturated soils. At the River Nore, the ducts for the cables will be installed several meters under the bed of the River Nore, using horizontal directional drilling technique. The drill pits will be located outside of the flood extent, as will the joint bays for this section of Underground Cabling. At the Lisdowney Stream crossing, due to a requirement for instream works and the fisheries suitability of the Lisdowney Stream - the instream construction works will be carried out during the months of July, August and September – as required by Inland Fisheries Ireland. Furthermore, the jointing chambers along the Ballyring-Parksgrove Underground Cabling will be located outside of the flood extents along the Lisdowney Stream. Mitigation measures include a commitment to schedule works in the area of both of these crossings to take place during July to September, and during a period when there is no risk of flooding.

In summary, it is considered that the likelihood of the proposed Gathabawn Windfarm or the operational Candidate Gathabawn Grid Connection being affected by flooding or extreme rainfall events or causing flooding to occur, is considered to be Extremely Unlikely. When the timing measure is implemented, it is considered that the likelihood of the Candidate Gathabawn Grid Connection construction works being affected by flooding or extreme rainfall events or causing flooding to occur is Extremely Unlikely.

3.12.2.4 Natural Disaster - Landslide

Vulnerability of the Proposed Gathabawn Windfarm: Site visits and ground investigations, which included trial holes and boreholes found that **no part of the Proposed Gathabawn Windfarm is located within an area of peat.** An examination of the GSI Landslide Susceptibility Mapping (www.gsi.ie/en-ie/data-and-maps/Pages/Geohazards.aspx#landslides) found that the majority of the turbines and windfarm site roads are located in locally flat areas with Low GSI landslide susceptibility. No turbines are located within a High Risk Area.

While there is one area with a high risk of landslide within the windfarm site, (located c.175m from T4 in the Ballylehaun Area), this area comprises one of the Biodiversity Area at the site, where the existing native wood will be protected and maintained, and a connecting corridor of trees and shrubs will be planted to join this wood with the small wood in the Gales Hill Nature Reserve to the north. This connectivity corridor is located along the High Risk area, no excavation works or changes to ground levels will occur in this zone. The authors of the Geotechnical Stability report (appended to Chapter 7 Soils) determined that there was no likelihood of landslide at the windfarm site, including at the Biodiversity Area in the Ballylehaun Area.

Furthermore, no landslide events have occurred at the Gathabawn Windfarm. Just one historic landslide event within 10km of the windfarm site, located at Cullahill Mountain c.1.5km from the closest proposed Gathabawn Windfarm turbine. Overall, the likelihood of the Gathabawn Windfarm project being affected by landslip is considered to be Extremely Unlikely.

Vulnerability of the Candidate Gathabawn Grid Connection: The Parksgrove Substation and Parksgrove-Moatpark Underground Cabling are both located within an area identified as Low Risk of landslide. The Ballyring-Parksgrove Underground Cabling is also predominantly in areas identified as having a Low Risk of landslide. However, there is a 30m section of the cable route which passes through an area of high risk for c.30m. As the cables will be installed in underground trenches which will backfilled with the material removed during the initial excavation, and the works location reinstated to match the original slopes and topography, it is considered by the authors of the Geotechnical Stability report that the construction of the Ballyring-Parksgrove Underground Cablings along this 30m section of the route is **Very Unlikely** to cause landslip.

3.12.2.5 Overall Risk

In summary, due to the Whole Gathabawn Windfarm Project not being vulnerable to Major Accidents, along with the inherent stability of the Proposed Gathabawn Windfarm and Candidate Gathabawn Grid Connection sites; the absence of peat; the absence of watercourses within the construction footprint of the windfarm and the timing of watercourse crossings along the Candidate Grid Connection; the absence of vulnerability to climate change, the design standards associated with the turbines, and grid connection components, the undergrounding of cabling at shallow depths – **disasters as a result of severe storms, extreme temperatures, land slippage or flooding/heavy rainfall events are considered extremely unlikely to occur**, no particular mitigation measures are required for Major Accidents; Natural Disasters and Climate Change.

Furthermore, it is considered that the presence of the Whole Project will not increase the likelihood of a disaster occurring.

3.12.2.6 Mitigation by Design to avoid/reduce Vulnerability to Natural Disasters

Although mitigation measures are not required for the project to manage vulnerability or risk associated with natural disasters, it is noted that the following measures, most of which form part of the project design or part of the suite of environmental protection measures for the windfarm development, will contribute to the reduction in risk in relation to natural disasters and climate change.

3.12.2.6.1 Mitigation by Design

The following design aspects of the Whole Gathabawn Windfarm Project will avoid or reduce the likelihood of the Project being affected by extreme weather, flooding or landslip events:

Proposed Gathabawn Windfarm

- Compliance of the wind turbines with the latest IEC 61400 standard;
- Location of the wind turbines, windfarm site roads and control buildings away from flood extents;
- Undergrounding of windfarm electricity cables. The electricity will be transported by underground cables placed in sealed ducts, protecting them from extreme weather and flooding;

- Turbine foundations constructed on bedrock or other competent material, overlain with and surrounded by a hardstanding area;
- Design of construction areas to ensure cut and fill slopes are provided at a minimum of 1:1.5, and detailed design reviewed by geotechnical engineer;
- Absence of sensitive hydrology features (i.e. watercourses) in the Ballylehaun or Ballyring Areas;
- Absence of peat at the proposed Gathabawn Windfarm site
- Installation of windfarm drainage network, to include upslope and downslope drains, along with cross drains, outfall weirs, check dams, swales and settlement ponds;
- Unsuitable material excavated from windfarm site roads and turbine hardstanding locations will be used to backfill borrow pits.

Candidate Gathabawn Grid Connection

- Timing of instream works at the Lisdowney Stream and HDD works at the River Nore to occur during the months of July, August or September, and during a period of low flood risk.
- Underground nature of the cabling,
- Location of Parksgrove Substation outside of a floodplain and outside of flood extents.

3.12.2.6.2 Mitigation by management

Mitigation by management relates to supervision and scheduling of works, and to practices which will be implemented in order to avoid/reduce the risk of the Whole Gathabawn Windfarm Project being affected by extreme weather, flooding or landslip events. These measures will include;

- Construction Environmental Management Plan
- Sediment & Erosion / Storm Water Control Plan
- Environmental Manager, Project Ecologist
- Ground Stability Measures, Management of excavated material
- Runoff and Sediment Control, Windfarm Drainage System
- Monitoring of Silt Fencing & Drainage Structures
- Weather monitoring
- Emergency Response Procedures

The provision for Emergency Response Procedures is included in the Environmental Management Plan (EMP) for the Whole Gathabawn Windfarm Project. The Emergency Response Procedures will include site-appropriate actions to be taken in the event of significant downstream surface water pollution.

Environmental Awareness Training will also be provided to ensure that all of the appointed Contractors site personnel have the appropriate knowledge to successfully implement the environmental management measures set out in the EMP. The main objective of the training will be to make sure that site personnel are aware of the relevant Environmental Commitments, the Environmental Protection Measures and that site personnel are aware of the steps to take in an environmental emergency situation.

In relation to unrelated disasters in the locality: Should a disaster occur, unrelated to, and not affecting, the windfarm or the grid connection, but occurring within in the locality – the implementation of the site drainage network, the use of weather forecasting, the monitoring of the construction works by the Environmental Clerk of Works, the monitoring of the operating windfarm by the Asset Manager and the monitoring of the Parksgrove Substation by Eirgrid, the provision of point of contact details to key stakeholders, and the ability to control the operational turbines and substations remotely, will ensure that the Project will not make the consequences of the unrelated event worse.

3.13 Potential to change the intensity of existing pressures to European Sites

There are 14 pressure categories under Article 17 Reporting. Pressures are considered to be factors which have acted within the current reporting period, while threats are factors expected to be acting in the future (in the future two reporting periods, i.e. within 12 years following the end of the current reporting period). It is possible for the same impact to be both a pressure and a threat if it is having an impact now and this impact is likely to continue. The potential for the Whole Gathabawn Windfarm Project to change the intensity of existing pressures to European Sites is examined in the table below.

AA Table 4: Potential to change intensity of existing pressures

Pressure Code	Pressure Category	Examination of the potential for the Project to contribute to the Pressure
PA	Agriculture related practices	No – project does not involve any agricultural related practices
PB	Forestry related practices	No – project does not involve any forestry related practices
PC	Extraction of resources	Yes – the project does involve the temporary extraction of rock from two borrow pits at the windfarm site.
PD	Energy production processes and related infrastructure development	Yes – the project is a renewable energy development. Related infrastructure development in the form of the 16km underground grid connection and associated substation.
PE	Development and operation of transport systems	No – the project does not involve the development or operation of transport systems
PF	Development, construction and use of residential, commercial, industrial and recreational infrastructure and areas	No – the project does not involve the development, construction or use of residential, commercial, industrial or recreational infrastructure areas
PG	Extraction and cultivation of biological living resources (other than agriculture and forestry)	No – the project does not involve the extraction or cultivation of any biological living resources
PH	Military action, public safety measures, and other human intrusions	No – the project does not involve military action or public safety measures or other human intrusions
PI	Alien and problematic species	Yes – excavation and vegetation clearance, and the movement of machinery and materials poses the risk of the spread of invasive species.
PJ	Climate change	No – the project will not increase the intensity of climate change impacts. It will however contribute to climate mitigation in the form of offsetting carbon emissions.
PK	Mixed source pollution	Yes - excavation and relocation of soils, groundworks, overburden storage, presence/use of machinery, oils and fuels, concrete pours, forestry felling have the potential to contaminate and reduce water quality in downstream sensitive watercourses.
PL	Human induced changes in water regimes	Yes, potential for hydrological and physical modifications of waterbodies as a result of sediment-laden runoff from construction works.
PM	Geological events, natural processes and catastrophes	No, the project will not cause geological events or catastrophes. Natural process are not relevant to the project.
PN	Unknown pressures, no pressures and pressures from outside the MS	No, no unknown pressures are anticipated.

3.14 Other Plans or Projects considered for in-combination effects

The identification of Other Projects and Activities, which due to their size and characteristics, were considered to have potential to cause cumulative impacts with the Proposed Gathabawn Windfarm was carried out through research of planning records and databases including the website os An Coimisiún Pleanála, Kilkenny County Council, Tipperary County Council, Laois County Council and the EIA Planning Portal. The research covered a 10-year period to mid-September 2026 and encompassed an area 20km from the Gathabawn turbines, hydrologically connected sub-catchments, and all catchments of the River Nore catchment upstream of Kilkenny City, which extended the research area beyond 20km.

The following Other Projects are included for consideration herein:

- Existing Lisdowney Wind Farm;
- Existing Wind Farms on cutover peatlands, west of Johnstown and Galmoy;
- Existing Wind Farms and Turbines on the southern Slieveardagh Hills;
- Existing and Consented Wind Farms on the Castlecomer Plateaux (Pinewood, Ballynalacken);
- Consented Briskalagh Wind Farm Grid Connection (could connect to Eirgrid Ballyragget);
- Consented Battery Energy Storage System projects in the Moatpark area (BESS 1 and BESS 2);
- In-Planning (under appeal to ACP) Seskin Wind Farm and Grid Connection (Counties Laois, Kilkenny);
- In-Planning (SID) Littleton Wind Farm Grid Connection (could connect to Eirgrid Ballyragget);
- Potential Killoshulan Wind Farm (c.3km south of the Ballylehaun Area);
- Potential future connection of another energy project into the Parksgrove Substation;
- Intensive management of agricultural lands; and
- Kilkenny County Council Ballyragget Masterplan (2024)- potential River Park and looped walk.

These Other Projects are identified on AA Figure 10: Other Projects Considered for In-Combination Effects.

3.14.1.1 Existing Lisdowney Wind Farm

The existing 4-turbine Lisdowney Windfarm is located 1.25km to the north of the Ballyring turbines.

Given its proximity to the Proposed Gathabawn Windfarm, this existing wind farm and is taken into consideration for in-combination effects on European Sites herein.

3.14.1.2 Existing Wind Farms on cutover peatlands, west of Johnstown and Galmoy

Existing large wind farms on cutover peatlands to the west of the proposed Gathabawn Windfarm - Lisheen I, II, III, and Bruckana Wind Farms. Only 6 turbines within the Nore catchment. Due to the presence of wind turbines, these Other Projects are taken into consideration for in-combination effects on European Sites herein.

3.14.1.3 Existing Wind Farms and turbines on the southern Slieveardagh Hills

Existing multiple small-medium wind farms on the southern Slieveardagh Hills to the south / southwest of the proposed Gathabawn Windfarm – Ballybay, Foyleature (existing) Farranrory Wind Farms (under construction) and Cnoc Wind Farms, Kyleballyoughter and Briskalagh Wind Farm (consented). These turbines are mainly located outside the Upper Nore catchment, in the Kings River catchment, though it is noted that some Briskalagh turbines are located in the Upper Nore catchment. In addition, due to the presence of wind turbines, these Other Projects are taken into consideration for in-combination effects on European Sites herein.

3.14.1.4 Wind Farms on the Castlecomer Plateaux (ACP Ref: PL11.316305, PA10.322069)

The 11-turbine Pinewood Windfarm is currently under construction in forestry and agricultural lands, c.16km from the Gathabawn Windfarm. The consented 12-turbine Ballynalacken Windfarm is also within the upper Nore catchment, located c.3-4km to the east of the River Nore, c.10km from the nearest Gathabawn turbines. The Ballynalacken project includes an underground grid connection route to Eirgrid Ballyragget along Regional

Road R432. Due to the inclusion of wind turbines in both developments, and in relation to Ballynalacken - the potential for overlapping construction periods, proximity of grid connection works, location within the Nore catchment, these Other Projects are taken into consideration for in-combination effects on European Sites.

3.14.1.5 Consented Briskalagh WF and Grid Connection (ACP Ref: PA10. 322154)

Consented 7-turbine wind farm on the southern Slieveardagh Hills, east of Kilkenny City, c.13km from the nearest Gathabawn turbines. Consent includes an underground grid connection route to Eirgrid Ballyragget. Wind Farm is mainly in the Kings River catchment. The Briskalagh WF grid connection is routed along the N77, crosses under the River Nore and is routed along the R432, adjacent or in close proximity to the Candidate Gathabawn Grid Connection route to Moatpark. Due to the potential for overlapping construction periods, particularly of the grid connection, the proximity of the grid connection with the Candidate Gathabawn Grid Connection, and inclusion of wind turbines in the development, this Other Project is taken into consideration for in-combination effects on European Sites herein.

3.14.1.6 Consented BESS 1, BESS 2 in Moatpark (Kilkenny Co Co Ref: 2460221, 2460241)

Two consented Battery Energy Storage System projects in the Moatpark area. Kilkenny County Council Planning Ref: 2460221, 2460241.

The Candidate Gathabawn Grid Connection is located in the same landholding as BESS 1. Both BESS 1 and BESS 2 are in relatively close proximity to the River Nore, and therefore are taken into consideration for in-combination effects on European Sites herein.

3.14.1.7 In-Planning (under appeal) Seskin Wind Farm and Grid Connection (ACP Ref: 323759, 323775)

8 No. wind turbines proposed for County Kilkenny (6 turbines) and County Laois (2 turbines), <1km from the River Nore. Includes an underground grid connection to Eirgrid Ballyragget Substation. The grid connection is routed along the N77 and crosses the River Nore by directional drilling technique, close to the crossing point of the Candidate Gathabawn Grid Connection. Due to the proximity of the grid connection works, and the location of the project in the Nore_SC_70, with turbines just under 5km from the proposed Gathabawn Windfarm turbines, this Other Project is taken into consideration for in-combination effects on European Sites herein.

3.14.1.8 In-Planning (SID) Littleton Wind Farm (ACP Ref: PAX92.324370)

11 No. turbines on cutover peatlands to the southwest, c16km from the nearest Gathabawn turbine. Windfarm is not within the River Nore catchment. A candidate grid route to Eirgrid Ballyragget Substation was identified, which appears to partially overlap the route of the Farranrory WF grid connection (under construction) between Littleton Wind Farm and Freshford, and then appears to overlap the route of the Briskalagh WF grid connection (consented) between Freshford and Moatpark. However, the location of the cables in the N77 road or its crossing of the Nore is not clear. Nonetheless, the grid route is adjacent or in close proximity to the Candidate Gathabawn Grid Connection route to Moatpark.

Due to the potential for overlapping construction periods, particularly of the grid connection, the proximity of the grid connection with the Candidate Gathabawn Grid Connection, and inclusion of wind turbines in the development, this Other Project is taken into consideration for in-combination effects on European Sites herein.

3.14.1.9 Potential Killoshulan Wind Farm development 3km from the Proposed Gathabawn Windfarm

Recent public engagement information day held near Urlingford, pre-application SID status. This potential development involves c.11 turbines, a 110kV substation with battery storage and a grid connection to Eirgrid Ballyragget Substation. Due to the proximity to the Proposed Gathabawn Windfarm and Candidate Gathabawn Grid Connection, the potential for overlap of construction periods, and inclusion of turbines in the development, this Other Project is taken into consideration for in-combination effects on European Sites herein

3.14.1.10 Potential future connection of another energy project into the Parksgrove Substation

The design of the Parksgrove Substation is in accordance with EirGrid specifications, and as such is future proofed to accommodate other potential energy projects in the area if necessary. Similarly, the size of the ducting between the Parksgrove Substation and the Ballyragget EirGrid Substation will also be sufficient to accommodate heavier cables which may be required to carry any extra electricity produced by other projects, avoiding further connections crossing beneath the River Nore.

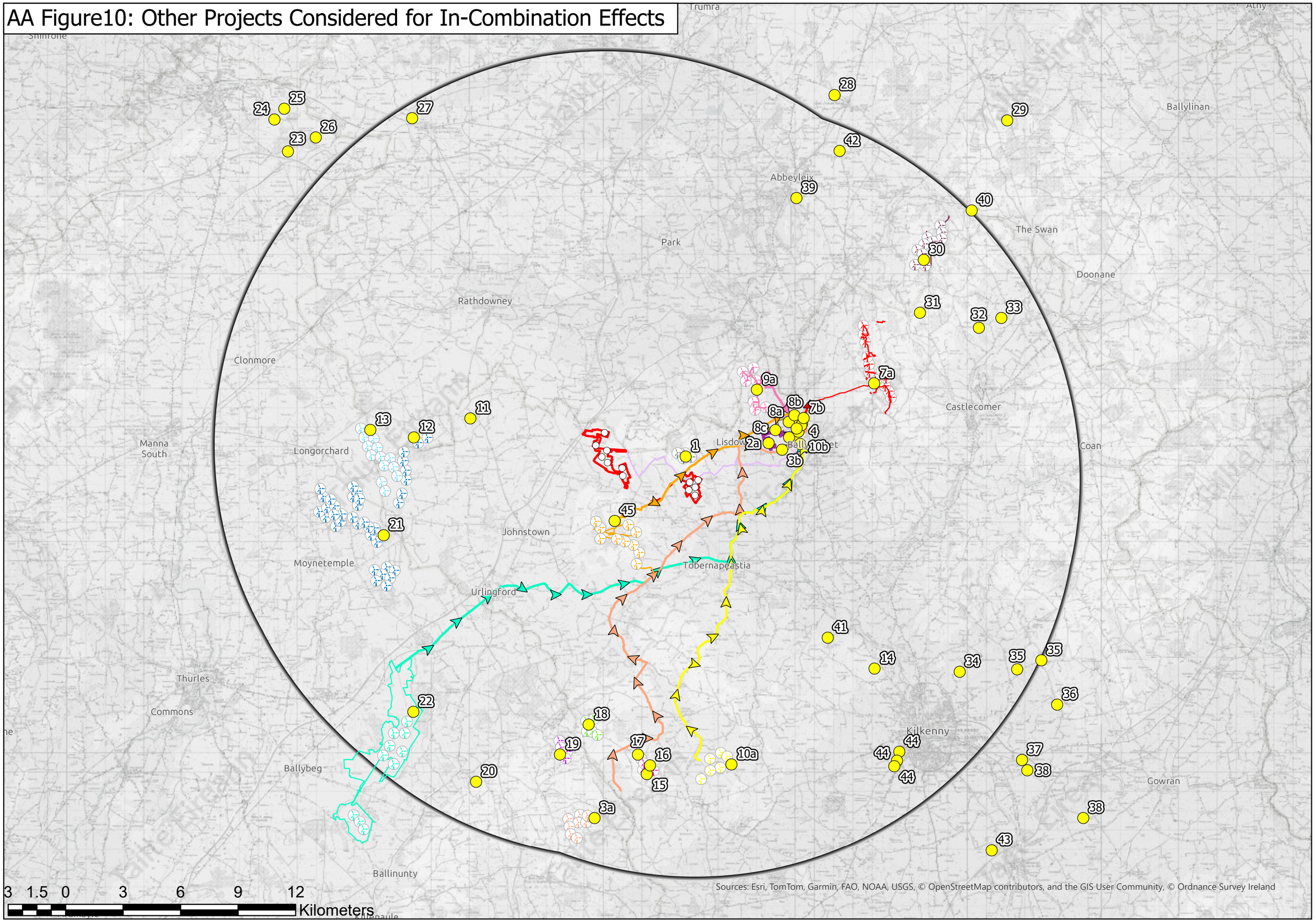
3.14.1.10.1 Facilitating Future Connection Needs

The existence of the Parksgrove Substation and the Parksgrove-Moatpark UGC *(should they be permitted and constructed)* could result in other energy projects, such as solar farms, windfarms, and battery energy storage projects seeking to use the Parksgrove Substation to connect onto the national electricity system, some of these projects – such as solar or battery could occur in close proximity to the Parksgrove Substation. It is likely that, should secondary projects connect into the Parksgrove Substation that that connection would take place after the Parksgrove Substation and cabling into Moatpark was constructed and commissioned, thereby avoiding cumulative effects to the environment associated with construction works, noise and activities.

3.14.1.11 Ballyragget River Park Walk

Kilkenny County Council Ballyragget Masterplan (2024), promotes a potential River Park along the banks of the River Nore, this potential River Park would be located along a new looped walk around the settlement area of Ballyragget.

AA Figure10: Other Projects Considered for In-Combination Effects



3.15 Physical Changes in the Environment

The **Proposed Gathabawn Windfarm** will result in the following physical changes in the environment:

- Up to 59ha of temporary landcover change within construction works areas. The majority of which will be reinstated/revegetated within 4-6 months of the main groundworks being completed.
- Permanent change of 6.6ha of improved grasslands to BL3 Building and Artificial Surfaces, under the permanent hardcore footprint of the wind farm.
- Erection of 12 No. 150m and 170m high wind turbines on the northern Slieveardagh Hills, in County Kilkenny.
- No instream works or other physical modifications of riverbeds associated with the development of the Proposed Gathabawn Windfarm; however,
- Without mitigation measures in place, there is potential for silt-laden runoff to enter downgradient waterbodies, which could result in changes to morphology.

In relation to the **other elements of the whole project**:

- Up to 14ha of temporary landcover change within construction works areas, vast majority of which will be reinstated within 4-6 months of works;
- Permanent change of 0.8ha scrub/grassland habitat associated with the Parksgrove Substation and the two short lengths of new access roads to the joint bays along the Parksgrove-Moatpark UCG.
- Construction of a new substation with control buildings and outdoor equipment in Parksgrove townland.
- Instream works in the Lismaine, Lisdowney and Ballyconra Streams to install the cable ducting.

In relation to the **other projects**:

- The nearby (1.25km) Lisdowney Wind Farm is located in agricultural grassland with land cover change to BL3, however no further changes to land cover are expected at this existing project; The Lisdowney Wind Farm has also resulted in addition of 4 No. 121.5m high turbines to the physical environment.
- The existing and under-construction wind farms in cutover peatlands to the west, and on the Slieveardagh Hills to the south, and on the Castlecomer Pleataux to the east have/will have resulted in landcover change from peatland, forestry and agriculture to BL3, and the addition of wind turbines to the physical environment.
- Both Ballynalacken WF and Briskalagh WFs were granted permission in 2026, including grid connections to the Ballyragget Eirgrid Substation. In addition, BESS 1 and BESS are also consented but not yet built. Both wind farms will result in temporary land cover change in the vicinity of the River Nore, with permanent landcover change associated with the BESS projects. The Ballynalacken and Briskalagh WFs will result in additional turbines on the Castlecomer Plateaux and southern Slieveardagh Hills.
- The Other Projects currently in the planning system – Seskin Wind Farm and Littleton Wind Farm if consented, would result in temporary and permanent landcover changes in agricultural grassland and cutover peatlands. It is noted that unlike Seskin Wind Farm, the Littleton Wind Farm is not located within the River Nore catchment. In addition, the Seskin and Littleton Wind Farms could result in the addition of turbines, 5km and 16.5km, respectively from the proposed Gathabawn turbines.
- The Other Project currently preplanning at public engagement stage – Killoshulan Wind Farm, should it enter the planning system and be consented, would result in temporary and permanent landcover changes in agricultural and forestry lands. In addition, the Killoshullan Wind Farm could result in the addition of 8 No. 185m high turbines within 5km of the Gathabawn turbines.
- Intensive management of agricultural lands maintains grasslands in the wider area, generally as improved agricultural grassland (GA1) habitat, through the use of fertilizers, slurry spreading, drainage, and grazing and mowing.

3.16 Overall affected area

Article 17 reporting uses the following parameters to assess the conservation status of habitats and species:

- Habitats - Range, Area, Structure and Function (including typical species) and Future Prospects
- Species - Range, Population, Habitats for the species and Future prospects

When all aspects of the project are considered in relation to the above parameters, it is considered that the potential for effects to European Sites relate to:

- Land cover change and vegetation clearance works;
- Dust deposition
- Mortality due to excavation works or collision with machinery
- Disturbance/displacement as a result of noise, vibration or presence of site personnel at works locations
- Changes in flow rates or drainage patterns
- Reduction in water quality in hydrologically connected waterbodies
- Spread of invasive species
- Mortality due to collision with turbines
- Displacement or barrier effects of the windfarm in the landscape

The expected areas affected by the proposed development are identified in the Table below. The Zone of Impact (ZoI) for designated sites is based on the Source-Pathway-Receptor model (S-P-R) to identify connectivity of impact sources via direct, hydrological, hydrogeological or other pathways to relevant QIs and SCIs based on QI/SCI specific ecological niches, distributions and extent of mobility as relevant to habitats and species associated with the site.:

AA Table 5: Expected Zone of Influence of the Whole Gathabawn Windfarm Project

Impact/Source of Impact	Distance/Area	Justification for distance/area
Land cover change, and vegetation clearance works	Species/taxa dependent; Works areas plus (in all directions): - 50m for habitats - 50m for invertebrates - 50m for amphibians or reptiles - 300m for Otter - 200m for bats (trees as roosts)	Professional judgement and as per Best Practice (CIEEM, 2018)
Dust deposition	Within 50m of the boundary of the site; and within 50m of the routes used by construction vehicles or delivery vehicles on the public road for the first 250m of the public road from the Project site entrance.	Based on the UK Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction Activities'.
Mortality due to excavation works or collision with machinery	Within the construction works area boundary.	Plant and machinery will be confined to the works area boundaries, which will be defined by a livestock-proof fence.
Disturbance or displacement around works locations	Species/taxa dependent; Works areas plus (in all directions): - 50m for invertebrates - 300m for Otter, - 500m for bats (trees as roosts)	Invertebrates: Best practice guidelines published by the NRA (2006). Otters: Best practice guidelines published by the Highways Agency (1999), NRA (2008), Reid *et al.* (2013).

	- 100m for passerine bird species - Up to 5km for raptors, waterfowl and waterbirds - 300m upstream and downstream for Kingfisher. - Watercourses at crossing locations	Bats and onshore wind turbines - survey, assessment and mitigation (SNH (now NatureScot), 2021); Kelleher, C. and Marnell, F. (2006) (NPWS); NPWS & Vincent Wildlife Trust (VWT) (2022); Collins (2023). Birds: Professional judgement and as per Best Practice (CBS, 2012; CIEEM, 2018; NRA, 2008; Lusby *et al.,* 2011; SNH, 2017; TII, 2017; EPA, 2006; Gilbert *et al.,* 2011; Bibby *et al.,* 2000; Goodship & Furness, (2022).
Changes in flow regimes or drainage patterns	Downslope / downstream waterbodies linked hydrologically via surface water and groundwater drainage catchments associated with the works areas- i.e., surface water sub-catchments: Goul_SC_010, Nore_SC_070, Nore_SC_060. Groundwater bodies: Durrow, Lisdowney and Kilkenny-Ballynakill Gravels.	As per CIEEM, 2018; EPA, 2017; DHPLG, 2018; CIRIA Technical Guidance C648: Control of water pollution from linear construction projects, CIRIA.
Reductions in downstream water quality	Downslope / downstream waterbodies linked hydrologically via surface water and groundwater drainage catchments associated with the works areas- i.e., surface water sub-catchments: Goul_SC_010, Nore_SC_070, Nore_SC_060. Groundwater bodies: Durrow, Lisdowney and Kilkenny-Ballynakill Gravels.	Worst-case scenario ZoI based on the extent of downstream pathway to the nearest designated site was considered not to extend beyond the first WFD transitional waterbody section of the River Nore [(Nore Estuary (IR_SE_100_0400)] from the nearest project source (OPR, 2021). As such, sub-catchments downstream of the Goul_SC_010, Nore_SC_070 and Nore_SC_060 were excluded due to dilution, dissipation and absorption factors in the main channel of the River Nore.
Spread of invasive species	Sub-catchments associated with whole project works areas- i.e. Goul_SC_010, Nore_SC_070 and Nore_SC_060.	Worst-case scenario ZoI based on the extent of downstream pathway to the nearest designated site was considered not to extend beyond the first WFD transitional waterbody section of the River Nore [(Nore Estuary (IR_SE_100_0400)] from the nearest project source (OPR, 2021). As such, sub-catchments downstream of the Goul_SC_010, Nore_SC_070 and Nore_SC_060 were excluded due to dilution, dissipation and absorption factors in the main channel of the River Nore.
Operational Phase		
Mortality due to collision with turbines	Species/taxa dependent; up to 5km from turbines for birds. 500m for bats.	Professional judgement and as per Best Practice (CIEEM, 2018). Birds: SNH (2017); Goodship & Furness (2022); Power *et al.* (2021). Bats: SNH (2021); NPWS & VWT (2022); Collins (2023).
Displacement of Barrier effect around turbines	Species/taxa dependent; up to 1km from turbines for birds.	Professional judgement and as per Best Practice (CIEEM, 2018). Assessing the impacts of wind farms on Birds (Drewitt & Langston, 2006).

Note: The competent expert, Ciara Nolan of AWN Consulting, who undertook the Air Quality evaluation in the EIA Report, conducted a screening of the Gathabawn Windfarm Project in accordance with the TII guidance document PE-ENV-01106, (2022), and found that the screening criteria to require a local Air Quality Assessment is not met for the affected road network (i.e. the roads along haulage routes), and therefore a local air quality assessment of traffic emissions is not required, and as a result it is evaluated that there is no potential for significant impacts to ecological receptors (including designated sites) as a result of traffic emissions.

4. Screening Step 3 – Identification of European Sites which may be affected by the project

4.1 Identifying European Sites – Methodology

In order to identify European Sites which may be affected by the Gathabawn Windfarm, in accordance with the Commission guidelines in Assessment of plans and projects in relation to European Sites (EC, 2021), the following matters were taken into account herein:

- the size and design, use of natural resources, emissions, wastes, transportation requirements, duration and timing of works and activities, and the requirement for physical changes in the environment of all aspects of the project, as described in Section 3.3 to 3.12, and Section 3.15 above;
- the potential for the project to change the intensity of existing pressures on European Sites, as outlined in Section 3.13 above;
- the potential for cumulation of impacts with other plans or projects, identified in Section 3.14 above;
- the extent of the area(s) affected by direct and indirect impacts, for example land cover change, disturbance or displacement around works locations, mortality or barrier affects around the turbines, reductions in water quality, changes in flow /drainage regimes, and relating to the risk of spread of invasive species, described in Section 3.16.
- an examination of the baseline ecological surveys to identify if any qualifying interest (QI) or special conservation interest (SCI) species occur or use the habitats at the windfarm site or within its zone of influence, see Section 4.2 below;
- an examination of the results of baseline ecological surveys to ascertain if there are any connectivity corridors for mobile species, or habitats which provide connectivity or ecological continuity to European Sites and in particular their designating features – see Section 4.2.8 below; and
- the geographical boundary of European Sites and the separation distance of the project to European Sites and in particular from their designating features – see Section 4.3 below.

4.1.1 Statutory Consultation

To inform the evaluations within this report, the following statutory bodies were consulted:

- A letter (including a map) requesting recommendations or observations in relation to the Gathabawn Windfarm was sent to the Development Applications Unit in the Department of Housing, Local Government and Heritage (letter dated 24th November 2021, with follow-up on 2nd June 2022); a response was received on 17th of August 2022, stating the department was not in a position to make specific comments on this referral at this particular time.
- A data request was also sent to the NPWS GIS division on 24th November 2021 and 31st May 2022, and a response was received on 29th November 2021 and 23rd June 2022, respectively for a full inventory of all protected and rare species recorded within the 10km grid squares overlapping the Gathabawn Windfarm site. An updated data request was sent to NPWS on 17th November 2025 and received a response on 18th November 2025 for the grid squares associated with the finalised Gathabawn Windfarm layout.
- A letter (including a map) requesting recommendations or observations in relation to the Gathabawn Windfarm was sent to Inland Fisheries Ireland (letter on 24th of November 2022, with a follow-up on 15th June 2022, and an additional follow-up on 17th of November 2025); a response was received on 20th December 2021,

15th June 2022 and 22nd December 2025, these letters by return which identified the relevant catchment areas, and made recommendations on surveys, evaluations and mitigation measures to be implemented.

4.1.2 Other Sources of Information used to inform site identification

This Appropriate Assessment Report takes into account the following sources of information:

- Standard Data Forms, Site Synopsis, Site Specific Conservation Objectives and Site boundary information and Management Plans where available for Natura 2000 sites;
- Supporting ecological receptor information, including field and detailed bird surveys, described in full in *Chapter 13: Biodiversity* of the subject application Proposed Gathabawn Windfarm EIA Report (EIAR 2026);
- Detailed description, location and layout mapping, and appendices for the Proposed Gathabawn Windfarm, in *Chapter 5: Description of the Development* of the subject application EIAR 2026;
- Detailed description and location and layout mapping for the other elements of the whole Gathabawn Windfarm project (i.e. Candidate Gathabawn Grid Connection and Off-Site Activities along the Turbine Delivery Route) in *Chapter 5: Description of the Development* of the subject application EIAR 2026; and
- Evaluation of the impact of the development on the Water environment, including the evaluation of the effect on the Water Framework Directive, carried out by SLR Consulting in EIAR Chapter 8: Water and EIAR Appendix 8.3 of the subject application EIAR 2026.
- Findings of the An Coimisiún Pleanála Appropriate Assessment for Ballynalacken Windfarm Project (ABP Ref. 322069-25) in Section 10 and Appendix 3 and Appendix 4 of the Inspector's report, which can be found at: https://www.pleanala.ie/anbordpleanala/media/abp/cases/reports/322/r322069.pdf?r=003075593126
- Findings of the An Coimisiún Pleanála Appropriate Assessment for Briskalagh Wind Farm Project (ABP Ref. 322069-25) in Section 10 and Appendix 1 and Appendix 2 of the Inspector's report, which can be found at: https://www.pleanala.ie/anbordpleanala/media/abp/cases/reports/322/r322154.pdf?r=672915086564

4.1.3 Desktop and Fieldwork Surveys

The Gathabawn Windfarm is located on the northern Slieveardagh Hills in north County Kilkenny. Lands in the area are typically intensively farmed with notable areas of commercial forestry in the surrounding area.

In order to identify the habitats and species present (or potentially present) within the receiving environment (and thus inform the assessment undertaken in this report), desktop studies and fieldworks surveys were conducted as described in the Sections below.

4.2 Desktop Studies and Field Surveys

The findings of desk and field studies undertaken between 2019 and 2026 for the various elements of the whole Gathabawn Windfarm project have been relied upon herein to inform the evaluation of the potential for the Proposed Gathabawn Windfarm to affect European Sites both alone and in-combination.

The Survey data is available in the Appendices which accompany this AA Report – *Appendix B: Species Records held by NBDC; Appendix C: Invertebrates, Amphibians, Reptiles and Terrestrial Mammals Survey Data; Appendix D Aquatic Ecology Baseline & Fisheries Report; Appendix E: Bird Survey Data; and Appendix 13.5 Bats which can be found in the EIAR Chapter 13*.

4.2.1 Methodology

4.2.1.1 Earlier studies for the Gathabawn Windfarm Project

Ecological studies have been conducted at the windfarm site for an extended period of time, between 2019 and 2026. Updated habitat, mammal (including bat), bird (vantage point, bird transect, raptor roost, raptor hinterland, wetland and waterbird) and freshwater aquatic ecology surveys were carried out in 2025 and 2026. Data from earlier studies are included herein where relevant to trends in the receiving environment.

4.2.1.2 Desk Study Methodology

A desk study was completed to assess the potential for all Qualifying Interests (QI) and Special Conservation Interests (SCI) of European Sites to occur within and in near proximity of the proposed Gathabawn Windfarm development, given their ecological requirements identified by Balmer *et al.* (2013) for SCIs, and the NPWS for QIs (NPWS, 2025a, 2025b and 2025c).

A desktop review of secondary data was carried out to formulate the baseline and background of the Whole Gathabawn Windfarm Project, including a review of:

- National Biodiversity Data Centre (NBDC) database for the 10km and 2km squares within which the Proposed Gathabawn Windfarm and Candidate Gathabawn Grid Connection are located;
- Irish Wildlife Manuals, including 159, 161, 162
- Consultation responses from the DAU, IFI, and NPWS;
- Kilkenny County Development Plan 2021-2027 and Laois County Development Plan;
- An Coimisiún Pleanála Appropriate Assessments for recently consented wind farm projects - Ballynalacken and Briskalagh.

4.2.1.3 Field Study Methodology

4.2.1.3.1 Terrestrial Habitats – Field Study Methodology

All habitat surveys undertaken followed best practice guidance (Smith *et al.,* 2011; CIEEM, 2018) and utilised the habitat classification presented in Fossitt (2000), the Irish Habitat Classification System and followed the Best Practice Guidance for such habitat surveys (Smith *et al.*, 2011). All habitats within a 50m buffer of the Gathabawn Windfarm Project were surveyed and classified to level 3. Habitat surveys were undertaken in August 2026. Nomenclature for vascular plants follows Parnell and Curtis (2012). Aerial photography assisted habitat delineation and interpretation, and plant identification and nomenclature followed Parnell & Curtis (2012) and Stace (2010). The predominant plant species for each habitat type were recorded to accurately determine habitats present within the study area.

Particular attention was paid to searching for suitable habitat for rare or protected flora species, to determine whether they were present within, or close to, the Gathabawn Windfarm. These surveys also included the search for any Invasive Alien Plant Species (IAPS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015, as amended), the First Schedule of the European Union (Invasive Alien Species) Regulations 2024 (S.I. 347) and any other High Impact invasive species. The surveys were carried out in good weather with no constraints.

See Appendix 13.1: Methodology for the evaluation of Biodiversity.

4.2.1.3.2 Marsh Fritillary – Field Study Methodology

Marsh Fritillary (*Euphydryas aurinia*) suitability surveys were undertaken in August 2025 following relevant guidance, specifically the '*Marsh Fritillary Monitoring Scheme'* (NBDC, 2015). Habitats were assessed for their suitability for Marsh Fritillary, specifically the presence of abundant Devils-bit Scabious (*Succisa pratensis*). Suitable habitat was searched for occupied larval webs during larval web search surveys, where the number was recorded in addition to the location. These surveys were conducted in September 2025 when webs will be most conspicuous and prior to the larvae entering hibernation.

4.2.1.3.3 Otter – Field Study Methodology

There are no watercourses within 50m of the construction works areas associated with the Proposed Gathabawn Windfarm. However, the Candidate Gathabawn Grid Connection crosses a number of watercourses – Gorteenamuck, Gorteenahilla, Lismaine, Lisdowney and Ballyconra Stream and the main channel of the River Nore.

Otter surveys were undertaken in April, July and September 2025 along watercourse crossings 150m upstream and downstream to identify any territories or couching sites along the riverbanks connected to the Whole Gathabawn Windfarm Project. Camera trap surveys were undertaken at the Gathabawn Windfarm site in April, May and September 2025.

Otter surveys followed the NRA 'Guidelines for Treatment of Otters during Construction of National Road Schemes' (NRA, 2006) and British Highways Agency's Nature Conservation Advice in Relation to Otters HA8199 (Highways Agency, 1999). The presence of Otter was assessed through the recording of Otter signs within 150m upstream and downstream of each survey site. Notes on the location (ITM co-ordinates) of field signs were recorded, in addition to the quantity and visible constituents of spraint (i.e. remains of fish, crustaceans, molluscs, etc.) (Reid *et al.,* 2025).

See Appendix 13.1: Methodology for the evaluation of Biodiversity.

4.2.1.3.4 Aquatic Habitats & Species – Field Study Methodology

A study area for Aquatic Habitats & Species has been defined as the local surface water body sub-catchments (Goul_SC_010, Nore_SC_070 and Nore_SC_060) during the construction phase. The gradient of the water body and the current EPA River Water Quality Status informed the characterisation of Aquatic Habitat & Species near the development.

Aquatic surveys were conducted on the 29th, 30th and 31st July 2025. Survey effort focused on both instream and riparian habitats at each aquatic sampling location and included a fisheries assessment (electro-fishing and fisheries habitat appraisal), White-clawed Crayfish (*Austropotamobius pallipes*) survey, macrophyte and aquatic bryophyte survey and biological water quality sampling (Q-sampling). Environmental DNA (eDNA) samples were also collected from the River Goul and Nuenna River.

In addition to the ecological characteristics of each survey site, a broad aquatic and riparian habitat assessment was conducted utilising elements of the methodology given in the Environment Agency's '*River Habitat Survey in*

Britain and Ireland Field Survey Guidance Manual 2003' (EA, 2003) and the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000).

See Appendix 13.1: Methodology for the evaluation of Biodiversity.

4.2.1.3.5 Kingfisher Watercourse Surveys – Field Study Methodology

To record Kingfisher and other riparian bird species, a standard transect survey methodology was used (Cummins *et al.* 2010; Crowe *et al.* 2008). Monthly visits were undertaken in April and May 2025 and 2026. Observers recorded all riparian bird species seen or heard while walking along banks, with any relevant behaviours recorded (e.g., behaviour suggesting nearby breeding). Suitable nesting opportunities were also recorded and mapped.

These watercourses included the Gorteenmauck River (15G39), Gorteenahilla River (15G08), Ballyring Upper Stream (15B73), Lismaine Stream (15L16), Lisdowney (Stream) (15L02) and the River Nore (15N01), which were selected due to their potential to support Kingfisher foraging and nesting habitats, and potential for greater prey item availability. Watercourse surveys followed best practice methodology (NRA, 2008) '*Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes*'. Suitable watercourses were evaluated for any evidence of nest holes. In each case, banks were inspected for evidence of Kingfisher and the general suitability of the banks. Target notes were made on bank suitability and any observed nest holes.

4.2.1.3.6 Avifauna – Field Study Methodology

Several bird survey methods were adopted to obtain information on use of the development site and adjacent land by birds including SCIs of relevant European Sites. A summary of the surveys and methodology is provided below. Full details of survey dates and methodology can be found in Appendix E: Bird Survey Data. These surveys were as follows:

***Transect Surveys**:*

A total of five transects were surveyed in the breeding season 2025 (April and May), and five transects were surveyed in the breeding season 2026 (April, May and June) at the Gathabawn Windfarm site. A total of nine transects in the winter season 2022-2023 (November, December, January, February and March), and five transects in the non-breeding season 2025-2026 (November, December, January and February) at the Gathabawn Windfarm site.

The methodology followed the standardised line transect methodology for surveying birds (BirdWatch Ireland, 2012). All birds were recorded on standardised recording sheets in four distance categories from the transect route (0-25m; 25-100m; 100+m and in flight) were undertaken between January and June 2018, and December to February 2024/25 and April to June 2025 within the area associated with the construction phase for the windfarm site. See *Chapter 13: Biodiversity* of the subject EIAR 2025 for full details.

***Vantage Point Surveys**:*

The selection of VP locations was based on viewshed analysis, ensuring adequate coverage of the Gathabawn Windfarm where turbines may be positioned and extended to a 500m radius from the outermost turbine perimeter (blade radius), as stated by Best Practice Guidance (SNH, 2017). A precautionary 600m zone was assigned to account for any design flexibility over the two-year monitoring period and updated guidance from Nature Scot in 2025 (SNH, 2017). The viewshed of a given VP extended to a distance no greater than 2km, and included an arc no greater than 180 degrees, as per SNH (2017). A total of six VPs were selected to cover the required viewshed (600m) from proposed turbine locations for the breeding seasons 2025 and 2026, and for the winter seasons 2022-2023 and 2025-2026.

The SNH (2017) Best Practice Guidance recommends a minimum of 72 hours per VP location divided between seasons (36 hours breeding and 36 hours non-breeding) per year. A minimum of 36 hours per VP were carried out between the breeding season 2025 and breading season 2026.

Hen Harrier Roost Surveys

Hen Harrier roost watch surveys were undertaken in the winter season 2022-2023, from October 2022 to March 2023, and in the winter season 2025-2026 from October 2025 to March 2026. Methods followed the '*Irish Hen Harrier Winter Survey'* Guidance (O' Donoghue, 2019; SNH, 2017). Areas of potential suitable habitat (rushy/tussocky grassland, and young conifer plantations) for roost locations within 2km of the Gathabawn Windfarm were identified during daytime walkover surveys and for GIS analysis of satellite imagery of the Gathabawn Windfarm. These potential roosts were observed during a time associated with roost activity, i.e. the last hour before dusk and continued to at least 30 minutes after sunset (or until it was too dark to see) as recommended by best practice methods (Gilbert *et al.*, 2011). Methods followed best practice from O' Donoghue (2019) and SNH (2017), these included observers stationed in VPs around suspected roost areas recording the number of individuals, listening for calling, detection of juveniles and sings of occupancy. Additional information such as arrival/departure times, settling/rising times and direction of arrival/departure as well as general observations were also noted.

Breeding Raptor Surveys (Peregrine)

Peregrine nest suitability surveys were conducted in April 2025 and April 2026 for breeding covering the area within a 2km buffer from the Gathabawn Windfarm turbines (SNH, 2017). This assessment included potential nest sites, such as cliffs, quarries, buildings and other man-made structures, and the old tree nests of other bird species (Hardey *et al.,* 2013).

Activity survey methods followed Hardey *et al.* (2013) in that sites with high or moderate suitability within 2km of the Gathabawn Windfarm Turbines were identified and surveyed via VPs for breeding activity (aerial displays, calling) in May, June and July 2025 and 2026. All raptors seen or heard were recorded and mapped, with emphasis on recording any activity suggesting breeding. Target habitat surveyed included ruins, derelict housing, active quarries, tree holes/hollows, modern and traditional agricultural buildings, sheds, and clear fell areas. These surveys were based on best practice disturbance buffers (Goodship & Furness, 2022) and core foraging zones for these species (SNH, 2016).

For Breeding Raptor Survey Results see Appendix E. Any sightings or records of active nest sites are provided in Appendix E in line with data protection restrictions of protected bird species breeding locations.

Wintering Wetland Bird Surveys*:*

To assess the presence of wetland bird species in the study area throughout the winter 2022-2023 and winter 2025-2026 seasons, surveys took place in suitable areas, these included all lakes and suitable waterbodies (I-e. turloughs, flooded fields) within a study area of 5km from the Gathabawn Windfarm Turbines. Wintering wetland birds include wildfowl (ducks, geese, and swans), waders and other species typically associated with wetland habitats, such as herons, grebes, crakes, rails, and gulls. Wetland birds were surveyed in winter following the standardised approach used for the Irish Wetland Birds Survey (I-WeBS). Surveys included observing from a VP over all lakes and suitable waterbodies (i.e. turloughs, flooded fields). Surveyors used binoculars and telescopes to record the count number, locations and time of sightings of species. Other species of conservation interest were also noted, along with their flight paths, during the walkover surveys. The I-WeBS methodology is detailed in the I-WeBS Counters Manual (BirdWatch Ireland, 2012) and these methods represent the recommended approach in the Nature Scot guidance documents (SNH, 2017) in relation to assessing impacts of onshore wind farm developments on wintering waterfowl.

Swan Surveys*:*

In the winter season 2022-2023, and winter season 2025-2026, VP survey efforts were carried out at one VP location (GCVP). This VP was conducted adjacent to the River Nore to identify individuals commuting through the wider area of the Candidate Gathabawn Grid Connection. This VP provided coverage of all the lands where the

Candidate Gathabawn Grid Connection intersects with the River Nore. Surveys from the VP were undertaken in accordance with best practice survey guidance (SNH, 2017) and were conducted in February, March and April 2026. Six dawn and six dusk surveys to each VP were undertaken over the three months.

See Appendix 13.1: Methodology for the evaluation of Biodiversity.

4.2.1.3.7 Bats - Field Study Methodology

Roost Surveys: A general walkover was conducted in 2025 and 2026 throughout the 500m area, to include any forestry and suitable structures to identify any candidate roost features with low suitability or higher.

A Preliminary Roost Assessment (PRA) and Ground-Level Tree Assessments (GLTA) were carried out for buildings, other structures and trees respectively within 500m of the proposed turbines, using binoculars (model: Steiner SkyHawk 3.0 10x42) to determine their suitability for bats. The PRAs and GLTA were carried out within a 50m buffer zone along the Candidate Gathabawn Grid Connection route during July 2026. Two watercourse crossings related to the Ballylehaun-Ballyring UGC element of the candidate grid connection were assessed prior to 2025. A site visit in September 2026 verified their suitability in line with CIEEM guidance. The structures identified within the 500m buffer area were searched externally for bats or signs of their presence. Structures were also examined for access/egress points, polishing or scratching, urine and oily residue stains, and for cavities suitable for roosting bats. Cavities and open areas were searched with a high-powered torch.

Bat Activity surveys: Emergence surveys were undertaken in line with best practice guidelines (Collins, 2023) in 2025. Emergence surveys were conducted with handheld bat detectors (e.g. Elekon Batlogger and Anabat Walkabout). Thermal camera equipment was used for transect and emergence surveys in 2025 per Collins (2023) guidance.

Bat Transects: As per best practice guidelines, three seasons (spring, summer, and autumn) of transect surveys were conducted in 2025. Three separate transect routes were chosen. The aim of these surveys is to identify bat species using the Gathabawn Windfarm site and to gather information on bat behaviour and important features used by bats (SNH, 2021).

Static Detector Surveys Bat Activity Surveys at the Gathabawn Windfarm Project site were undertaken using automated Anabat Express bat detectors (Titley Scientific). External microphones were mounted on canes at a height of approximately 1m in 2025. A total of 12 locations were chosen for the 2025 passive surveys, covering the twelve turbine locations and the habitats in the surrounding areas. In 2025, 12 static detectors were deployed in spring for between 14 and 18 nights, summer for 15 nights and autumn for 12 nights.

See also EIA Report 2026, Chapter 13 Biodiversity, Appendix 13.1: Methodology for the evaluation of Biodiversity which includes methodology for the evaluation of effects, desktop surveys and fieldwork.

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AA Figure 11 - Aquatic Habitat, Kingfisher Watercourse Survey & Otter Survey Locations

Legend:

- Proposed Gathabawn Windfarm Construction Works Area
- Candidate Gathabawn Grid Connection Construction Works Area
- Otter Transect 2025
- Kingfisher Survey Locations 2025-2026
- Kingfisher Sighting
- Otter Spraints 2025
- Swan Vantage Point Survey 2022
- Nore Waterbird Vantage Point Survey 2026
- Aquatic Survey Sites
- EPA Waterbodies

WFD SubBasins:

- Gorteenahilla_010
- Goul_050
- Goul_060
- Nore_120
- Nore_130
- Nore_140
- Nore_150

Cullahill
Goul_060
Goul_050
Gathabawn
Gorteenahilla_010
Nore_120
Nore_130
Nore_140
Nore_150
Lisdowney
Ballyragget
Freshford
A1
A2
A3
B1
B2
B3
B4
B5
B6
C1
C2
C3
C4
C5
C6
P1
N

4.2.1.4 Constraints & Sufficiency of Data

The biodiversity baseline information was collated from site investigations and field surveys, along with publicly available online resources including Biodiversity Data Centre (NBDC), National Parks & Wildlife Service (NPWS), Environmental Protection Agency (EPA), and Inland Fisheries Ireland (IFI), which are regularly updated. The results of Birdwatch Ireland surveys were also reviewed. The online baseline data were verified in the field.

All field survey work was carried out by qualified and experienced ecologists, including specialists in the field of ornithology and the aquatic environment. Vantage Point survey data from Winter 2022/2023 are older than three years as of the writing of this report, and as such are considered to be nearing the end of their validity according to CIEEM guidance on the lifespan of ecological reports and surveys (CIEEM, 2019). This was considered in the analysis of species populations and weighted accordingly with the most recent surveys in 2025 and 2026 for all assessments provided in this Report. A full suite of ecological surveys is continuing until a planning decision is reached. Due to scheduling constraints, certain VPs were surveyed on the same day. However, all seasons were surveyed for the minimum number of hours as set by NatureScot for VPs (SNH, 2017). Therefore, no significant constraint is related to the VP survey data. However, such scheduling variations are within the accepted reality for conducting field surveys. As such, no significant constraint relating to data validity is present.

Weather stations were deployed for spring, summer and autumn 2025 static detector deployments; however, no weather data was recorded. Weather data from the local Durrow weather station was used to inform the weather conditions within the site for the 2025 efforts. Static detector deployments are currently ongoing for the 2026 season. The spring static detector deployment at T6 partially failed from 22/05/2025 to 24/05/2025, 01/06/2026 to 06/06/2026 and 08/06/2026. The static detector deployed at T4 during summer 2025 was noted as missing during collection. The static detector deployed at T6 during summer 2025 malfunctioned, and no data was collected. The static detector deployed at T5 during autumn 2025 malfunctioned from 17/08/2025 to 26/08/2025. The static detector deployed at T9 during autumn 2025 malfunctioned from 19/08/2025 to 26/08/2025. However, these detectors were not deployed at a later date as the detectors at the other turbine locations covered the area adequately.

The SD bat activity surveys were carried out before the recently published BCI (2026) guidance. The zero-crossing method was used for recording bat static detector activity in 2025. It is acknowledged that zero-crossing is less effective in detecting bat activity than full spectrum and, as a result, may lead to slightly lower levels of activity being recorded. However, full spectrum requires significant data storage and battery power to operate; as such, the zero-crossing method was the only available method at the time of these surveys. Furthermore, no qualitative data (mating, social and communicating calls) was required for determining the overall bat activity (passes per night) within the proposed Gathabawn Windfarm. Nevertheless, it is considered that the data provided presents an adequate baseline against which impacts within this document can be evaluated and, as such, no limitation to the assessment exists.

The evaluation of the baseline environment and potential for impacts has been informed by and carried out using best practice guidance, namely Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (Chartered Institute of Ecology and Environmental Management, 2018) and the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2018). European Commission (2021) *Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.* Office for Official Publications of the European Communities.

The professional judgement of the ecologist has been used in the scoping of surveys, interpretation of data, and assessment of impacts; this approach is consistent with the CIEEM guidelines. A clear documentary trail is provided throughout this section regarding the data and methods used in the evaluation. Documentation used is referenced at the end of this AA Report.

4.2.2 Results of Desktop Studies

In order to identify the habitats and species present (or potentially present) within the receiving environment (and thus inform the assessment undertaken in this report), desktop studies were conducted as described below.

4.2.2.1 National Biodiversity Data Centre

A search was undertaken on the National Biodiversity Data Centre for Protected and Invasive Species presence in the vicinity of the development within the last 20 years. The areas associated with the Proposed Gathabawn Windfarm are located within S36 and S37 10x10km Irish Grid Squares. The Candidate Gathabawn Grid Connection is located in S36, S37, S46 and S47 10km squares.

4.2.2.1.1 Annex I Bird Species

The Annex I bird species records available for S36, S37, S46 and S47 which are QIs and SCIs of the European Sites are shown in the table below.

AA Table 6: NBDC records of Annex II (QI) and Annex I (SCI) species in S36, S37, S46 and S47 grid squares

Grid	Common name	Scientific name	No. Records	Date of record
QI Mammal				
S36 S37 S46 S47	Otter	*Lutra Lutra*	2 7 4 6	09/10/2015 27/09/2018 16/04/2013 09/10/2015
QI Invertebrate - Marsh Fritillary				
S37 S47	Marsh Fritillary	*Euphydryas aurinia*	20 16	06/06/2023 27/05/2023
SCI Birds - Raptors				
S36 S37 S46 S47	Peregrine	*Falco peregrinus*	6 8 2 2	23/12/2022 01/01/2024 07/08/2023 31/10/2024
S37	Hen Harrier	*Circus cyaneus*	2	29/10/2019
S37	Merlin	*Falco columbarius*	5	13/10/2024
S47	Red Kite	*Milvus milvus*	1	01/07/2014
SCI Bird – Wetland/River Features				
S47 S37	Kingfisher	*Alcedo atthis*	30 27	04/03/2024 30/01/2023
S36 S37 S46 S47	Golden Plover	*Pluvialis apricaria*	3 17 10 7	06/12/2021 06/10/2024 25/01/2023 19/12/2022
S36 S37 S46 S47	Little Egret	*Egretta garzetta*	2 43 19 17	31/12/2011 04/01/2025 04/11/2023 02/04/2025
S37 S46 S47	Whooper Swan	*Cygnus cygnus*	36 9 2	04/01/2025 25/01/2023 17/12/2021
S37	Bewick's Swan	*Cygnus columbianus bewickii*	1	31/12/2001

Grid	Common name	Scientific name	No. Records	Date of record
S37	Greenland White-fronted Goose	*Anser albifrons flavirostris*	2	31/12/2011
S37	Ruff	*Calidris pugnax*	3	23/10/2022
S36 S47	Bar-tailed Godwit	*Limosa lapponica*	2 1	31/12/2011 31/12/2001
S46	Balearic Shearwater	*Puffinus mauretanicus*	1	30/03/2019

4.2.2.1.2 Regularly Occurring Migratory Waterbirds & Waders

Other bird species recorded in the NBDC in each of the 10km squares, S36, S37, S46, S47 include: Lapwing, Snipe, Curlew, Mute Swan, Mallard, Cormorant, Teal, Coot, Little Grebe, Black-headed Gull, Lesser black-Backed Gull, an Herring Gull.

Species recorded less frequently, mainly in S37 included: Common Gull, Greylag Goose, Pink-footed Goose, White-fronted Goose, Dunlin, Shelduck, Pintail, Shoveler, Gadwal, Pochard, Tufted Duck, Redshank, Jack Snipe, Woodcock, Common Sandpiper.

There are no records within the NBDC 10km squares S36, S37, S46, S47 of Lesser Horseshoe Bat, Marsh Harrier, White-tailed Eagle, Golden Eagle, Corncrake, Nightjar, Short-eared Owl, or Wood Sandpiper.

The full list of species recorded in the NBDC database can be found in Appendix B: Species Records held by NBDC.

4.2.2.2 Results of Irish Wetland Bird Surveys

Irish Wetland Bird Survey (I-WeBS) carried out by BirdWatch Ireland monitor the numbers and distribution of waterbird populations wintering across a network of defined survey sites in the Republic of Ireland. The survey focuses on those birds wintering here, as opposed to autumn and spring passage migrants. A report on the I-WeBS was published by NPWS in 2025 as the Irish Wildlife Manual 162.

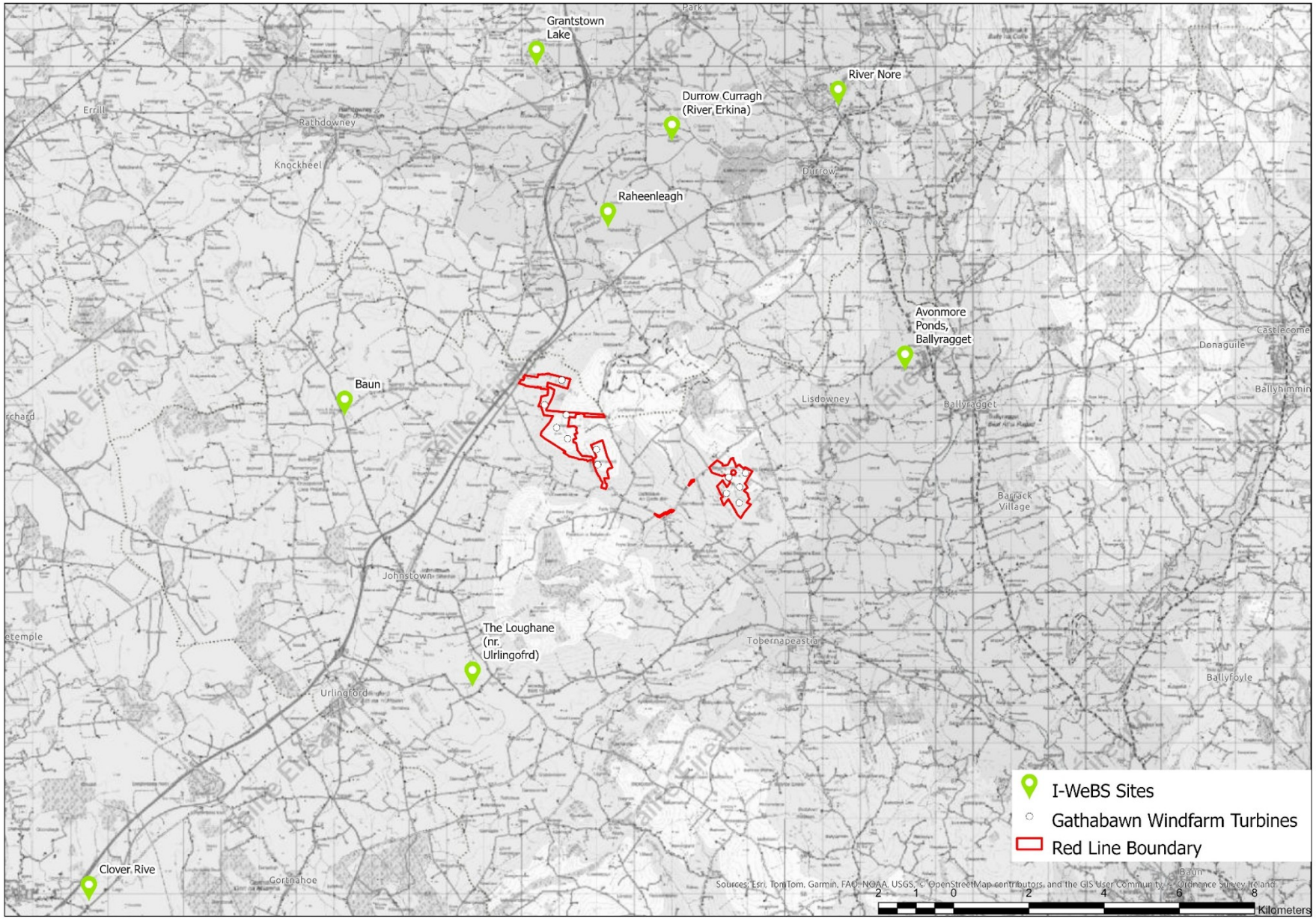
4.2.2.2.1 Irish Wildlife Manual 162: The status and distribution of wintering waterbirds in Ireland in 2023

A review was carried out of the Irish Wildlife Manual - *The status and distribution of wintering waterbirds in Ireland in 2023* (NPWS, 2025d), which provides a comprehensive account of the population size, trends, key sites and pressures and threats faced by wintering waterbirds in the Republic of Ireland. The report is based primarily on data collected from 2016/17 to 2022/23 inclusive.

A total of 448 sites (1,523 subsites) were surveyed during the recent 5-season period (2018/19 - 2022/23), upon which the assessment of site importance in the species accounts is based. Of these, 238 were surveyed in at least three seasons during this period.

I-WeBS sites in Counties Kilkenny, Laois, and Tipperary which were included in the NPWS review are listed in the table below. These survey sites are located on low-lying lands to the southwest, west, northwest and north of the Proposed Gathabawn Windfarm. See AA Figure 12 (over).

County Kilkenny	County Laois	County Tipperary
Avonmore Ponds, Ballyragget (0N004)	Durrow Curragh (River Erkina) (0Q310)	Clover River 0J390
Baun (0NS99)	Grantstown Lake (0Q001)	
The Loughane (nr Ulrlingofrd) (0NS01)	Raheenleigh (0Q600)	
	River Nore 0Q300	


Grantstown Lake
River Nore
Durrow Curragh (River, Erkina)
Raheenleagh
Avonmore Ponds, Ballyragget
Baun
The Loughane (nr. Ulrlingofrd)
Clover, Rive
I-WeBS Sites
Gathabawn Windfarm Turbines
Red Line Boundary
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, © Ordnance Survey Ireland
2 1 0 2 4 6 8
Kilometers

Count Results

Nationally important numbers (>910) of **Golden Plover** were recorded at Baun, Durrow Curragh and River Nore.

No internationally or nationally important numbers of other wetland or waterbirds were recorded at the Kilkenny, Laois and Tipperary sites listed above.

Annex I species which were recorded, but at numbers under the threshold for national/international importance included:

- Little Egret was recorded at Durrow Curragh and River Nore
- Whooper Swan was recorded at Baun, Raheenleigh, Durrow Curragh, and River Nore
- A single record of Ruff at Baun in winter 2022/2023

Other regularly occurring or migratory species which were recorded, at numbers under the threshold for national/ international importance included:

- Snipe, Pintail, Redshank, and Little Grebe were only recorded at Durrow Curragh.
- Shoveler, Dunlin and Moorhen was recorded Durrow Curragh. Shoveler and Dunlin were also recorded at Buan, and Moorhen was also recorded at the River Nore site.
- Lapwing and Curlew were recorded at The Loughanes, Baun, Durrow Curragh, and River Nore. Curlew was also recorded at Raheenleigh.
- Whooper Swan was recorded at Baun, Raheenleigh, Durrow Curragh, and River Nore
- Mute Swan, Cormorant, Coot, Wigeon, Teal and Mallard were recorded at The Loughanes, Baun, Durrow Curragh, and River Nore.
- Grey Heron, Common Gull, Lesser Black-backed Gull and Black-headed Gull were recorded at The Loughanes and Durrow Curragh, Grey Heron and Black-headed Gull were also recorded at the River Nore.

4.2.2.0 NBDC - Invasive Species

A number of invasive species are also recorded on the NBDC database in S36, S37, S46 and S47.

Invasive Species	*S36*	*S37*	*S46*	*S47*
Butterfly-bush (Buddleja davidii)	Yes	*Yes*		
Common Broomrape (*Orobanche minor*)		*Yes*		
Douglas Fir (*Pseudotsuga menziesii*)			Yes	Yes
Giant Hogweed (*Heracleum mantegazzianum*)	Yes		Yes	
Japanese Knotweed (*Fallopia japonica*)	Yes	*Yes*	Yes	Yes
Japanese Knotweed, bohemian (*F. x bohemica*)		*Yes*		
Rhododendron ponticum		*Yes*		
Canadian Waterweed (*Elodea canadensis*)			Yes	
Cherry Laurel (*Prunus laurocerasus*)			Yes	Yes
Himalayan Balsam (Impatiens glandulifera)			Yes	
Himalayan Honeysuckle (*Leycesteria formosa*)				Yes
Japanese Rose (Rosa rugosa)				Yes
Sycamore (*Acer pseudoplatanus*)	Yes	*Yes*	Yes	Yes
Traveller's-joy (*Clematis vitalba*)		*Yes*	Yes	
Turkey Oak (*Quercus cerris*)			Yes	
Common Garden Snail (*Cornu aspersum*)	Yes	*Yes*	Yes	Yes
Jenkins' Spire Snail (*Potamopyrgus antipodarum*)	Yes	*Yes*	Yes	Yes
Wrinkled Snail (*Xeroplexa intersecta*)	Yes	*Yes*	Yes	Yes
Budapest Keeled Slug (Tandonia budapestensis)				Yes
Sowerby's Keeled Slug (Tandonia sowerbyi)				Yes
American Mink (*Neovison vison*)	Yes	*Yes*	Yes	Yes
Bank Vole (*Myodes glareolus*)	Yes	*Yes*	Yes	Yes
Brown Rat (*Rattus norvegicus*)	Yes		Yes	
Fallow Deer (*Dama dama*)	Yes			
Sika Deer (Cervus nippon)			Yes	
Greater White-toothed Shrew (*Crocidura russula*)	Yes	*Yes*		Yes
Grey Squirrel (*Sciurus carolinensis*)	Yes	*Yes*	Yes	
Rabbit (Oryctolagus cuniculus)	Yes	*Yes*	Yes	Yes
Grey Lag Goose		*Yes*		
Crayfish Plague - Aphanomyces astaci		*Yes*	Yes	Yes

4.2.3 Baseline Surveys of Aquatic Habitats and Species

4.2.3.1 Locational Context of Waterbody Catchments

Proposed Gathabawn Windfarm: Gathabawn Windfarm is situated in an upland area in the Goul_SC_010 and Nore_SC_*070 sub-catchments*. See AA Figure 13: Locational Context of Aquatic Habitats at and downgradient of the Gathabawn Windfarm (over)

The windfarm infrastructure will be mainly located in the Goul_050 sub-basin (four turbines, met mast and one borrow pit, partially) and the Goul_060 sub-basin (three turbines, temporary construction compound, temporary blade storage area). The Goul_060 drains to the River Goul, while the Goul_050 drains to the River Goul via the Coolnacrutta stream. The remaining windfarm infrastructure is in the Gorteenahilla_010 sub-basin (four turbines, one borrow pit, partially, two windfarm control buildings and one temporary construction compound), and to a lesser degree in the Nore_150 sub-basin (one turbine, one borrow pit). The Gorteenahilla_010 drains to the River Nore via the Gorteennamuck stream, Gorteenahilla River and Nuenna River, while the Nore_150 drains to the River Nore via the Lismaine stream.

Relevant water bodies to the proposed Gathabawn Windfarm are as follows:

- **Coolnacrutta Stream (EPA code 15C50):** 1st order stream draining most of the Ballylehaun Area. It flows c.450m south of the site boundary in a northwesterly direction for c.3.6km before joining the 4th order River Goul (EPA code 15G02). The Coolnacrutta stream is part of the Goul_050 WFD river water body (EU Code: IE_SE_15G020360), classified as Moderate WFD water quality for the period 2019-2024 (EPA, 2025).
- **River Goul (EPA code 15G02):** The 4th order River Goul drains the northern part of the Ballylehaun Area. It flows c.2km from the site boundary at its closest point. The River Goul flows in a northerly direction for c.8.2km before joining the River Erkina. The River Goul is part of the Goul_060 WFD river water body (EU Code: IE_SE_15G020500), with a status of Poor for the period 2019-2024 (EPA, 2025).
- **Ballyring Upper Stream (EPA code 15B73):** The 1st order Ballyring Upper Stream flows in a southerly direction c.475m west of the Ballyring Area and c.5m east of Facilitating Works FW9. The Ballyring Upper Stream flows south for c.1.4km before joining the Gorteenahilla River. The Ballyring Upper stream is part of the Gorteenahilla_010 WFD river water body (EU Code: IE_SE_15G080300), with a status of Moderate for the period 2019-2024 (EPA, 2025).
- **Lismaine Stream (EPA code 15L16):** The nearest surface watercourse to the proposed development site, flowing within c.320m of the T9 hardstand. The Lismaine stream is a 1st order watercourse, flowing southeast for c.6.8km to meet the River Nore (EPA code 15N01). The Lismaine stream is part of the Nore_150 WFD river water body (EU Code: IE_SE)15N011700), with a status of Moderate for the WFD river water bodies monitoring network 2019-2024 (EPA, 2025).

A review of aerial photography of the habitats within or adjacent to riparian zones along downstream watercourses did not identify any potential woodland Annex I habitats such as Old sessile Woods, or *Taxus bacatta* woods, or Alluvial Woodland between the windfarm site and the main channel of the River Nore.

Candidate Gathabawn Grid Connection: The Candidate Gathabawn Grid Connection is located in the Nore_SC_060 and Nore_SC_070 sub-catchments, and is spread across a number of sub-basins.

The Ballylehaun-Ballyring Underground Cabling (UGC) is located in the Gorteenahilla_010 sub-basin. The Ballyring-Parksgrove UGC is located in the Gorteenahilla_010, Nore_150, Nore_140, Nore_130 and Nore_120 sub-basins, while the Parksgrove Substation and Parksgrove-Moatpark UGC are both located within the Nore_120 sub-basin.

Relevant water bodies to the Candidate Gathabawn Grid Connection are as follows:

- **Gorteennamuck Stream (EPA code 15G39):** 1st order stream which is crossed by the Ballylehaun-Ballyring UGC. The Gorteennamuck Stream flows southeast for c.730m before joining the 2nd order Gorteenahilla River. The Gorteennamuck stream is part of the Gorteenahilla_010 WFD river water body (EU Code: IE_SE_15G080300), with a status of Moderate for the period 2019-2024 (EPA, 2025).

- **Gorteenahilla River (EPA code 15G08):** 2nd order stream which is crossed by the Ballylehaun-Ballyring UGC. The Gorteenahilla River flows southeast for c.6.7km before joining the 3rd order River Nuenna and eventually into the River Nore. The Gorteenahilla River is part of the Gorteenahilla_010 WFD river water body (EU Code: IE_SE_15G080300), with a status of Moderate for the period 2019-2024 (EPA, 2025).
- **Lismaine Stream (EPA code 15L16):** 1st order stream crossed by the Ballyring-Parksgrove UGC. The Lismaine stream flows southeast for c.6.8km to meet the River Nore (EPA code 15N01). The Lismaine stream is part of the Nore_150 WFD river water body (EU Code: IE_SE)15N011700), with a status of Moderate for the WFD river water bodies monitoring network 2019-2024 (EPA, 2025).
- **Lisdowney Stream (EPA code 15L02):** 3rd order stream which is crossed by the Ballyring-Parksgrove UGC. The Lisdowney Stream flows southeast for c.3.1km before joining the River Nore. The Lisdowney Stream is part of the Nore_140 WFD river water body (EU Code: IE_SE_15N011600), with a status of Good for the period 2019-2024 (EPA, 2025).
- **Ballyconra Stream (EPA code 15B86):** 1st order stream which is crossed by the Ballyring-Parksgrove UGC. The Gorteennamuck Stream flows south for c.140m before joining the Lisdowney Stream. The Ballyconra stream is part of the Nore_140 WFD river water body (EU Code: IE_SE_15N011600), with a status of Good for the period 2019-2024 (EPA, 2025).
- **River Nore (EPA code 15N01):** 6th order watercourse which is crossed by the Parksgrove-Moatpark UGC and is c.70m from the Parksgrove Substation. The Parksgrove-Moatpark UGC crosses the River Nore in the Nore_120 sub-basin. The Nore_120 WFD river water body (EU Code: IE_SE_15N011400), has a status of Moderate for the period 2019-2024 (EPA, 2025).

4.2.3.2 Fieldwork – Results of Water Quality Monitoring:

Biological water quality (Q-sampling) surveys were undertaken at the 17 No. aquatic survey sites in July 2025. The laboratory results are found in the accompanying EIA Report, Chapter 8 Water, Appendix 8.2.

All riverine sites sampled failed to meet the target good status (>Q4) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and the Water Framework Directive (2000/60/EC).

Site A4 on the River Goul and site B4 on the Gorteenahilla River achieved Q3-4 (Moderate Status), with all other sites achieving Q2-3 or Q3 (poor status).

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AA Figure 13 - Locational Context of Aquatic Habitats at and downgradient of the Whole Gathabawn Windfarm Project site

Legend:

- Proposed Gathabawn Windfarm
- Candidate Gathabawn Grid Connection
- EPA Waterbodies
- Aquatic Survey Sites

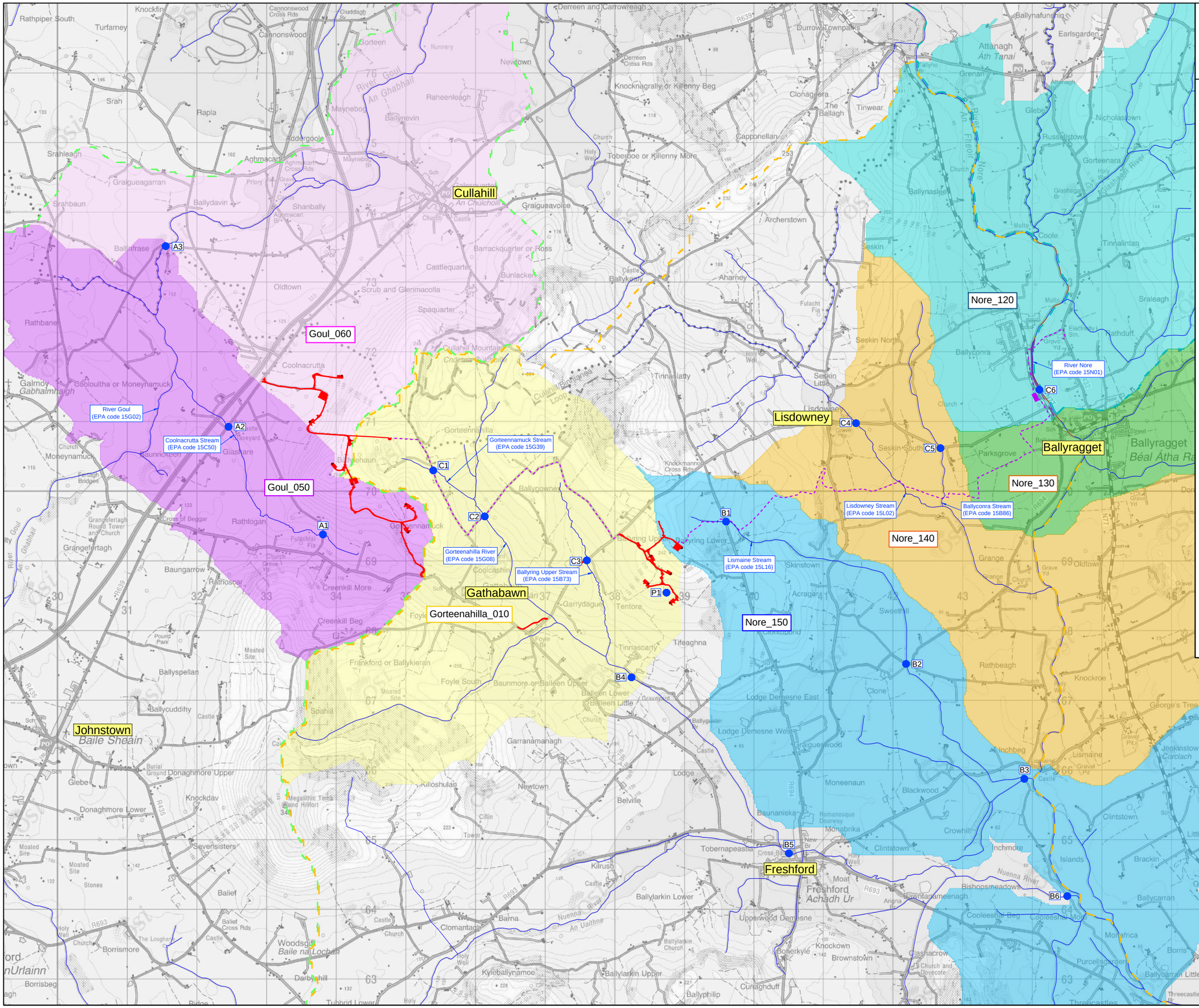
WFD SubCatchments:

- Goul_SC_010
- Nore_SC_060
- Nore_SC_070

WFD SubBasins:

- Gorteenahilla_010
- Goul_050
- Goul_060
- Nore_120
- Nore_130
- Nore_140
- Nore_150

Source:
-Environmental Protection Agency
-National Parks & Wildlife Service



4.2.3.3 Desktop Survey Results

Desktop Survey results are described below. See also Appendix B: Species Records held by NBDC herein.

4.2.3.3.1 Annex II species

Annex II fish species which could occur in downstream waterbodies include: Twaite Shad, River Lamprey, Brook Lamprey, Sea Lamprey, and Atlantic Salmon.

Annex II crayfish species – NBDC records identified White-clawed Crayfish are recorded available for the wider area, with more contemporary records for the River Goul and River Nore (2005-2023 data).

The project is outside the range of Killarney Shad (*Alosa killarnensis*), which are only found in Lough Leane in County Kerry and therefore is not considered further herein, as there is no likelihood of effects to the range, population, habitats or future prospects of this species as a result of the project. As a result it is not considered further herein.

Multiple records for the critically endangered hard-water form of the Freshwater Pearl Mussel were available for the River Nore. This species has declined significantly in recent years and is now confined to areas upstream of the Erkina confluence, Durrow (NPWS & Triturus data). It has been concluded that Freshwater Pearl Mussel is no longer present in the River Nore downstream of the Erkina confluence (Sweeney, 2022).

Annex II mammal, contemporary Otter records were widespread throughout the respective grid squares S36 and S37, with contemporary records available for the Coolnacrutta Stream, River Goul, Gorteenahilla River, Nuenna River, Lisdowney Stream and River Nore (2005-2023 data).

Annex II coastal mammal species could occur in downstream estuarine and coastal waters; these include Grey Seal, Harbour Seal, Harbour Porpoise and Common Bottlenosed Dolphin. These species are not considered at risk from reductions in water quality or changes in flow – given the characteristics of their coastal and estuarine habitats, and it is evaluated that there is no likelihood of significant effects to the range, population, habitats or future prospects of these species, as a result they are not considered further herein.

The known mapped areas of Annex II Desmoulin's Whorl Snail in the River Barrow and River Nore SAC are located upstream of the development and within a separate sub-catchment (Nore_SC_050) to the Gathabawn Windfarm. The Gathabawn Windfarm does not have direct hydrological connectivity to the known areas of this QI species. It is therefore evaluated that there is no likelihood of significant effects to the range, population, habitats or future prospects of whorl snail species, as a result they are not considered further herein.

4.2.3.3.2 Desktop Survey Results – Annex I habitats

Aerial photography and mapping for European Sites in the Nore Catchment were examined for records of Annex I habitats such as woodland, grassland, riparian and wetland habitats which could occur at the windfarm site or downslope/downstream of the development.

No Annex I habitats of the River Barrow and River Nore SAC were recorded during aquatic surveys

While no Annex I woodland, such as Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles, or Alluvial forests with *Alnus g*lutinosa and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) is recorded or identified during desktop surveys , known locations of Alluvial forests with *Alnus g*lutinosa and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) in the River Barrow and River Nore SAC are mapped in the related Conservation Objectives document (NPWS, 2025e). The closest mapped site of this habitat is located approx. 11km downstream of the Ballylehaun Area via the River Goul and River Erikina. Within the River Barrow and River Nore SAC, the closest site containing Old sessile oak woods is located approx. 44km hydrologically downstream from the proposed Gathabawn Windfarm and the Candidate Gathabawn Grid Connection.

Taking into account the characteristics of the streams and rivers within the catchment of the Drumhills, there is also potential for smaller scale Annex I habitats to occur along the watercourses downstream of the site, such as Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, or

Hydrophilous tall herb fringe communities of plains or Rivers with muddy banks with *Chenopodion* rubri p.p. and *Bidention* p.p. vegetation and of the montane to alpine levels.

4.2.3.4 Fieldwork Survey Results:

4.2.3.4.1 Annex I habitats

There are no running watercourses in close proximity to the proposed Gathabawn Windfarm. The nearest watercourses are minor headwater streams which rise more than 50m from construction works or rise at some distance from the site. Facilitating Works FW9 are proposed for an area of agricultural grassland c.5m from the Ballyring Upper Stream. These watercourses are of high to medium gradient near the proposed development site and are categorised as both 'Eroding/upland rivers' (FW1) and 'Depositing/lowland rivers' (FW2) (Fossitt, 2000) classification. AA Figure 14.1 – AA Figure 14.2 shows water features draining the Gathabawn Windfarm site.

The Candidate Gathabawn Grid Connection crosses 6 no. watercourses: The Ballylehaun-Ballyring UGC crosses the Gorteennamuck stream and Gorteennahilla River, the Ballyring-Parksgrove UGC crosses the Lismaine stream, Lisdowney Stream and Ballyconra stream, and the Parksgrove-Moatpark UGC crosses the River Nore.

Aquatic surveys were carried out in July 2025. A total of 17 sites, in the watercourses downgradient of the windfarm site, were selected for detailed aquatic assessment.

No Annex I habitats of the River Barrow and River Nore SAC were recorded during aquatic surveys.

Invasive Species: No invasive plant species were recorded during aquatic surveys.

4.2.3.4.2 Annex II Species

Aquatic surveys were carried out on the 29th, 30th and 31st July 2025. A total of 17 sites, in the watercourses downstream of the windfarm site, were selected for detailed aquatic assessment.

A typical diversity of fish for the surveyed sub-catchments was recorded, with Annex II Atlantic Salmon (*Salmo salar*) and Lamprey (*Lampetra* sp.), along with Brown Trout (*Salmo trutta*), European Eel (*Anguilla anguilla*), Stone Loach (*Barbatula barbatula*), Three-spined Stickleback (*Gasterosteus aculeatus*) and Minnow (*Phoxinus phoxinus*) in July 2025. Fish were recorded from all sites except sites A1 on the Coolnacrutta stream, B1 on the Lismaine stream, C1 on the Gorteennamuck stream and C5 on the Ballyconra stream. Pond site P1 and site C6 on the River Nore were subject to a fisheries appraisal only, and as such no fish were recorded from these sites. Salmonid populations were widespread in the survey area although were absent from the upper reaches of several watercourses such as the Coolnacrutta and Lismaine Streams (which supported salmonids further downstream). Atlantic Salmon were recorded from 7 no. sites on the Coolnacrutta Stream (A2), River Goul (A3, A4), Lismaine Stream (B3), Gorteenahilla River (B4) and the Nuenna River (B5, B6). Brown trout were also present at these sites as well as sites C2 on the Gorteenahilla River and C4 on the Lisdowney Stream but are also known from the River Nore in the vicinity of the candidate grid connection route crossing (Site C6 too deep for electro-fishing) and the upper reaches of the Lisdowney Stream (Triturus data).

Lamprey habitat was often restricted in the survey area given the higher energy conditions at many sites which discourages the settlement of organic rich fines for larval burial (Aronsuu & Virkkala, 2014; Goodwin *et al.* 2008, Gardiner, 2003) plus siltation, eutrophication and Hydromorphological pressures. However, *Lampetra* sp. ammocoetes were recorded in low to medium densities (0.67 to 7 per m^2) from a total of 4 no. sites on the Coolnacrutta Stream (A2), River Goul (A4), Lismaine Stream (B3) and Gorteenahilla River (B4). Sites B3 and B4 supported higher ammocoete densities given the abundance of suitable soft sediment accumulations not typically encountered elsewhere (invariably flocculent and too shallow for larval burial).

In keeping with an absence of records for the respective watercourses, Freshwater Pearl Mussel were not detected in the eDNA samples from the River Goul or Nuenna River (0 positive replicates out of 12).

A low number of records for Annex II White-clawed Crayfish were available in the wider survey area, with more contemporary records for the River Goul and River Nore (2005-2023 data). Crayfish remains have previously been identified in Otter (*Lutra lutra*) spraint on the lower reaches of the Coolnacrutta Stream (current survey site A2) (Triturus 2022 data). No White-clawed Crayfish were recorded via hand-searching or sweep netting of instream refugia at any of the aquatic survey sites in July 2025. White-clawed Crayfish eDNA was detected at site A4 on the River Goul and site B6 on the Nuenna River (5 & 3 positive replicates out of 12, respectively). These results were considered as evidence of the species' presence at and or upstream of the sampling locations.

Invasive Species: No invasive species were recorded during aquatic surveys.

4.2.3.5 Locational Context of Other Projects

Other Projects:

- The existing Lisdowney Wind Farm is located in the Nore_SC_070 sub-catchment.
- The existing wind farms on cutover peatlands west of Johnstown and Galmoy (Lisheen I, Lisheen II, Lisheen III and Bruckana Wind Farm) are predominantly located outside of the Nore Catchment within the Suir Catchment, however there are 4 no. Lisheen III turbines and 2 no. Bruckana Wind Farm turbines within the Erkina_SC_010 sub-catchment of the Nore Catchment.
- The existing wind farms and turbines on the southern Slieveardagh Hills (existing Ballybay, Foyleatalure and Cnoc windfarms, Farranrory Windfarm (currently under construction), and the consented Kyleballyoughter and Briskalagh Wind Farms) are located in the Munster_SC_010 sub-catchment.
- Pinewood Wind Farm is currently under construction and is located in the Nore_SC_060. Ballynalacken Windfarm is located in the Nore_SC_060, Nore_SC_080 and Dinin[North]_SC_010 sub-catchments, while the Ballynalacken Grid Connection is in the Nore_SC_060.
- Briskalagh Wind Farm is located in the Munster_SC_010 sub-catchment, with the Briskalagh WF Grid Connection within the Munster_SC_010, Nore_SC_070 and Nore_SC_060 sub-catchments.
- The two consented Battery Energy Storage System projects in the Moatpark area are both located in the Nore_SC_060 sub-catchment.
- Seskin Wind Farm [Laois/Kilkenny] is located in the Nore_SC_070, with the Seskin WF Grid Connection located in the Nore_SC_060 and Nore_SC_070 sub-catchments.
- Littleton Wind Farm is located in the Suir_SC_040 sub-catchment with the Littleton WF Grid Connection located in the Suir_SC_040, Goul_SC_010, Nore_SC_070 and Nore_SC_060 sub-catchments.
- The potential Killoshulan Wind Farm is located in the Nore_SC_070, with the potential Killoshulan WF Grid Connection in the Nore_SC_070 and Nore_SC_060.
- Potential Ballyragget River Park walk would occur along the banks of the River Nore.

These Other Projects are illustrated on AA Figure 10.

4.2.4 Baseline Surveys of Terrestrial Habitats

4.2.4.1 Desktop Survey Results

No Annex I habitats are recorded at the windfarm site. A review of aerial photography and 2026 drone footage did not identify any Annex I habitat types at the windfarm site. The aerial footage confirmed that the windfarm site and immediate surrounding area predominantly comprises improved agricultural grassland, hedgerow, buildings and artificial surfaces, and treelines. In the surrounding area, agricultural grassland is interspersed with mature hedgerows, freshwater habitats of varying quality - some with riparian areas of broadleaved trees along their boundaries, and private residential buildings and farm buildings.

Site photos taken by the developer during drone surveys can be found in the EIA Report, Chapter 5, Appendix 5.1.

4.2.4.2 Fieldwork – Results of Terrestrial Habitat Surveys

A habitat survey was carried out in August 2026 of the windfarm site. The survey recorded habitats within the construction works areas plus a 50m buffer around these areas.

No Annex I habitat was recorded at the windfarm site during habitat surveys. In addition, there are **no wetland habitats** at the windfarm site. The results of the terrestrial habitat surveys are summarised in the table below.

AA Table 7: Habitat types and areas within the proposed development site and a 50m buffer

Habitat code (Fossitt, 2000)	Habitat Type	Area (ha) within construction works area	Area (ha) within 50m buffer
Ballylehaun Area			
GA1	Improved Agricultural Grassland	31.83	90.48
GA1/HD1	Improved Agricultural Grassland/Dense Bracken	4.17	8.94
WS1	Scrub	0.92	8.32
GA1/ER2/WD5	Improved Agricultural Grassland/Exposed Calcareous Rock/Scattered Trees and Parkland/	1.89	6.85
GA1/ER2	Improved Agricultural Grassland/Exposed Calcareous Rock	2.03	5.59
GS1	Dry Calcareous and Neutral Grassland	0	2.44
BL3	Buildings and Artificial Surfaces	0.77	2.37
WN2	Oak-Ash-Hazel Woodland	0.01	1.92
GS2	Dry Meadows and Grassy Verges	0.97	0.99
WD1	Mixed Broadleaved Woodland	0	0.37
ED3	Recolonising Bare Ground	0.1	0.27
GA2	Amenity Grassland	<0.01	0.25
ER2	Exposed Calcareous Rock	0	0.16
BL3/GA2	Buildings and Artificial Surfaces/Amenity Grassland	0	0.10
Ballyring Area			
GA1	Improved Agricultural Grassland	12.19	41.46
BC1	Arable Crops	3.19	7.04
ED2	Spoil and Bare Ground	0.93	1.13
ED3/GS2	Recolonising Bare Ground/Dry Meadows and Grassy Verges	0.07	1.07
BL3	Buildings and Artificial Surfaces	0.08	0.44
WS1	Scrub	0.29	0.33
ED5	Refuse and Other Waste	0.13	0.13

WS3	Ornamental/Non-native Shrub	0.01	0.10
ED3	Recolonising Bare Ground	0.08	0.08
GS2	Dry Meadows and Grassy Verges	0.03	0.05
GA1/WS1	Improved Agricultural Grassland/Scrub	0	0.04
FL8	Other Artificial Lakes and Ponds	0	0.01
Facilitating Works FW8 and FW9			
BL3	Buildings and Artificial Surfaces	0.06	0.99
GA1	Improved Agricultural Grassland	1.19	8.37
WD1	Mixed Broadleaved Woodland	0	0.04

AA Table 8: Habitat types and areas within the Candidate Gathabawn Grid Connection and a 50m buffer

Habitat code (Fossitt, 2000)	Habitat Type	Area (ha) within construction works area	Area (ha) within 50m buffer
GA1	Improved Agricultural Grassland	13.45	148.23
BL3	Buildings and Artificial Surfaces	1.32	8.57
WD1	Mixed Broadleaved Woodland	0.69	5.14
ED2	Spoil and Bare Ground	3.42	3.68
ED3	Recolonising Bare Ground	1.2	2.42
WS1	Scrub	0.09	2.05
GS2	Dry Meadows and Grassy Verges	0.62	1.86
BC1	Arable Crops	0.29	1.67
FW2	Depositing/Lowland Rivers	0.09	1.52
GA2	Amenity Grassland	0.01	1.47
GS4/WS1	Wet Grassland/Scrub	0.02	1.31
GS1	Dry Calcareous and Neutral Grassland		0.97
BL3/GA2	Buildings and Artificial Surfaces/Amenity Grassland	<0.01	0.92
WD4	Conifer Plantation	0.02	0.73
FW1	Eroding/Upland Rivers	0.03	0.3
ED5	Refuse and Other Waste	0.07	0.13

One invasive plant species, Japanese Knotweed, was recorded in two discrete locations in the Ballyring area during habitat surveys.

See AA Figure 14.1 – AA Figure 14.2: Terrestrial Habitats at the Whole Gathabawn Windfarm site (see over)

Annex II plant species: Killarney Fern was not recorded ex-situ during habitat surveys at the Gathabawn Windfarm or during aquatic surveys in downstream waterbodies. The closest mapped locations of this QI flora species are within a separate sub-catchment (Nore_SC_120) from the Whole Gathabawn Windfarm and are located > 50km downstream of the hydrological pathway of the Whole Gathabawn Windfarm to the River Barrow and River Nore SAC, and therefore there is no likelihood of significant effects to the distribution, population size or habitat extent, or the hydrological conditions at the known locations of this species.

There are no other QI plant species listed for sites within the relevant ZoI.

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AA Figure 14.1.1 - Terrestrial Habitats at the Whole Gathabawn Windfarm site (Map 1 of 2)

Legend:

- Gathabawn Turbine
- 50m Study Area from Proposed Gathabawn Windfarm Construction Works Area
- 50m Study Area from Candidate Gathabawn Grid Connection Construction Works Area
- BC1 - Arable crops
- BL1 - Stone walls and other stonework
- BL1/WL1 - Stone walls and other stonework/Hedgerows
- BL3 - Buildings and artificial surfaces
- BL3/GA2 - Buildings and artificial surfaces/Amenity grassland
- ED2 - Spoil and bare ground
- ED3 - Recolonising bare ground
- ED3/GS2 - Recolonising bare ground/Dry meadows and grassy verges
- ED5 - Refuse and other waste
- ER2 - Exposed calcareous rock
- FL8 - Other artificial lakes and ponds
- FW1 - Eroding/upland rivers
- FW4 - Drainage ditches
- GA1 - Improved agricultural grassland
- GA1/ER2 - Improved agricultural grassland/Exposed calcareous rock
- GA1/ER2/WD5 - Improved agricultural grassland/Exposed calcareous rock/Scattered trees and parkland
- GA1/HD1 - Improved agricultural grassland/Dense bracken
- GA1/WS1 - Improved agricultural grassland/Scrub
- GA2 - Amenity grassland
- GS1 - Dry calcareous and neutral grassland
- GS2 - Dry meadows and grassy verges
- GS4/WS1 - Wet grassland/Scrub
- WD1 - (Mixed) broadleaved woodland
- WD4 - Conifer plantation
- WL1 - Hedgerows
- WL2 - Treelines
- WL2/BL1 - Treelines/Stone walls and other stonework
- WN2 - Oak-ash-hazel woodland
- WS1 - Scrub
- WS3 - Ornamental/non-native shrub
- Invasive Species - Japanese Knotweed

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12

Location of Japanese Knotweed

N

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AA Figure 14.1.2 - Terrestrial Habitats at the Whole Gathabawn Windfarm site (Map 2 of 2)

Legend:

- 50m Study Area from Candidate Gathabawn Grid Connection Construction Works Area
- BC1 - Arable crops
- BL1 - Stone walls and other stonework
- BL3 - Buildings and artificial surfaces
- BL3/GA2 - Buildings and artificial surfaces/Amenity grassland
- ED2 - Spoil and bare ground
- ED3 - Recolonising bare ground
- FW1 - Eroding/upland rivers
- FW2 - Depositing/lowland rivers
- GA1 - Improved agricultural grassland
- GS2 - Dry meadows and grassy verges
- WD1 - (Mixed) broadleaved woodland
- WD4 - Conifer plantation
- WL1 - Hedgerows
- WL2 - Treelines

N

4.2.4.0 Locational Context of Other Projects – Terrestrial habitats

Other Projects: Lisdowney Wind Farm, Seskin Wind Farm, Briskalagh Wind Farm, the wind farms and turbines on the southern Slieveardagh Hills and the BESS projects in Moatpark are currently predominantly utilised for agriculture. The Ballynalacken Windfarm, Pinewood Wind Farm and potential Killoshulan Wind Farm sites are utilised for commercial forestry and agriculture. The Littleton Wind Farm site is cutover peatland. The existing windfarm sites west of Johnstown and Galmoy are predominantly located on peatlands, with some turbines in areas of agriculture and forestry. None of these Other Projects overlaps the Proposed Gathabawn Windfarm development area. However, the future potential grid connections for Seskin, Briskalagh, Littleton and Killosullan may all occur in agricultural grassland on both sides of the River Nore.

4.2.5 Baseline Surveys for Terrestrial Species

Terrestrial Annex II species in Ireland include the Otter, Marsh Fritillary, Kerry Slug, and three species of whorl snail. Of these species, only the Otter and Desmoulin's Whorl Snail are recorded in the wider area around the windfarm site listed by a European Site connected to the Gathabawn Windfarm.

4.2.5.1 Baseline Survey Results for Otter

Otter is a qualifying interest species in the downslope River Barrow and River Nore SAC.

4.2.5.1.1 Desktop Survey Results

Otter - The Proposed Gathabawn Windfarm is located in OS grid squares S36 and S37, while the Candidate Gathabawn Grid Connection is located in OS grid squares S36, S37, S46 and S47. Otter are recorded 9 times in the NBDC OS grid squares S36 and S37 (most recently in 2018 in S37), and 10 times in S46 and S47 (most recently in 2015 in S47).

4.2.5.1.2 Fieldwork survey results

Otter - Aquatic surveys in July 2025 recorded an Otter latrine on the Nuenna River at site B6 and Otter spraint sites on the Coolnacrutta Stream (site A2) and Lisdowney Stream (site C4). Two Otter spraints (ITM: 644282.43, 673384.19; ITM 644440.86, 672912.35) were recorded on the River Nore as incidental sightings during a Watercourse Survey in May 2025. There is an Otter Holt/Couch recorded near these spraint locations. These records were recorded c.1.3km north of the Candidate Gathabawn Grid Connection crossing of the River Nore. Older surveys at the windfarm site recorded secondary evidence of Otter (spraints, scats and burrows) in 2021. See Appendix D: Aquatic Ecology Baseline and Fisheries Report, and Appendix C: Invertebrates, Amphibians, Reptiles, Terrestrial Mammals Survey Data at the end of this Report.

4.2.5.1.3 Suitable Habitat for Otter

Otter - There was no occurrence of suitable habitat for Otter within the Gathabawn Windfarm site. Within the wider area around the site, suitable habitats of greater value to Otter occurs – i.e. larger streams and rivers, including the River Nore to the east of the Gathabawn Windfarm site at aquatic survey site C6 and the River Nuenna at sites B5 and B6.

4.2.5.1.4 Locational Context of Other Projects – Otter

A review of the Ballynalacken, Briskalagh, Seskin and Littleton Wind Farms AA and inspector reports found that Otter was considered a QI of the River Barrow and River Nore SAC for the Ballynalacken Wind Farm, Briskalagh Wind Farm, Seskin Wind Farm and Littleton Wind Farm due to the presence of the species and secondary evidence during field surveys and suitable habitat within the wider area of these projects.

4.2.5.2 Baseline Survey Results for Slugs and Snails

Desmoulin's Whorl Snail is a qualifying interest species in the downslope River Barrow and River Nore SAC.

4.2.5.2.1 Desktop Survey Results

Desmoulin's Whorl Snail – Desmoulin's Whorl Snail was recorded 1 time in the OS grid square S37, in 2022, and 6 times in S47, most recently in 1998. The known mapped areas of Desmoulin's Whorl Snail in the River Barrow and River Nore SAC are located upstream of the development and within a separate sub-catchment (Nore_SC_050) to the Gathabawn Windfarm. The Gathabawn Windfarm does not have direct hydrological connectivity to the known areas of this QI species.

4.2.5.2.2 Fieldwork Survey Results

Desmoulin's Whorl Snail – Desmoulin's Whorl Snail was not observed during aquatic surveys undertaken for the Gathabawn Windfarm.

4.2.5.2.3 Suitable Habitat for Desmoulin's Whorl Snail

Desmoulin's Whorl Snail – Populations of Desmoulin's Whorl Snail are found widely in central and southern Ireland. It is found mainly in calcareous, lowland wetlands, especially swamps, fens and marshes bordering rivers, canals, lakes and ponds (NPWS, 2025a); these habitat do not occur within the habitats baseline for the Gathabawn Windfarm. The main pressures are associated with natural succession, resulting in changes in species composition, and habitat drying, including drainage due to agricultural practices.

4.2.5.3 Baseline Survey Results for Marsh Fritillary

4.2.5.3.1 Desktop Survey Results

20 sightings of Marsh Fritillary are recorded in the NBDC OS grid square S37, with the most recent sighting from 2023. There are 16 records of Marsh Fritillary in OS grid square S47, most recently recorded in 2023.

4.2.5.3.2 Fieldwork Survey Results

No Marsh Fritillary colonies were recorded within the windfarm study area in 2025 or 2026. Similarly, no Marsh Fritillary were recorded during surveys in 2021. Surveys of the habitat within the adjacent Cullahill Mountain SAC at the Ballylehaun Area do have patches of suitable habitat (i.e. abundant Devils-bit Scabious) and records of larval webs from efforts in 2021 and 2022. However, follow-up surveys carried out in 2025 and 2026 have yielded no suitable patches of this species' host plant (5 individual plants scattered across large fields) or larval webs.

4.2.5.3.3 Suitable Habitat for Marsh Fritillary

While patches of Devil's Bit Scabious was recorded infrequently during Marsh Fritillary surveys in 2026, no Marsh Fritillary colonies were recorded within the windfarm study area during surveys carried out in 2025 or 2026. Similarly, no Marsh Fritillary were recorded during surveys in 2021. Surveys of the habitat within the adjacent Cullahill Mountain SAC at the Ballylehaun Area does have patches of suitable habitat (i.e. abundant Devils-bit Scabious) and records of larval webs from efforts in 2021 and 2022, with 2023 records of larvae and adults in the north of the SAC recorded on the NBDC. However, follow-up surveys in 2025 and 2026 have yielded no suitable patches of this species' host plant (5 individual plants scattered across large fields) or larval webs. Due to the extent of improved agricultural grassland habitat and public road corridor along the candidate grid connection route, it is considered that there is not suitable habitat to support successful reproduction of Marsh Fritillary within the ecological baseline.

4.2.5.3.4 Locational Context for Other Projects

A review of the Ballynalacken, Briskalagh and Seskin and Littleton Wind Farms AA and inspector reports found that no SACs designated for Marsh Fritillary were recorded within the ZoI of their respective projects, and therefore no sites were screened in for stage 2 appropriate assessment. The Briskalagh Wind Farm identified no Marsh Fritillary sightings and no suitable supporting habitat within the site. See AA Figure 15: Marsh Fritillary Survey at the Proposed Gathabawn Windfarm site (see over)

Appropriate Assessment Report

AA Figure 15: Marsh Fritillary Survey at the Proposed Gathabawn Windfarm site

Legend:

Proposed Gathabawn Windfarm

Larvel Web Search 2026

T5

T7

T6

N

4.2.6 Baseline Surveys for Bats

All resident Irish bat species are protected under Annex IV of the EU Habitats Directive, and their local distribution and collision-risk assessments are evaluated comprehensively within Chapter 13 Biodiversity of the accompanying EIAR. However, only the Lesser Horseshoe Bat holds Annex II status capable of triggering a European site designation. Desk studies and NPWS distribution data confirm that the Lesser Horseshoe Bat is absent from the Kilkenny/Laois region, and no nearby European sites hold bat species as a QI.

Lesser Horseshoe Bat was not recorded at the proposed Gathabawn Windfarm site during bat surveys in 2025 and 2026. There are no records of Lesser Horseshoe Bat within the NBDC OS grid squares S36 or S37. The proposed Gathabawn Windfarm is located c.94km from the nearest SAC designated for Lesser Horseshoe Bat, which is significantly beyond the core foraging and commuting range of 2.5 - 5km for Lesser Horseshoe Bats (NPWS & VWT, 2022) and is also beyond the distance of winter-summer roost migration exhibited by this species, which can be up to 10km (Collins, 2023).

4.2.7 Baseline Surveys for Birds

Desktop research results and fieldwork results are summarised below and can be found in Appendix B: Species Records held by NBDC and Appendix E: Bird Survey Data.

4.2.7.1 Desktop Survey Results

The waders and waterbirds records and counts within the NBDC S36, S37, S46 and S47 grid squares are outlined in Section 4.2.2.1.1 National Biodiversity Data Centre, while the results of I-WeBS carried out by BirdWatch Ireland on behalf on NPWS in Section 4.2.2.2 Results of Irish Wetland Surveys. A review of the Irish Wetland Bird Survey results published by NPWS in 2025 found that these birds are most likely using the River Nore and Durrow Curragh, River Barrow areas.

Annex I waterbird, seabird and wader species were recorded during the I-WeBS at lakes and suitable waterbodies within a study area of 5km from the Gathabawn Windfarm turbines; internationally or nationally important numbers were recorded for the following species:

Nationally important numbers (>910) of **Golden Plover** were recorded at Baun, Durrow Curragh and River Nore.

No internationally or nationally important numbers of other wetland or waterbirds were recorded.

Annex I species which were recorded, but at numbers under the threshold for national/international importance included:

- Little Egret was recorded at Durrow Curragh and River Nore
- Whooper Swan was recorded at Baun, Raheenleigh, Durrow Curragh, and River Nore
- A single record of Ruff at Baun in winter 2022/2023

Other regularly occurring or migratory species which were recorded, at numbers under the threshold for national/ international importance included:

- Pintail, Redshank, and Little Grebe were only recorded at Durrow Curragh.
- Shoveler, Dunlin and Moorhen were recorded Durrow Curragh. Shoveler and Dunlin were also recorded at Buan, and Moorhen was also recorded at the River Nore site.
- Lapwing and Curlew were recorded at The Loughanes, Baun, Durrow Curragh, and River Nore. Curlew was also recorded at Raheenleigh.
- Whooper Swan was recorded at Baun, Raheenleigh, Durrow Curragh, and River Nore
- Mute Swan, Cormorant, Coot, Wigeon, Teal and Mallard were recorded at The Loughanes, Baun, Durrow Curragh, and River Nore.

- Grey Heron, Common Gull, Lesser Black-backed Gull and Black-headed Gull were recorded at The Loughanes and Durrow Curragh. Grey Heron and Black-headed Gull were also recorded at the River Nore

The following birds of prey are recorded in the OS grid squares within which the Proposed Gathabawn Windfarm (S36 and S37) and Candidate Gathabawn Grid Connection (S36, S37, S46, S37) are located: Barn Owl (*Tyto alba*) (S36, S37, S46, S47), Kestrel (*Falco tinnunculus*) (S36, S37, S46, S47), Hen Harrier (*Circus cyaneus*) (S37), Merlin (*Falco columbarius*) (S37), Buzzard (*Buteo buteo*) (S36, S37, S46), Long-eared Owl (*Asio otus*) (S37, S46, S47), Peregrine (*Falco peregrinus*) (S36, S37, S46, S47) and Sparrowhawk (*Accipiter nisus*) (S37, S46, S47).

4.2.7.2 Bird Field Survey Results

Bird surveys were carried out during winter 2022/2023, breeding 2025, winter 2025/2026, and breeding 2026. These surveys are described below. Although not relied upon in the evaluations herein, bird surveys have been carried out for the Gathabawn Windfarm development between 2019 and 2022, and some references to older survey results are included below where it lends to a deeper understanding of the use of the area over time by a bird species.

Survey Details:

- Transect Surveys and VP Surveys were carried out during winter 2022/2023, breeding 2025, winter 2025/2026, and breeding 2026.
- I-WeBS were carried out during winter 2022/2023 and winter 2025/2026.
- Water Connectivity VP surveys were carried out in February, March and April 2026.
- Breeding raptor (Peregrine) surveys were carried out in April, May, June, July and August 2025 and 2026.
- Hen Harrier roost surveys were carried out in winter 2022/2023 from October 2022 to March 2023, and in winter 2025/2026 from October 2025 to March 2026.
- Breeding Wader surveys were carried out in June and July 2021, and April, May and June 2022.

See also Appendix E: Bird Survey Data.

Bird Survey Results:

Birds of Special Conservation Interest (Annex I) which were recorded at or in the vicinity of the Gathabawn Windfarm site are included in the table that follows the Plate3. The ecological significance of the number of birds recorded, suitability of habitats at the windfarm site, and key habitats for these species in the wider area are described. Annex I species recorded in the S36, S37, S46 and S47 NBDC squares are also included.

See AA Figure 16.1: Location of Bird Surveys for the Whole Gathabawn Windfarm Project – Raptor Surveys

AA Figure 16.2: Location of Bird Surveys for the Whole Gathabawn Windfarm Project – Breeding Wader Survey

AA Figure 16.3: Location of Bird Surveys for the Whole Gathabawn Windfarm Project – iWeBS Survey Locations and Water Connectivity Vantage Point Survey

AA Figure 16.4: Location of Bird Surveys for the Whole Gathabawn Windfarm Project – Vantage Point Locations and Transect Surveys

Appropriate Assessment Report

AA Figure 16.1 - Location of Bird Surveys for the Whole Gathabawn Windfarm Project - Raptor Surveys

Legend:

- Proposed Gathabawn Windfarm Construction Works Area
- Candidate Gathabawn Grid Connection Construction Works Area
- Barn Owl Study
- Incidental Barn Owl sighting
- Hen Harrier Survey
- Raptor Suitability - Low
- Raptor Suitability - Intermediate
- Raptor Suitability - High
- Peregrine Survey
- Kestrel Survey

Cullahill
Lisdowney
Ballyragget
Gathabawn
Johnstown
Freshford

Appropriate Assessment Report

AA Figure 16.2 - Location of Bird Surveys for the Whole Gathabawn Windfarm Project - Breeding Wader Survey

Legend:

- Proposed Gathabawn Windfarm Construction Works Area
- Candidate Gathabawn Grid Connection Construction Works Area
- Breeding Wader Survey Area

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12

N

Aghmacart Aghmacart Cross Rds Maynebog Br Sch Holy Well Toberboe or Killenny More 253 Priory Grave Lodge Moneenaun Castle Gravel Pit

Appropriate Assessment Report

AA Figure 16.3 - Location of Bird Surveys for the Whole Gathabawn Windfarm Project - iWeBS Survey Locations and Water Connectivity Vantage Point Survey

Legend:

- Proposed Gathabawn Windfarm Construction Works Area
- Candidate Gathabawn Grid Connection Construction Works Area
- iWEBS Survey Locations 2022-2023
- iWEBS Survey Locations 2025-2026
- Nore Waterbird Vantage Point 2026
- Swan Vantage Point 2022

Durrow
Cullahill
Lisdowney
Ballyragget
Gathabawn
Johnstown
Freshford
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
N

Appropriate Assessment Report

AA Figure 16.4 - Location of Bird Surveys for the Whole Gathabawn Windfarm Project - Vantage Point Locations and Transect Surveys

Legend:

- Proposed Gathabawn Windfarm Construction Works Area
- Candidate Gathabawn Grid Connection Construction Works Area
- Vantage Locations
  - Winter 2022-2023
  - Winter 2025-2026
  - Breeding 2025
  - Breeding 2026
- Additional Vantage Point location for Vantage Point Winter 2022-2023
- Transect Surveys 2022-2023
- Transect Surveys 2025-2026

Cullahill
Lisdowney
Ballyragget
Gathabawn
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
VP1
VP2
VP3
VP4
VP5
VP6
VP7
N

AA Table 9: Annex I and Regularly Occurring Bird Species recorded during bird surveys at Gathabawn Windfarm site

Species	Survey Results	Discussion of numbers recorded at the windfarm	Suitable habitat at the Windfarm Site and along the Candidate Grid Route?	Key habitats in the wider area
Kingfisher	Kingfishers were not recorded during surveys at the Gathabawn Windfarm. There was 1 no. location surveyed which had intermediate signs of nesting; this was at the bridge over the Lisdowney Stream north of Lisdowney. There was 1 no. location the which had habitats (vertical exposed banks present on the stream bank) suitable for nesting on the Lisdowney Stream c.1.3km south-west of Lisdowney. All other locations surveyed were of low or negligible potential.	No sightings of Kingfisher were recorded within the Gathabawn Windfarm.	Suitable streams are present within the ecological baseline, with the high suitability areas pertaining to the Candidate Gathabawn Grid Connection crossing of the River Nore. Two Kingfishers were recorded flying along the River Nore, c.542m north of the Candidate Gathabawn Grid Connection.	The River Nore SPA, which is crossed by the Candidate Gathabawn Grid Connection, is of high ornithological importance as it supports a nationally important population of Kingfisher.
Lapwing	VP surveys recorded 36 Lapwings during the winter 2022/2023 season, with a further eight recorded in winter 2025/2026. Lapwings were not recorded utilising the windfarm site during transect or wader surveys. However, suitable foraging habitat (i.e. grassland) is present in the vicinity of the proposed development. A peak count of 64 Lapwings was recorded in February 2023 during I-WeBS Surveys in winter 2022/2023; the closest record (of six Lapwings) was recorded in November 2022, 3.5km from T1. A peak count of 70 Lapwings was recorded in January 2026 during I-WeBS surveys in winter 2025/2026, the closest record being 4.5km from T1.	These VP survey results indicate that Lapwings occasionally use habitat in the vicinity of the windfarm site, based on the counts for both the winter seasons.	Lapwings were not recorded utilising the windfarm site during transect or wader surveys. However, suitable foraging habitat (i.e. grassland) is present in the vicinity of the Gathabawn Windfarm and Candidate Gathabawn Grid Connection.	Wintering flocks are regularly recorded in a variety of habitats, including most of the major wetlands and pasture.

Species	Survey Results	Discussion of numbers recorded at the windfarm	Suitable habitat at the Windfarm Site and along the Candidate Grid Route?	Key habitats in the wider area
Peregrine	Peregrine were observed once during VP surveys in winter 2022/2023, 12 times in the 2025 breeding season, and 9 times in the 2026 breeding season. They were observed once during transect surveys in winter 2022/2023. During raptor surveys in 2025 and 2026, 17 Peregrines were recorded.. There is an established nest site recorded West of Ballyring and South of Ballylehaun. Visits in 2025 and 2026 have shown this nest is still active. Juveniles were recorded at the nest site in 2025 and 2026 and in the nearby quarry which is north of Ballyring and east of Ballylehaun in 2025. This nest site is over 1km from the nearest project element.	These survey results indicate that Peregrine occasionally use habitat within the windfarm site, based on records for both the winter seasons and breeding seasons.	Suitable foraging habitats are present at the Windfarm site; additionally, Peregrine will opportunistically utilise many open habitats for hunting. Suitable nesting/roosting habitats which are available at the site.	An established nest site was recorded in the wider area during visits in 2025 and 2026, and this nest is still active. Juveniles were recorded at the nest site in 2025 and 2026, and in a nearby quarry in 2025. This nest site is over 1km from the nearest project element.
Golden Plover	Golden Plovers were observed during VP surveys 1,378 times in the winter season 2022/2023 and 28 times in the breeding season 2025. Older surveys recorded Golden Plover during VP surveys in the breeding season 2021, and during I-WeBS surveys in the winter season 2021/2022.	These survey results indicate that Golden Plover regularly use habitat within the windfarm site, based on the counts for the winter season 2022/2023.	Golden Plover feed on a variety of soil and surface-living invertebrates, principally soil invertebrates. Habitat at the windfarm site and Candidate Gathabawn Grid Connection is considered to be unsuitable for Golden Plover as they require wetland and peatland/heath habitat, which is not present.	Recorded at nationally important numbers at Baun, River Nore and Durrow Curragh (River Erkina) during NPWS I-WeBS (NPWS, 2025d). Recorded at nationally important numbers during the winter season 2022/2023 surveys.
Dunlin	The peak count recorded for Dunlin during I-WeBS surveys was 50. The Dunlin	These survey results indicate that Dunlin do	Dunlin feed predominantly on small invertebrates	No key habitats within the wider area. They are common along all coastal

Species	Survey Results	Discussion of numbers recorded at the windfarm	Suitable habitat at the Windfarm Site and along the Candidate Grid Route?	Key habitats in the wider area
	sightings were west of Ballylehaun, c.5.2km from the closest proposed Gathabawn Windfarm turbine.	not use habitat within the windfarm site, based on records for the winter season.	of estuarine mudflats, which are not present within the windfarm site and Candidate Gathabawn Grid Connection.	areas - especially on tidal mudflats and estuaries.
Little Egret	Little Egret was recorded once from VP surveys on the River Nore in April 2026, and 4 times during VP surveys at the windfarm site in winter 2022/2023. A peak count of 2 Little Egrets was recorded in November 2022 and February 2023 during I-WeBS surveys in winter 2022/2023, and 2 in February 2026 during I-WeBS surveys in winter 2025/2026, the closest I-WeBS record being c.3.5km north of T1.	These survey results indicate that Little Egret do not regularly use habitat within the windfarm site, based on records for the breeding and winter seasons.	No suitable habitat is available for Little Egret within the windfarm site and Candidate Gathabawn Grid Connection.	Recorded at nationally important numbers at River Barrow: Mountmellick (Clonterry) during NPWS I-WeBS (NPWS, 2025d).
Whooper Swan	Dedicated swan VP surveys were carried out in January 2022 but did not record any Whooper Swan. Whooper Swans were recorded during winter season VP surveys, with three records in winter 2022/2023 and six records in winter 2025/2026. A peak count of 28 Whooper Swans was recorded in February 2023 during I-WeBS surveys in winter 2022/2023, and a peak count of 50 was recorded in March 2026 during winter 2025/2026 surveys. The closest of these records was located c.4.2km north of T1.	These survey results indicate that Whooper Swans occasionally use habitat within the windfarm site, based on records for the winter seasons.	Whooper Swans are winter visitors to Irish Wetlands. Whooper Swans are found on lowland open farmland around inland wetlands, regularly seen while feeding on grasslands and stubble. There is suitable habitat at the windfarm site and Candidate Gathabawn Grid Connection, such as improved agricultural grassland and amenity grassland.	Lowland open farmland around inland wetlands which supports the wintering population.

Species	Survey Results	Discussion of numbers recorded at the windfarm	Suitable habitat at the Windfarm Site and along the Candidate Grid Route?	Key habitats in the wider area
Mute Swan	Mute Swan were recorded 3 times during VP surveys on the River Nore in 2026, 10 times during the winter season 2022/2023 and 8 times during the winter season 2025-2026. During these VP surveys, Mute Swan was recorded flying c.0.2km south of the Ballylehaun Area in 2023, with four Mute Swan flying between T8 and T10 at the Ballyring Section. A further eight Mute Swans were recorded flying through the Ballylehaun Section in October 2025, with the closest records c.150m north of T6. A peak count of 12 Mute Swans was recorded in November 2022 during I-WeBS surveys in winter 2022/2023, with a peak count of 9 recorded in November 2025. The closest records were c.3.5km north of the Ballylehaun Section.	These survey results indicate that Mute Swans occasionally use habitat within the windfarm site, based on records for the winter seasons.	Mute Swans are generally widespread on lakes, rivers and ponds. As such, the Candidate Gathabawn Grid Connection, which crosses the River Nore, provides suitable habitat for Mute Swan.	Lakes, ponds and rivers provide suitable breeding and wintering habitat.
Cormorant	Cormorants were recorded seven times during VP surveys on the River Nore in 2026. Cormorants were recorded three times in VP surveys onsite in winter 2022/2023. All of these records are from the lands around the River Nore north of Ballyragget, c.5.5km from the T9, the closest Gathabawn Windfarm turbine.	These survey results indicate that Cormorants infrequently use habitat in the vicinity of the windfarm site, based on the counts during the winter survey efforts.	Breeds in colonies mainly around the coast of Ireland, with some birds breeding inland. Birds on the coast breed on cliffs whilst those inland reside on inland lakes and rivers and breed in trees. Habitat at the windfarm site is considered to be of low suitability for Cormorant. The section of the Candidate Gathabawn Grid	Breeding habitat in the form of inland lakes and rivers.

Species	Survey Results	Discussion of numbers recorded at the windfarm	Suitable habitat at the Windfarm Site and along the Candidate Grid Route?	Key habitats in the wider area
			Connection that crosses the River Nore provides some suitable habitat.	
Curlew	The peak count recorded for Curlew during I-WeBS surveys was 22 in 2022/2023. All Curlew sightings were recorded c.5.2km west of T2. Older surveys recorded Curlew during I-WeBS surveys in the winter season 2021/2022.	These survey results indicate that Curlew do not use habitat within the windfarm site, based on the locations of counts for the winter season.	Habitat at the windfarm site is considered to be of low suitability to Curlew. This is due to the low frequency of recorded observations and lack of suitable habitat for the species, as Curlew nests on the ground in rough pastures, meadows and heather. Additionally, in winter it may be found in a wide range of wetland habitats, both coastal and inland and in damp fields. It was concluded that, given the low suitability of habitat at the windfarm site and the Candidate Gathabawn Grid Connection, and considering the absence of records within the windfarm and Candidate Gathabawn Grid Connection, the Whole Gathabawn Windfarm is not considered to have suitable habitats for this species.	Nests on the ground in rough pastures, meadows and heather. Winters in wetland habitats (coastal and inland) and other good feeding areas including damp fields.

Species	Survey Results	Discussion of numbers recorded at the windfarm	Suitable habitat at the Windfarm Site and along the Candidate Grid Route?	Key habitats in the wider area
Mallard	Mallard were recorded once during VP surveys in winter 2022/2023, flying over the River Nore c.6.5km northeast of the closest Gathabawn Windfarm turbine, and 2 times in the 2026 breeding season. A peak count of 16 Mallards was recorded in March 2023 during I-WeBS surveys in winter 2022/2023, and a peak count of 58 Mallards in November 2025 during I-WeBS surveys in winter 2025/2026. The closest record was c.2.4km south of T12, the closest Gathabawn Windfarm turbine.	These survey results indicate that Mallards infrequently use habitat in the vicinity of the windfarm site, based on the counts during the winter survey efforts.	Mallards are widely distributed across freshwater and coastal wetlands. The windfarm site provides some limited habitat for breeding individuals in areas of high vegetation cover. The Candidate Gathabawn Grid Connection provides suitable habitat where it crosses the River Nore.	Freshwater wetlands, ponds, lakes, streams and bogs.
Teal	A peak count of 60 Teal was recorded in January 2023 during I-WeBS surveys in winter 2022/2023, and a peak count of 43 was recorded in November 2025 during winter 2025/2026 surveys. The closest record was c.2.4km south of T12, the closest Gathabawn Windfarm turbine.	These survey results indicate that Teal do not use habitat in the vicinity of the windfarm site, based on the locations of records during the winter survey efforts.	Teal are widely distributed across freshwater and coastal wetlands. As such, the windfarm site does not provide suitable habitat. The Candidate Gathabawn Grid Connection provides suitable habitat where it crosses the River Nore.	Teal, similar to Mallard, are very widespread across Ireland in the winter and are known to utilise a variety of inland wetland habitats, from the largest lakes to the smallest ponds, bogs and drainage ditches.
Coot	A peak count of 3 Coots was recorded in January and February 2023 during I-WeBS surveys in winter 2022/2023, and a peak count of 12 Coots was recorded in March 2026 in winter 2025/2026. The closest record was c.3.5km north of T1, the closest Gathabawn Windfarm turbine.	These survey results indicate that Coots do not use habitat in the windfarm site, based on the locations of records during the winter survey efforts.	Coots nest in large shallow water bodies and in winter are found on lakes, coastal estuaries and river systems, but show a clear preference for large inland lakes. Habitat at the windfarm site is considered to be of limited suitability for Coot. The section of	Shallow water bodies that are rich in nutrients and have abundant bottom vegetation for food and some emergent vegetation for nest anchorage, and inland lakes.

Species	Survey Results	Discussion of numbers recorded at the windfarm	Suitable habitat at the Windfarm Site and along the Candidate Grid Route?	Key habitats in the wider area
			the Candidate Gathabawn Grid Connection that crosses the River Nore provides some suitable habitat.	
Little Grebe	A peak count of 2 Little Grebes was recorded in February 2026 during I-WeBS surveys in winter 2025/2026, the closest record being c.3.3km southeast of T12.	These survey results indicate that Little Grebes do not use habitat in the windfarm site, based on the locations of records during the winter survey efforts.	Breeding Little Grebes use margins of shallow, freshwater rivers, streams, loughs and ponds and in winter use ephemeral wetlands and are often encountered on sheltered coasts, estuaries and coastal lakes and lagoons. Habitat at the windfarm site is considered to be of limited suitability for Little Grebe. The section of the Candidate Gathabawn Grid Connection that crosses the River Nore provides some suitable habitat.	Margins of freshwater rivers, streams, lakes and ponds.
Shoveler	A peak count of 25 Shovelers was recorded in January 2026 during I-WeBS surveys in the winter season 2025/2026, with the nearest sighting c.5.2km from the closest proposed Gathabawn Windfarm turbine	These survey results indicate that Shovelers do not use habitat in the windfarm site, based on the locations of records during the winter survey efforts.	Shovelers nest on the ground among waterside vegetation and in winter prefer shallow eutrophic waters and occur on a variety of habitats while wintering in Ireland, including coastal estuaries, lagoons and inland lakes and callows. Habitat at the windfarm site is considered to be of low suitability for	Waterside vegetation and a variety of habitats while wintering, including inland lakes.

Species	Survey Results	Discussion of numbers recorded at the windfarm	Suitable habitat at the Windfarm Site and along the Candidate Grid Route?	Key habitats in the wider area
			Shoveler. The section of the Candidate Gathabawn Grid Connection that crosses the River Nore provides some suitable habitat.	
Wigeon	A peak count of 100 Wigeon was recorded in February 2023 during I-WeBS surveys in winter 2022/2023, and a peak count of 208 was recorded in March 2026 during winter 2025/2026 surveys. The closest record was of eight no. Wigeon c.2.4km south of T12, the closest Gathabawn Windfarm turbine.	These survey results indicate that Wigeon do not use habitat in the windfarm site but are regularly occurring in the vicinity, based on the locations of records during the winter survey efforts.	They breed in shallow freshwater marshes, under tussocks adjacent to lakes and lagoons or on lake islands. In winter, they occur on coastal marshes, freshwater and brackish lagoons, estuaries, and bays. Many on inland wetlands, lakes, rivers and turloughs. Habitat at the windfarm site is considered to be of limited suitability for Wigeon. The section of the Candidate Gathabawn Grid Connection that crosses the River Nore provides some suitable habitat.	Inland wetlands, lakes, rivers and turloughs.
Grey Heron	Grey Heron was recorded once during VP surveys on the River Nore in April 2026. Grey Heron was also recorded 3 times during VP surveys in winter 2022-2023 and 1 time in the breeding season 2026. A peak count of 3 Grey Herons was recorded in November 2022 during I-WeBS surveys in winter 2022/2023, and a peak count of 2 Grey Herons was recorded in February 2026	These survey results indicate that Grey Herons infrequently use habitat in the vicinity of the windfarm site, based on the counts during the winter and breeding survey efforts.	Grey Herons breed in large trees and in winter are found in the same wetland habitats during the winter as in the breeding season. Habitat at the windfarm site is considered to be of low suitability for Grey Heron. The section of the Candidate	Small freshwater wetlands such as urban and farmland ponds, stretches of river, drainage ditches and temporary wetlands such as flooded fields.

Species	Survey Results	Discussion of numbers recorded at the windfarm	Suitable habitat at the Windfarm Site and along the Candidate Grid Route?	Key habitats in the wider area
	during I-WeBS surveys in winter 2025/2026, with the closest I-WeBS record being c.890m east of T12.		Gathabawn Grid Connection that crosses the River Nore provides some suitable habitat.	
Black-headed Gull	Black-headed Gull was observed 328 times during VP surveys on the River Nore in 2026. Black-headed Gull were also recorded 112 times during VP surveys onsite in winter 2022/2023, 8 times in the 2025 breeding season, 89 times in winter 2025/2026, and 18 times in the 2026 breeding season. They were also recorded 5 times during transect surveys in winter 2025/2026. A peak count of 9 Black-headed Gulls was recorded in January 2023 during I-WeBS surveys in winter 2022/2023, and 67 in December 2025 during I-WeBS surveys in winter 2025/2026.	These survey results indicate that Black-headed Gull regularly use habitat within the windfarm site, based on the counts for the winter season 2022/2023 and winter 2025/2026.	Usually nest on the ground in wetland areas, such as bogs and marshes and will also use man-made lakes. The wintering population are widespread on the coast and inland. Based on the extent of activity recorded within the windfarm, habitat at the windfarm site is considered to be of high suitability for Black-headed Gull. The section of the Candidate Gathabawn Grid Connection that crosses the River Nore provides some suitable habitat given the widespread nature of this species.	Wetland areas, such as bogs and marshes and man-made lakes.
Lesser black-Backed Gull	Lesser Black-backed Gull was recorded 337 times during VP surveys on the River Nore in 2026. Lesser Black-backed Gulls were recorded 707 times during VP surveys in winter 2022/2023, 57 times in the 2025 breeding season, 208 times in winter 2025/2026, and 23 times in the 2026 breeding season. A peak count of 210 Lesser Black-backed Gulls was recorded in January 2023	These survey results indicate that Lesser Black-headed Gull regularly use habitat within the windfarm site, based on the counts for both the winter and breeding seasons.	Suitable habitat for the species includes offshore islands, islands in inland lakes, sand dunes and coastal cliffs. Habitat in the vicinity of the windfarm site is considered to be of high foraging suitability to Lesser Black-backed Gull. This is due to the high frequency of	Inland lakes for both breeding and wintering populations.

Species	Survey Results	Discussion of numbers recorded at the windfarm	Suitable habitat at the Windfarm Site and along the Candidate Grid Route?	Key habitats in the wider area
	during I-WeBS surveys in winter 2022/2023, and 135 in November 2025 during I-WeBS surveys in winter 2025/2026. They were also recorded 50 times during transect surveys in winter 2025/2026, and once in the 2026 breeding season.		observations recorded during breeding and winter survey efforts. The Candidate Gathabawn Grid Connection is also considered to provide high-quality foraging habitat given the widespread nature of this species.	
Herring Gull	Herring Gull was recorded ten times during VP surveys in winter 2022/2023.	These survey results indicate that Herring Gulls infrequently use habitat in the vicinity of the windfarm site, based on the counts during the winter and breeding survey efforts.	Habitat at the windfarm site and Candidate Gathabawn Grid Connection is considered to be of low suitability for Herring Gull. This is due to the low frequency of recorded observations and lack of suitable habitat for the species as they favour offshore islands, islands in inland lakes, sand dunes and coastal cliffs.	Inland lakes for both breeding and wintering populations.
Moorhen	A peak count of 1 Moorhen was recorded in October 2022 during I-WeBS surveys in winter 2022/2023, and 10 in December 2025 during I-WeBS surveys in winter 2025/2026, with the closest record c.2.4km south of T12.	These survey results indicate that Moorhen does not use habitat within the windfarm site, based on the very low activity for the winter seasons.	Nests near water, usually in emergent vegetation or on a floating raft. They can be found in any freshwater habitat with abundant emergent vegetation, including town canals, muddy ditches, and large lakes. Despite the low activity levels	Almost all wetland habitats, including the smallest of ponds in the countryside and in urban areas.

Species	Survey Results	Discussion of numbers recorded at the windfarm	Suitable habitat at the Windfarm Site and along the Candidate Grid Route?	Key habitats in the wider area
			recorded during surveys, habitats in the vicinity of the windfarm site and Candidate Gathabawn Grid Connection are considered to be of some suitability for Moorhen given their widespread nature throughout Ireland.	

Birds with potential to be affected by the project:

Due to the absence of Hen Harrier from field survey efforts, and very low numbers of Little Egret, Cormorant, Curlew, Coot, Little Grebe, Grey Heron, Herring Gull, Moorhen, and the low-value habitat for Lapwing, Dunlin and Shoveler, and the absence of breeding or roosting within 500m of the windfarm site for all of these species, it is considered that there is no likelihood of the windfarm project affecting the range, population, habitats or future prospects of these species, and as a result, they are not considered further herein.

It is considered that there is potential for the remaining raptors, waterbirds and waders mentioned above (Peregrine, Kingfisher, Golden Plover, Whooper Swan, Mute Swan, Mallard, Teal, Wigeon, Black-headed Gull and Lesser Black-backed Gull) to occur in downstream waterbodies and surrounding wetland areas based on extensive bird survey results.

The River Nore is particularly relevant here with regard to the Candidate Gathabawn Grid Connection crossing this river, and it is an SPA designated for Kingfisher. Ex-situ effects may occur to the other waterbirds and waders in downstream hydrologically connected habitats. Mute Swan, Mallard, Black-headed Gull and Lesser Black-headed Gull were recorded using habitat along the River Nore during field surveys.

4.2.7.3 Locational Context of Other Projects

Other Projects: A review of the Ballynalacken, Briskalagh, Seskin and Littleton Wind Farms AA and inspector reports found that the River Barrow and River Nore SAC and River Nore SPA were screened in for stage 2 appropriate assessment. The Littleton Wind Farm AA report screened in the River Barrow and River Nore SAC for stage 2 appropriate assessment. The Briskalagh, Seskin and Littleton Wind Farms have identified grid connection works crossing under the River Nore by HDD. The Ballynalacken grid connection, crosses under the Rathduff Stream upstream of its confluence with the River Nore, also by HDD. The potential future project, Killoshulan, has a grid connection identified on its community website showing a route through Lisdowney village and joining/overlapping the Seskin route to the Eirgrid Ballyragget Substation.

Other Projects: A review of other projects found draft plans for the Ballyragget town, which promote a potential River Park alongside the banks of the River Nore and a looped walk around the town, this is relevant due to the proximity of the project to the River Barrow and River Nore SAC.

4.2.8 Connectivity Corridors and Pathways for QI and SCI species

Baseline ecological surveys were reviewed to establish whether the development site exhibits ecological connectivity or habitat continuity with any European sites, specifically focusing on mobile species and their designating features. This exercise complies with Step 3 of the European Commission (2021) Methodological Guidance for Stage 1 Screening. Its purpose is to determine whether the proposed wind farm site functions as an ecological pathway—either through flight corridors, foraging grounds, or terrestrial links—that could connect the project area to any Qualifying Interests (QI) or Special Conservation Interests (SCI) of nearby European sites.

4.2.8.1 Zones of Influence – Mobile Species

The Zones of Influence of the project, set out in Section 3.16: Overall Affected Area, are summarised hereunder for each type of mobile species:

Mobile Species	Zone of Influence
Terrestrial / Hydrological Species	
Marsh Fritillary Butterfly	Boundary of works areas plus 50m in all directions
Otter	Boundary of works areas plus 300m in all directions Watercourses that intersect the project site boundary up to 13.2km ± 5.3km from crossing points
Bat Species	
Lesser Horseshoe Bat	Boundary of works areas plus 300m in all directions (roosts)
	2.5 - 5km (commuting and foraging), 10km (winter-summer roost migration)
Bird Species	
Highly Mobile Bird Species: Raptors, Waterbirds, Waders	2km around the wind turbines for core operational displacement Known mean foraging ranges for SCIs
Kingfisher	300m upstream and downstream of watercourse crossing works; Watercourses that intersect the project site boundary, including watercourse crossing points along the Candidate Gathabawn Grid Connection route.
Aquatic Species and Salmonid/Margaritifera Catchments	
Fisheries – Atlantic Salmon, Lamprey species, Twaite Shad	Hydrologically connected watercourses within the Goul_SC_010, Nore_SC_070, Nore_SC_060 sub-catchments and the Durrow, Lisdowney and Kilkenny-Ballynakill Gravels groundwater bodies, including watercourse crossing point along the Candidate Gathabawn Grid Connection route.
White-Clawed Crayfish	
Desmoulin's Whorl Snail	
Freshwater Pearl Mussel	
Otter (see above - hydrological foraging pathways and local disturbance)	

4.2.8.2 Identification of Connectivity Corridors and Pathways

The baseline ecological survey results—derived from site-specific vantage point counts, transect surveys, wetland bird surveys, watercourse surveys and aquatic surveys, habitat surveys and invertebrate surveys —were cross-referenced against Qualifying Interests (QI) and Special Conservation Interests (SCI) species to ascertain whether a functional ecological pathway connects the Gathabawn Windfarm site to these protected features. The results are presented in the table below.

Table 3: Baseline Connectivity Matrix

QI/SCI Species / Feature Group	Baseline Survey Findings *(Evidence & Record Summary)*	Potential Pathway and/or Connectivity *(How it functions as an ecological link)*
Fisheries *(Atlantic Salmon, Lamprey species, Twaite Shad)*	Location of the Proposed Windfarm in the Goul_SC_010 and Nore_SC_070 sub catchments. Multiple watercourses intersecting the whole project works areas drain directly into the Goul_SC_010, Nore_SC_070 and Nore_SC_060 sub-catchments	Yes — Hydrological Pathway. Connected and downslope streams provide habitat to mobile aquatic species.
White-clawed Crayfish	Suitable habitat and historical records exist downstream within the connected sub-catchments.	Yes — Hydrological Pathway. Connected and downslope streams provide habitat to mobile aquatic species.
Freshwater Pearl Mussel	Known populations exist downstream in the main channel of the River Nore. Larval stages rely on salmonid hosts.	Yes — Hydrological & Fish Vector Pathway. Connected downstream surface-water channels which provide habitat to both adult mussels and their host fish.
Otter	Suitable habitat and foraging activity recorded along intersecting watercourses. No holts or couches located within 300m of proposed works.	Yes — Hydrological Foraging Corridor. Breeding sites are present north of the Candidate Gathabawn Grid Connection, and downslope streams function as a contiguous foraging link to the wider catchment.
Highly Mobile Birds *(Raptors, Waterbirds, Waders)*	VP surveys recorded target species flights. The candidate grid connection directly intersects the River Nore SPA at the proposed HDD crossing location. Annex I and regularly occurring migratory waders and waterbirds were recorded in the wider surrounding area. Suitable foraging habitat occurs at the project site for Peregrine, Golden Plover, Whooper Swan, Mute Swan, Mallard, Teal, Wigeon, Black-headed Gull and Lesser black-Backed Gull. Peregrine flightline activity for Peregrine was recorded within the Gathabawn Windfarm, and a confirmed nest site was recorded in the wider area of the Gathabawn Windfarm.	**Yes —** The open airspace and terrain over the site represent functional flight-lines and foraging areas **Yes** — grassland habitats at the windfarm and grid connection sites provide suitable foraging resources for Peregrine, Golden Plover, Whooper Swan, Mute Swan, Mallard, Teal, Wigeon, Black-headed Gull and Lesser black-Backed Gull.
Kingfisher	Suitable river corridor habitat exists along watercourses intersecting the Candidate Grid Connection route.	Yes — Hydrological and Riparian Corridors along watercourses provide highly localised commuting and foraging links for this species.

QI/SCI Species / Feature Group	**Baseline Survey Findings** ***(Evidence & Record Summary)***	**Potential Pathway and/or Connectivity** ***(How it functions as an ecological link)***
	No active breeding banks inside the 300m works buffer.	
Marsh Fritillary	Targeted surveys mapped patches of the larval foodplant Devil's-bit Scabious (*Succisa pratensis*) within the site. No active larval webs were recorded during the survey period.	**Yes —** Terrestrial / Ecological Pathway. While currently unoccupied, the on-site foodplant resource has potential to act as a functional "stepping-stone" or expansion habitat corridor.
Desmoulin's Whorl Snail	Baseline habitat mapping confirmed no suitable tall-sedge, swamp, or fen habitats exist within the works area or immediate site boundary.	**No Functional Pathway**. The local site boundary lacks the specific, localised wetland or riparian habitat pockets required to act as a vector or stepping stone
Lesser Horseshoe Bat	Desktop data and bat surveys carried out in 2025 and 2026 at the wind farm site confirm the absence of the Annex II Lesser Horseshoe Bat within the region.	**No Functional Pathway**. Outside of the range of this species. No European sites within the ZoI hold bat species as a Qualifying Interest (QI). Fully scoped out of AA.

Following the identification of physical, hydrological, and aerial connectivity pathways at the Gathabawn Windfarm Project site, the next phase cross-references these routes against the QIs and SCIs of European sites within the ZoI. This forms the foundation of the Stage 1 Screening assessment.

4.3 European Sites within the Zone of Influence of the Project

4.3.1 Identification of European Sites using Criteria relating the Affected Area

The Commission guidelines in Assessment of plans and projects in relation to Natura 2000 sites (EC, 2021) recommend that, in particular the screening process should apply the following criteria to identify European Sites:

1) any Natura 2000 sites geographically overlapping with any of the actions or aspects of the plan or project in any of its phases, or adjacent to them;
2) any Natura 2000 sites within the likely zone of influence of the plan or project. Natura 2000 sites located in the surroundings of the plan or project (or at some distance) that could still be indirectly affected by aspects of the project, including as regards the use of natural resources (e.g. water) and various types of waste, discharge or emissions of substances or energy;
3) Natura 2000 sites in the surroundings of the plan or project (or at some distance) which host fauna that can move to the project area and then suffer mortality or other impacts (e.g. loss of feeding areas, reduction of home range);
4) Natura 2000 sites whose connectivity or ecological continuity can be affected by the plan or project.

These recommendations are examined in relation to the Proposed Gathabawn Windfarm in the table below, and sites identified are carried forward to Screening Step 4- Screening Exercise.

AA Table 10: European Sites within the Zone of Influence of the Proposed Gathabawn Windfarm

Criteria	Examination of the Project	European Sites
1) Geographical Overlap or Adjacency	The proposed wind farm boundary does not geographically overlap with any European site. However, the wind farm site is **immediately adjacent** to a terrestrial conservation area.	Cullahill Mountain SAC (Site Code: 000831)
	The Candidate Gathabawn Grid Connection route **geographically overlaps and crosses** designated riparian areas along a designated linear river channel.	River Barrow and River Nore SAC (Site Code: 002162) River Nore SPA (Site Code: 004233
2) Zone of Influence for Indirect Effects *Sites at a distance that could be affected via resources, waste, discharges, or emissions.*	The project footprint overlays the **Goul_SC_010, Nore_SC_070, and Nore_SC_060 sub-catchments**, establishing a downstream hydrological pathway to water-dependent European Sites. – See AA Figure 21. Instream works and watercourse crossing works to install cable ducting across streams under the River Nore by HDD provide a direct pathway for potential water quality effects.	River Barrow and River Nore SAC (Site Code: 002162) River Nore SPA (Site Code: 004233)
	The wind farm and grid route footprint also overlay regional groundwater bodies (**Durrow/Lisdowney/Kilkenny-Ballynakill Gravels**), creating a hydrogeological pathway to groundwater-dependent habitats.	Galmoy Fen SAC (Site Code: 001858) The Loughans SAC (Site Code: 000407) Lisbigney Bog SAC (Site Code: 000869)
	Proximity of main windfarm construction works and windfarm site road to a terrestrial conservation area, establishing a zone of influence for dust emissions during dry and windy weather.	Cullahill Mountain SAC (Site Code: 000831)

Criteria	Examination of the Project	European Sites
3) Mobile Fauna Interactions. Sites hosting mobile species that can move to the project area and suffer impacts.	Baseline aquatic and terrestrial data confirmed connectivity for Otter and Kingfisher. Instream grid works could potentially interact with highly mobile aquatic species. This includes spawning salmonids/lamprey, foraging Otters, and Kingfishers using the local stream networks and the River Nore corridor.	River Barrow and River Nore SAC *(for Otter)* River Nore SPA (Site Code: 004233)
	Baseline bird surveys confirmed that open airspace over the site and in the surrounding area is utilised by a range of raptor, waterbird and wader species.	Wicklow Mountains SPA (Site Code: 004040) Wexford Harbour and Slobs SPA (Site Code: 004076) Tramore Back Strand SPA (Site Code: 004027) Mid Waterford Coast SPA (Site Code: 004193) Helvick Head to Ballyquin SPA (Site Code: 004192) Middle Shannon Callows SPA (Site Code: 004096) River Little Brosna Callows SPA (Site Code: 004086)
	Baseline surveys mapped pockets of the larval foodplant (*Succisa pratensis*) within the wind farm site, though no active larval webs were recorded	Ballynafagh Lake SAC (Site Code: 001387) East Burren Complex SAC (Site Code: 001926)
4) Ecological Continuity & Connectivity Sites whose broader landscape connectivity or corridors can be affected.	Linear features across the site, such as hedgerows, and local foodplant distributions provide localised "stepping stone" links and resource continuity tied directly to the adjacent SAC.	Cullahill Mountain SAC (Site Code: 000831) Spahill and Clonmantagh Hill SAC (Site Code: 000849)
	Riparian corridors and bankside vegetation affected by the grid connection act as linear landscape pathways to the downstream River Nore.	River Barrow and River Nore SAC (Site Code: 002162) River Nore SPA (Site Code: 004233)

4.4 European Sites identified for the Step 4 screening exercise

The table below sets out the separation distances of the Proposed Gathabawn Windfarm and the Candidate Gathabawn Grid Connection from European Sites. These Sites are illustrated on AA Figure 17: Location of the Whole Gathabawn Windfarm Project in relation to European Sites (sites < 15km separation distances) and AA Figure 18: Location of the Whole Gathabawn Windfarm Project in relation to European Sites (sites > 15km separation distances) (over).

AA Table 11: Proximity of European Sites to the Whole Gathabawn Windfarm Project

		Separation Distance	
No.	**European Site & Site Code**	**Proposed Gathabawn Windfarm**	**Candidate Gathabawn Grid Connection**
1	Cullahill Mountain SAC (000831)	2m	2m
2	River Barrow and River Nore SAC (002162)	4.6km	0m
3	River Nore SPA (004233)	4.8km	0m
4	Galmoy Fen SAC (001858)	3.7km	5.7km
5	The Loughans SAC (000407)	5.8km	6.7km
6	Lisbigney Bog SAC (000869)	11km	6.4km
7	Spahill and Clonmantagh Hill SAC (000849)	850m	1.8km
8	Ballynafagh Lake SAC (001387)	69km	64km
9	East Burren Complex SAC (001926)	97km	97km
10	Wicklow Mountains SPA (004040)	64km	58km
11	Wexford Harbour and Slobs SPA (004076)	65km	61km
12	Tramore Back Strand SPA (004027)	70km	68km
13	Mid Waterford Coast SPA (004193)	69km	70km
14	Helvick Head to Ballyquin SPA (004192)	78km	79km
15	Middle Shannon Callows SPA (004096)	53km	55km
16	Little Brosna Callows SPA (004086)	49km	49km

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AA Figure 17 - Location of the Whole Gathabawn Windfarm Project in relation to European Sites (sites < 15km separation distances)

Legend:

- Proposed Gathabawn Windfarm
- Candidate Gathabawn Grid Connection
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)

Lisbigney Bog SAC (000869)

River Barrow and River Nore SAC (002162)

Galmoy Fen SAC (001858)

River Nore SPA (004233)

Cullahill Mountain SAC (000831)

Spahill And Clomantagh Hill SAC (000849)

The Loughans SAC (000407)

Durrow

Cullahill

Lisdowney

Ballyragget

Gathabawn

Johnstown

Freshford

Urlingford

Rathdowney
Ráth Domhnaigh

CASTLECOMER
Caislean an Chomair

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Appropriate Assessment Report

AA Figure 18 - Location of the Whole Gathabawn Windfarm project in relation to European Sites (sites > 15km separation distances)

Legend:

- Proposed Gathabawn Windfarm
- Candidate Gathabawn Grid Connection
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)

Middle Shannon Callows SPA (004096)

All Saints Bog SPA (004103)

Dovegrove Callows SPA (004137)

Little Brosna Callows SPA (004086)

East Burren Complex SAC (001926)

Lough Derg (Shannon) SPA (004058)

Slievefelim to Silvermines SPA (004165)

Slieve Bloom Mountains SPA (004160)

Ballynafagh Lake SAC (001387)

Wicklow Mountains SPA (004040)

Proposed Gathabawn Windfarm

Candidate Gathabawn Grid Connection

Wexford Harbour and Slobs SPA (004076)

Tramore Back Strand SPA (004027)

Mid Waterford Coast SPA (004193)

Helvick Head to Ballyquin SPA (004192)

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5. Screening Step 4 – Screening Exercise

The Screening exercise herein evaluates the effects of the proposed Gathabawn Windfarm on European Sites, both alone and in combination with other elements of the project and other projects or plans and considers whether it can be objectively concluded that effects on European Sites will not be significant, taking into account the conservation objectives and measures that have been set for the Sites.

The Screening Evaluation is presented in two parts. The first part of the Screening Evaluation consists of an examination of each of the European Sites identified during Step 3 to determine if there is potential for connectivity with Gathabawn Windfarm Project works. The second part of the Screening Evaluation examines whether there is potential or likelihood for the Proposed Gathabawn Windfarm to cause significant effects on those European Sites which were considered to have connectivity with the project, either alone or in-combination.

Application of Protective/Mitigation Measures in the Screening Evaluation

For the avoidance of doubt, this Screening Evaluation to inform the AA process is carried out in the absence of any environmental protective/mitigation measures which may be required or prescribed to avoid or reduce harmful effects on designated European Sites.

5.1 Description of European Sites under Consideration

Brief descriptions of the European Sites within the study area are provided in the table below. The Site Synopsis and Conservation Objectives for each site are available in full on the National Parks & Wildlife Service website at https://www.npws.ie/protected-sites.

AA Table 12: Description of European Sites

No	European Site	Summary Description (from Site Synopsis)	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Data Source www.npws.ie last accessed online on 15/09/2026
1	**Cullahill Mountain SAC (000831)**	Cullahill Mountain SAC lies on a western outlier of the Castlecomer plateau, 6 km north-east of Johnstown in Co. Kilkenny. In this area, the underlying limestone has been exposed relatively recently by erosion of the higher shales. The rock is in the form of an escarpment, with a steep side facing the central plain (and the Cork Dublin road) and more gradual slopes to the south-east where the shale soon appears.	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	Site Synopsis [Version 23.09.2013] Conservation Objectives Series [Version 11.11.2021]
2	**River Barrow and River Nore SAC (002162)**	This site consists of the freshwater stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains, and it also includes the tidal elements and estuary as far	Desmoulin's Whorl Snail Vertigo moulinsiana Freshwater Pearl Mussel Margaritifera margaritifera	Site Synopsis [Version dated 03.04.2024]

No	European Site	Summary Description (from Site Synopsis)	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Data Source www.npws.ie last accessed online on 15/09/2026
		downstream as Creadun Head in Waterford. The site passes through eight counties – Offaly, Kildare, Laois, Carlow, Kilkenny, Tipperary, Wexford and Waterford. Major towns along the edge of the site include Mountmellick, Portarlington, Monasterevin, Stradbally, Athy, Carlow, Leighlinbridge, Graiguenamanagh, New Ross, Inistioge, Thomastown, Callan, Bennettsbridge, Kilkenny and Durrow. The larger of the many tributaries include the Lerr, Fushoge, Mountain, Aughavaud, Owenass, Boherbaun and Stradbally Rivers of the Barrow, and the Delour, Dinin, Erkina, Owveg, Munster, Arrigle and King's Rivers on the Nore. Both rivers rise in the Old Red Sandstone of the Slieve Bloom Mountains before passing through a band of Carboniferous shales and sandstones. The Nore, for a large part of its course, traverses limestone plains and then Old Red Sandstone for a short stretch below Thomastown. Before joining the Barrow it runs over intrusive rocks poor in silica. The upper reaches of the Barrow also run through limestone. The middle reaches and many of the eastern tributaries, sourced in the Blackstairs Mountains, run through Leinster Granite. The southern end, like the Nore runs over intrusive rocks poor in silica.	White-clawed Crayfish Austropotamobius pallipes Sea lamprey Petromyzon marinus Brook lamprey Lampetra planeri River lamprey Lampetra fluviatilis Twaite shad Alosa fallax Salmon Salmo salar Estuaries Mudflats and sandflats not covered by seawater at low tide Salicornia and other annuals colonizing mud and sand Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Otter Lutra lutra Mediterranean salt meadows (Juncetalia maritimi) Killarney fern Trichomanes speciosum Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation European dry heaths Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels *Petrifying springs with tufa formation (Cratoneurion) Old sessile oak woods with Ilex and Blechnum in the British Isles *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	Conservation Objectives Series [Version 06/06/2025]
3	**River Nore SPA (004233)**	The River Nore SPA is a long, linear site that includes the following river sections: the River Nore from the bridge at Townparks, (north-west of Borris in Ossory) to Coolnamuck (approximately 3 km south of Inistioge) in Co. Kilkenny; the Delour River from its junction with the River Nore to Derrynaseera bridge (west of Castletown) in Co. Laois; the Erkina River from its junction with the River Nore at Durrow Mills to	Kingfisher Alcedo atthis	Site Synopsis [Version 13.09.2011] Conservation Objectives Series [Version 02.07.2024]

No	European Site	Summary Description (from Site Synopsis)	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Data Source www.npws.ie last accessed online on 15/09/2026
		Boston Bridge in Co. Laois; a 1.5 km stretch of the River Goul upstream of its junction with the Erkina River; the Kings River from its junction with the River Nore to a bridge at Mill Island, Co. Kilkenny. The site includes the river channel and marginal vegetation.		
4	**Galmoy Fen SAC (001858)**	Galmoy Fen is situated 7 km north of Johnstown in Co. Kilkenny, close to the boundary with Co. Laois. It comprises a cutover raised bog that has become flooded with base-rich groundwater and that now supports alkaline fen vegetation. It lies in a depression and is underlain by Carboniferous limestone.	Alkaline fens	Site Synopsis [Version 13.11.2013] Conservation Objectives Series [Version 17.07.2019]
5	**The Loughans SAC (000407)**	The Loughans is a turlough situated in flat land about 3 km east of Urlingford, below the Slieve Ardagh Hills, in Co. Kilkenny. The basin is slightly undulating, with banks and hummocks of glacial drift around which the water rises. It has a level floor for the most part, but swallow holes and subsidence hollows are present. The turlough floods regularly, despite some drainage. In summer, it retains a permanent central pond and there are several subsidiary wet hollows at the eastern end.	Turloughs*	Site Synopsis [Version 22.08.2013] Conservation Objectives Series [Version 16.12.2020]
6	**Lisbigney Bog SAC (000869)**	Lisbigney Bog is situated about 5 km north-east of Durrow in Co. Laois. Although referred to as a bog, this site is actually a wetland dominated by fen vegetation. It is a former lake basin, and is now criss-crossed by streams.	Desmoulin's Whorl Snail Vertigo moulinsiana Calcareous fens with Cladium mariscus and species of the Caricion davallianae*	Site Synopsis [Version 24.09.2013] Conservation Objectives Series [Version 13.12.2021]
7	**Spahill and Clonmantagh Hill SAC (000849)**	Spahill and the adjacent hills form part of an escarpment which links the Slieve Ardagh Hills with the Castlecomer Plateau in Co. Kilkenny. The hills are of limestone overlain by shales and/or sandstones, and so the surface geology is variable, with	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	Site Synopsis [Version dated 12.01.2018] Conservation Objectives Series [Version 11.11.2021]

No	European Site	Summary Description (from Site Synopsis)	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Data Source www.npws.ie last accessed online on 15/09/2026
		different rock types supporting different vegetation types. This particular site is mostly limestone, exposed as small ledges or as flat sheets. When the latter occurs it is often weathered into a pavement pattern, similar to that found in the Burren, Co. Clare. The hills are generally low and rounded - they rise relatively steeply from the central plain but drop south-eastwards more gently. Their surface is grassy in appearance but the soil is shallow, especially on the upper parts, and the rock breaks through frequently.		
8	**Ballynafagh Lake SAC (001387)**	Ballynafagh Lake is located about 2 km north-west of Prosperous in Co. Kildare. It is a shallow alkaline lake with some emergent vegetation. The Blackwood Feeder, which connects Ballynafagh Lake to the Grand Canal, is also included in the site.	Desmoulin's Whorl Snail Vertigo moulinsiana Marsh Fritillary Euphydryas Aurinia Alkaline fens	Site Synopsis [Version 10.11.2013] Conservation Objectives Series [Version 10.12.2021]
9	**East Burren Complex SAC (001926)**	This large site incorporates all of the high ground in the east Burren in Counties Clare and Galway, and extends south-eastwards to include a complex of calcareous wetlands. The area encompasses a range of limestone habitats that include limestone pavement and associated calcareous grasslands and heath, scrub and woodland together with a network of calcareous lakes and turloughs. The site exhibits some of the best and most extensive areas of oligotrophic limestone wetlands to be found in the Burren and in Europe.	Marsh Fritillary Euphydryas aurinia Lesser Horseshoe Bat Rhinolophus hipposideros Otter Lutra lutra Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. Turloughs* Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation Alpine and Boreal heaths Juniperus communis formations on heaths or calcareous grasslands Calaminarian grasslands of the Violetalia calaminariae Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	Site Synopsis [Version 09.02.2016] Conservation Objectives Series [Version 18.01.2022]

No	European Site	Summary Description (from Site Synopsis)	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Data Source www.npws.ie last accessed online on 15/09/2026
			Calcareous fens with Cladium mariscus and species of the Caricion davallianae* Petrifying springs with tufa formation (Cratoneurion)* Alkaline fens Limestone pavements* Caves not open to the public Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*	
10	**Wicklow Mountains SPA (004040)**	This is an extensive upland site, comprising a substantial part of the Wicklow Mountains. Most of the site is in Co. Wicklow, but a small area lies in Co. Dublin. Exposed rock and scree are features of the site. The predominant habitats present are blanket bog, heaths and upland grassland. The Wicklow Mountains SPA is of high ornithological importance as it supports nationally important populations of Merlin and Peregrine, both species that are listed on Annex I of the E.U. Birds Directive. Part of Wicklow Mountains SPA is a Statutory Nature Reserve.	Merlin Falco columbarius Peregrine Falco peregrinus	Site Synopsis [Version 07.07.2014] Conservation Objectives Series [Version 16.07.2024]
11	**Wexford Harbour and Slobs SPA (004076)**	Wexford Harbour is the lowermost part of the estuary of the River Slaney, a major river that drains much of the south-east region. The site is divided between the natural estuarine habitats of Wexford Harbour, the reclaimed polders known as the North and South 'Slobs', and the tidal section of the River Slaney. The seaward boundary extends from the Rosslare peninsula in the south to the area just west of The Raven Point in the north. Shallow marine water is a principal habitat, but at low tide extensive areas of intertidal flats are exposed. These vary from rippled sands in exposed areas to sandy-muds in the more sheltered areas.	Little Grebe Tachybaptus ruficollis Great Crested Grebe Podiceps cristatus Cormorant Phalacrocorax carbo Grey Heron Ardea cinerea Bewick's Swan Cygnus columbianus Whooper Swan Cygnus cygnus Light-bellied Brent Goose Branta bernicla hrota Shelduck Tadorna tadorna Wigeon Anas penelope Teal Anas crecca Mallard Anas platyrhynchos Pintail Anas acuta	Site Synopsis [Version 08.07.2014] Conservation Objectives Series [Version 21.03.2012]

No	European Site	Summary Description (from Site Synopsis)	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Data Source www.npws.ie last accessed online on 15/09/2026
		The flats support a rich macro invertebrate fauna. Salt marshes fringe the intertidal flats. The Slobs are two flat areas of farmland, mainly arable and pasture grassland, empoldered behind 19th century sea walls. The channels often support swamp vegetation. The river section of the site is extensive, extending to Enniscorthy, a distance of almost 20 km from Wexford town. It is noticeably tidal as far as Edermine Bridge but with tidal influence right up to Enniscorthy. Wexford Harbour and Slobs SPA is one of the most important ornithological sites in the country supporting internationally important populations of Greenland White fronted Goose, Light-bellied Brent Goose, Black-tailed Godwit and Bar-tailed Godwit. In addition, it has 26 species of wintering waterbirds with populations of national importance, and nationally important numbers of breeding Little Tern. Also of significance is that several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Little Egret, Whooper Swan, Bewick's Swan, Greenland White-fronted Goose, Hen Harrier, Golden Plover, Bar-tailed Godwit, Ruff, Wood Sandpiper, Little Tern and Short-eared Owl. Wexford Wildfowl Reserve, located within Wexford Harbour and Slobs SPA, is a Ramsar Convention site, a Biogenetic Reserve and a Statutory Nature Reserve. Parts of the Wexford Harbour and Slobs SPA are also designated as Wildfowl Sanctuaries.	Scaup Aythya marila Goldeneye Bucephala clangula Red-breasted Merganser Mergus serrator Hen Harrier Circus cyaneus Coot Fulica atra Oystercatcher Haematopus ostralegus Golden Plover Pluvialis apricaria Grey Plover Pluvialis squatarola Lapwing Vanellus vanellus Knot Calidris canutus Sanderling Calidris alba Dunlin Calidris alpina Black-tailed Godwit Limosa limosa Bar-tailed Godwit Limosa lapponica Curlew Numenius arquata Redshank Tringa totanus Black-headed Gull Chroicocephalus ridibundus Lesser Black-backed Gull Larus fuscus Little Tern Sterna albifrons Greenland White-fronted goose Anser albifrons flavirostris Wetlands	
12	**Tramore Back Strand SPA (004027)**	Tramore Back Strand SPA is located approximately 2 km east of Tramore town in County Waterford. It comprises a medium-sized estuary sheltered from the open sea by a long	Brent Goose Branta bernicla hrota Golden Plover Pluvialis apricaria Grey Plover Pluvialis squatarola Lapwing Vanellus vanellus	Site Synopsis [Version 07.07.2014] Conservation Objectives Series [Version 03.10.2013]

No	European Site	Summary Description (from Site Synopsis)	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Data Source www.npws.ie last accessed online on 15/09/2026
		shingle spit, with high dunes. The area known as the Back Strand empties almost completely at low tide; it is connected to the outer bay and sea by narrows at Rinnashark. Tramore Back Strand is an important site for wintering waterfowl, providing both feeding and roosting areas. Tramore Back Strand SPA is of high ornithological importance for wintering waterfowl, with one species occurring in internationally important numbers and a further seven species having populations of national importance. The regular occurrence of Little Egret, Golden Plover and Bar-tailed Godwit is of particular note as these three species are listed on Annex I of the E.U. Birds Directive. Tramore Back Strand is also a Ramsar Convention site.	Dunlin Calidris alpina alpina Black-tailed Godwit Limosa limosa Bar-tailed Godwit Limosa lapponica Curlew Numenius arquata Wetlands	
13	**Mid Waterford Coast SPA (004193)**	The Mid-Waterford Coast SPA encompasses the areas of high coast and sea cliffs in Co. Waterford between Newtown Cove to the east and Ballyvoyle to the west. The site includes the sea cliffs and the land adjacent to the cliff edge. The high water mark forms the seaward boundary. Sea cliffs are the predominant habitat of the site; these occur along its length and are generally well-vegetated by a suite of typical sea cliff species. Above the cliffs areas of heath, improved grassland, unimproved wet and dry grassland, and woodland occur. The Mid-Waterford Coast SPA is an important site for Chough and Peregrine, both species that are listed on Annex I of the E.U. Birds Directive. It also supports a range of breeding seabirds, including nationally important populations of Cormorant and Herring Gull.	Cormorant Phalacrocorax carbo Peregrine Falco peregrinus Herring Gull Larus argentatus Chough Pyrrhocorax pyrrhocorax	Site Synopsis [Version 20.01.2015] Conservation Objectives Series [Version 06.08.2024]

No	European Site	Summary Description (from Site Synopsis)	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Data Source www.npws.ie last accessed online on 15/09/2026
14	**Helvick Head to Ballyquin SPA (004192)**	Helvick Head to Ballyquin SPA is a linear site situated on the south-west coast of Co. Waterford. It includes the sea cliffs and land adjacent to the cliff edge between Helvick Head in the east and Ballyquin townland in the south-west. The high water mark forms the seaward boundary, except around Helvick Head where the adjacent sea area to a distance of 500 m from the cliff base is included. The Helvick Head to Ballyquin SPA is an important site for Chough and Peregrine, both species that are listed on Annex I of the E.U. Birds Directive. It also supports a range of breeding seabirds, including populations of Cormorant, Herring Gull and Kittiwake of national importance.	Cormorant Phalacrocorax carbo Peregrine Falco peregrinus Herring Gull Larus argentatus Kittiwake Rissa tridactyla Chough Pyrrhocorax pyrrhocorax	Site Synopsis [Version 20.01.2015] Conservation Objectives Series [Version 23.05.2025]
15	**Middle Shannon Callows SPA (004096)**	The Middle Shannon Callows SPA is a long and diverse site which extends for approximately 50 km from the town of Athlone to the town of Portumna; it lies within Counties Galway, Roscommon, Westmeath, Offaly and Tipperary. The site averages about 0.75 km in width though in places is up to 1.5 km wide. The Middle Shannon Callows SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of two species - Whooper Swan and Black-tailed Godwit. In addition, there are four species that have wintering populations of national importance. The site also supports a nationally important breeding population of Corncrake. Of particular note is that several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Corncrake and Golden Plover.	Whooper Swan Cygnus cygnus Wigeon Anas penelope Corncrake Crex crex Golden Plover Pluvialis apricaria Lapwing Vanellus vanellus Black-tailed Godwit Limosa limosa Black-headed Gull Chroicocephalus ridibundus Wetlands	Site Synopsis [Version 10.01.2012] Conservation Objectives Series [Version 12.1.2022]

No	European Site	Summary Description (from Site Synopsis)	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Data Source www.npws.ie last accessed online on 15/09/2026
16	**Little Brosna Callows SPA (004086)**	The River Little Brosna Callows SPA follows the River Brosna from its confluence with the River Shannon for approximately 9 km south-eastwards to just beyond New Bridge on the R438 road. The site extends along both sides of the river within counties Offaly and Tipperary. The main habitat present is the extensive area of low lying callow grassland along the floodplain of the river. These grasslands are subject to prolonged flooding in winter, early spring and occasionally in summer.	Whooper Swan Cygnus cygnus Wigeon Anas penelope Teal Anas crecca Pintail Anas acuta Shoveler Anas clypeata Golden Plover Pluvialis apricaria Lapwing Vanellus vanellus Black-tailed Godwit Limosa limosa Black-headed Gull Chroicocephalus ridibundus Greenland White-fronted Goose Anser albifrons flavirostris Wetlands	Site Synopsis [Version 07.07.2014] Conservation Objectives Series [Version 31.01.2025]

5.2 Screening Evaluation – Examination of Connectivity to European Sites

5.2.1 Conceptual Modelling

Connectivity with a European Site was evaluated using a conceptual site model which identifies potential impact sources and pathways between the project and the European Sites, taking into account the Conservation Objectives of the European Sites.

The conceptual model (based on source-pathway-receptor connectivity) is a standard tool used in environmental assessment. For an effect to be likely, all three elements (source, pathway, and receptor) of this mechanism must be in place.

The identification of impact pathways takes account of the key parameters for the conservation status of habitats or species – i.e. Range, Population, Habitat for the species and Future Prospects for species, and Range, Area, Structure and functions and Future Prospects for habitats.

5.2.2 Examination of Connectivity to SAC Sites

Impact Sources:

The following project works during construction are potential sources of impact to European Sites: excavations, groundworks; earthworks and temporary storage of overburden material; removal of vegetation; use of cement-based compounds; importation of aggregate (stone), use and movement of machinery; use of hydrocarbons; noise emissions; vibration from construction works; presence of humans; waste generation; increase extent of built/artificial surfaces; and reinstatement works.

The following sources have potential to cause impacts during during operation and decommissioning: groundworks and reinstatement works; use and movement of machinery; use of hydrocarbons; noise and presence of humans; and waste generation.

Connectivity Pathways to European Sites: Physical/direct contact; surface water and ground-water flow paths; movement of soils, vehicles, machinery, presence of personnel; air quality; air and ground; and visibility.

Receptor: Special Areas of Conservation (SAC) Natura 2000 sites

Description of the Potential Impact:

- **SAC Impact A: Direct impact to QI habitat** - Direct loss, fragmentation or degradation of QI habitats, direct loss or reduction in connectivity of QI habitats or plant species;
- **SAC Impact B: Indirect impact to QI habitat or plant species** – Loss or degradation of terrestrial or aquatic habitats, or loss of connectivity of habitats or species, within or ex-situ SAC sites (via reductions in water quality, dust emissions or the spread of invasive species);
- **SAC Impact C: Indirect Impacts to QI species** – loss, reduction, fragmentation of loss of connectivity of suitable habitat or reduction in prey item species (via reductions in water quality, changes in flow, or spread of invasive species);
- **SAC Impact D: Direct or Indirect Impacts to QI species** via mortality, disturbance or displacement.

See Figures:

AA Figure 19: Locational Context of the Gathabawn Windfarm Project and Surrounding Landuse in relation to Cullahill Mountain SAC (over)

AA Figure 20: Locational Context of the Gathabawn Windfarm Project and Surrounding Landuse in relation to River Barrow and River Nore SAC (over)

AA Figure 21: Hydrological Connectivity of the Gathabawn Windfarm Project (over)

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AA Figure 19 - Locational Context of the Gathabawn Windfarm Project and Surrounding Landuse in relation to Cullahill Mountain SAC

Legend:

- Turbine Foundation
- Turbine Hardstanding Area
- Ballylehaun Control Building
- New Windfarm Site Road
- Windfarm Cabling
- Candidate Gathabawn Grid Connection
- Public Road
- Existing Private Road
- Cullahill Mountain SAC

T2

Cullahill Mountain SAC

Windfarm Site Road

T3

Windfarm Cabling

Ballylehaun Control Building

Candidate Gathabawn Grid Connection

T4

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AA Figure 20 - Locational Context of Gathabawn Windfarm Project and Surrounding Landuse in relation to River Barrow and River Nore SAC

Legend:

- Underground Cabling
- Parksgrove Substation
- Drill Pits
- Joint Bay
- Existing EirGrid Ballyragget Substation
- Long Term Storage Berm
- Briskalagh WF Grid Connection (Consented)
- Seskin WF Grid Connection (Under Appeal, ACP)
- Construction Works Area Boundary
- River Barrow and River Nore SAC
- N77 Public Road Identification Number

Gathabawn Drill Pits (Crossing the River Nore)

Existing Eirgrid Ballyragget Substation

Seskin WF Grid Connection (Under Appeal, ACP)

River Barrow and River Nore SAC

Briskalagh WF Grid Connection (Consented)

Parksgrove - Moatpark UGC

Gathabawn Drill Pits (Crossing the N77)

Parksgrove Substation

Temporary Construction Compound

Access Road

Long Term Storage Berm

Ballyring - Parksgrove UGC

Cemetery

N432

N77

Páirc an Mhóta
Moatpark

River Nore
An Fheoir

N

AA Figure 21: Hydrological Connectivity of the Gathabawn Windfarm Project

Legend

- Gathabawn Windfarm Turbines
- Gathabawn Windfarm Red Line Boundary
- Candidate Gathabawn Grid Connection
- River Waterbodies (EPA)
- WFD_RiverSubBasins
- Special Area of Conservation
- Special Protection Area
- Goul_SC_010
- Nore_SC_050
- Nore_SC_060
- Nore_SC_070
- Nore_SC_080
- Erkina_SC_010

River Barrow And River Nore SAC
River Nore SPA
OWVEG (NORE)_040
OWVEG (NORE)_050
NORE_110
Nore_SC_050
ERKINA_050
Nore_SC_060
GOUL_060
NORE_120
LISDOWNEY_010
Cullahill Mountain SAC
GOUL_050
NORE_130
BAUNBALLINLOUGH STREAM_010
Goul_SC_010
GOUL_040
GORTEENAHILLA_010
Nore_SC_070
River Nore SPA
NORE_140
Nore_SC_080
River Barrow And River Nore SAC
NORE_150
Spahill And Clomantagh Hill SAC
GOUL_030
NUENNA_020
NUENNA_010
N
GOUL_020
ARDREAGH_010
The Loughans SAC
ARIGNA (KILKENNY)_010
NORE_160
Microsoft Vantor

5.2.2.1 Examination of Connectivity with Potential Impacts – SAC sites

AA Table 13: Examination of the Connectivity to SAC European Sites

European Site (Receptor)	Examination of Source/Pathway Connectivity – SAC Sites A: Direct impact to QI habitat - Direct loss, fragmentation or degradation of QI habitats; direct loss or reduction in connectivity of QI habitats or plant species B: Indirect Impact to QI habitat or plant species – Loss or degradation of terrestrial or aquatic habitats or species, or loss of connectivity of habitats, within or ex-situ SAC sites (via reductions in water quality, dust emissions or the spread of invasive species). C: Indirect Impacts to QI fauna species loss, reduction, fragmentation of loss of connectivity of suitable habitat or reduction in prey item species (via reductions in water quality, dust emissions, changes in flow, or spread of invasive species) D: Direct or Indirect Impacts to QI species via mortality, disturbance or displacement
Cullahill Mountain SAC (000831)	A: No connectivity for impacts – no part of the Proposed Gathabawn Windfarm, nor the Candidate Gathabawn Grid Connection, is located within the boundary of this SAC.
	B: YES - connectivity for impacts, (i) proximity of adjacent works at the Ballylehaun Area of the Proposed Gathabawn Windfarm (ii) potential for sources of dust during construction works (iii) excavations in close proximity to the boundary of this SAC; (iv) machinery movements and material deliveries in close proximity to this SAC.
	C: Not relevant – no faunal species included as QIs; this SAC is designated for habitats and plant species only.
	D: Not relevant – no faunal species included as QIs; this SAC is designated for habitats and plant species only.
River Barrow and River Nore SAC (002162)	A: YES – While the Proposed Gathabawn Windfarm is located outside of the boundary of this SAC, the Candidate Gathabawn Grid Connection element of the whole project overlaps the boundary of the SAC where underground cables will be laid within grassland in the riparian area and under the River Nore by HDD technique.
	B: YES - connectivity for impacts, (i) windfarm and grid connection locations are hydrologically connected: (ii) grid connection works in close proximity, in addition to works overlapping the SAC, with watercourse crossing works upstream of the SAC; (iv) machinery movements and presence of personnel through or in close proximity to this SAC.
	C: YES - connectivity for impacts, (i) windfarm and grid connection locations are hydrologically connected: (ii) grid connection works in close proximity, in addition to works overlapping the SAC, with watercourse crossing works upstream of the SAC; (iv) works and machinery movements and material delivery within or in close proximity to this SAC or in close proximity to suitable habitat ex-situ the SAC.
	D: YES - connectivity for impacts, (i) grid connection works in close proximity, in addition to works overlapping the SAC, with watercourse crossing works upstream of the SAC; (ii) machinery movements and presence of personnel through or in close proximity to this SAC and to suitable habitat ex-situ the SAC
Galmoy Fen SAC (001858)	A: No connectivity for impacts – no part of the Proposed Gathabawn Windfarm, nor the Candidate Gathabawn Grid Connection, is located within the boundary of this SAC.
	B: No connectivity for impacts, (i) not hydrologically connected; (ii) considerable overland separation distance; (iii) no machinery movements through or in close proximity to this SAC.
	B: No connectivity for indirect impacts related to dust emissions, or sediment/contaminant laden runoff due to i) separation distance (3.8km); (ii) this SAC is upstream in the downstream Goul catchment. B: No connectivity via groundwater; (i) whilst within the 5km study area for groundwater effects (3.8km separation distance), this SAC is located within a separate groundwater body (Shanahoe GWB) to the Proposed Gathabawn Windfarm (Durrow GWB).

European Site (Receptor)	**Examination of Source/Pathway Connectivity – SAC Sites** A: Direct impact to QI habitat - Direct loss, fragmentation or degradation of QI habitats; direct loss or reduction in connectivity of QI habitats or plant species B: Indirect Impact to QI habitat or plant species – Loss or degradation of terrestrial or aquatic habitats or species, or loss of connectivity of habitats, within or ex-situ SAC sites (via reductions in water quality, dust emissions or the spread of invasive species). C: Indirect Impacts to QI fauna species loss, reduction, fragmentation of loss of connectivity of suitable habitat or reduction in prey item species (via reductions in water quality, dust emissions, changes in flow, or spread of invasive species) D: Direct or Indirect Impacts to QI species via mortality, disturbance or displacement
	C: Not relevant – no faunal species included as QIs; this SAC is designated for habitats and plant species only.
	D: Not relevant – no faunal species included as QIs; this SAC is designated for habitats and plant species only.
The Loughans SAC (000407)	A: No connectivity for impacts – no part of the Proposed Gathabawn Windfarm, nor the Candidate Gathabawn Grid Connection, is located within the boundary of this SAC.
	B: No connectivity for impacts, (i) not hydrologically connected; (ii) considerable overland separation distance; (iii) no machinery movements through or in close proximity to this SAC.
	B: No connectivity for indirect impacts as a result of dust emissions or surface water quality impacts due to (i) separation distance; (ii) no surface water connection – upstream in the catchment to the works. (ii) no machinery movements through or in close proximity to this SAC. B: No connectivity for indirect impacts to groundwater quality or quantity due to (i) separation distance, (ii) no machinery movements through or in close proximity to this SAC.
	C: Not relevant – no aquatic or animal species included as QIs; these SACs are designated for habitats/plant species only.
	D: Not relevant – no aquatic or animal species included as QIs; these SACs are designated for habitats/plant species only.
Lisbigney Bog SAC (000869)	A: No connectivity for impacts – no part of the Proposed Gathabawn Windfarm, nor the Candidate Gathabawn Grid Connection, is located within the boundary of this SAC.
	B: No connectivity for impacts, (i) not hydrologically connected; (ii) considerable overland separation distance; (iii) no machinery movements through or in close proximity to this SAC.
	B: No connectivity for indirect impacts as a result of dust emissions or surface water quality impacts due to (i) separation distance (11km); (ii) no surface water connection – upstream in the catchment to the works. (ii) no machinery movements through or in close proximity to this SAC. B: No connectivity for indirect impacts to groundwater quality or quantity due to (i) separation distance (11km from the Gathabawn Windfarm and c.6.43km from the Candidate Gathabawn Grid Connection), (ii) no machinery movements through or in close proximity to this SAC.
	C: Not relevant – no aquatic or animal species included as QIs; this SAC is designated for for habitats/plant species only.
	D: Not relevant – no aquatic or animal species included as QIs; this SAC is designated for habitats/plant species only.

European Site (Receptor)	**Examination of Source/Pathway Connectivity – SAC Sites** A: Direct impact to QI habitat - Direct loss, fragmentation or degradation of QI habitats; direct loss or reduction in connectivity of QI habitats or plant species B: Indirect Impact to QI habitat or plant species – Loss or degradation of terrestrial or aquatic habitats or species, or loss of connectivity of habitats, within or ex-situ SAC sites (via reductions in water quality, dust emissions or the spread of invasive species). C: Indirect Impacts to QI fauna species loss, reduction, fragmentation of loss of connectivity of suitable habitat or reduction in prey item species (via reductions in water quality, dust emissions, changes in flow, or spread of invasive species) D: Direct or Indirect Impacts to QI species via mortality, disturbance or displacement
Spahill and Clonmantagh Hill SAC (000849)	A: No connectivity for impacts – no part of the Proposed Gathabawn Windfarm, nor the Candidate Gathabawn Grid Connection, is located within the boundary of this SAC.
	B: No connectivity for impacts, (i) no direct hydrological connectivity via surface water pathways; (ii) considerable overland separation distance; (iii) no machinery movements through or in close proximity to this SAC.
	B: No connectivity for indirect impacts as a result of dust emissions or surface water quality impacts due to (i) separation distance (>800m); (ii) elevated location of this SAC; (iii) no surface water connection – while it is in the same sub-catchments as the Proposed Gathabawn Windfarm, this SAC is located across the Coolnacrutta Stream valley from works in the Ballylehaun Area, and across the Foyle South Stream and Gorteenahilla Stream valleys from works in the Ballyring Area; (iv) no machinery movements through or in close proximity to this SAC. B: No connectivity for indirect impacts to groundwater quality or quantity due to (i) elevated nature of this SAC; which is (ii) located across the valley from the Proposed Gathabawn Windfarm; and (iii) no machinery movements through or in close proximity to this SAC.
	C: Not relevant – no aquatic or animal species included as QIs; this SAC is designated for habitats/plant species only.
	D: Not relevant – no aquatic or animal species included as QIs; this SAC is designated for habitats/plant species only.
Ballynafagh Lake SAC (001387) East Burren Complex SAC (001926)	A: No connectivity for impacts – no part of the Proposed Gathabawn Windfarm, nor the Candidate Gathabawn Grid Connection is located within with boundary of this SAC.
	B: No connectivity for impacts, (i) not hydrologically connected: (ii) considerable overland separation distance; (iii) no machinery movements through or in close proximity to this SAC.
	C & D: No connectivity: The nearest European sites designated for Marsh Fritillary are Ballynafagh Lake SAC (001387) and the East Burren Complex SAC (001926), which are located 72km and 97km respectively from the Gathbawn Windfarm Project locations. As these separation distances far exceed the maximum migration distance of this species (10km; Fowles, 2003) and the biological dispersal capability of the butterfly, no connectivity or pathway exists between any Marsh Fritillary populations which may exist in the local environment and the designated European populations in these Sites.

5.2.2.2 Screening of the Connected SAC Sites

As described in Section 5.2.2.1 above, an examination of connectivity pathways between the project and the European Sites found that six of the eight European Sites were considered to have no connectivity with the Gathabawn Windfarm Project. As a result, it is evaluated that there is no potential for effects from the Gathabawn Windfarm either alone or in-combination on these European Sites, and they are therefore screened out from further evaluation.

The remaining two European Sites are considered further below. The site-specific conservation measures for the SAC sites have been taken into account in the examinations hereunder.

5.2.2.2.1 River Barrow and River Nore SAC

Due to the proximity of the Gathabawn Windfarm Project to the River Barrow and River Nore SAC, the hydrological connectivity with the Project, and the mobility of qualifying interest species, aspects of the Gathabawn Windfarm Project have the potential to affect the Natura 2000 site through the following impacts:

- Habitat degradation
- Disturbance to species, or reductions in populations/densities
- Changes in ecological functions (e.g. water quality, spread of invasive species)
- Potential for interference with the key relationships that define the structure/function of the Site.

In relation to cumulative impacts, due to the location of Seskin Wind Farm Project (in-planning), Briskalagh Wind Farm and Grid Connection (consented), Ballynalacken Windfarm Project (consented), BESS 1 and BESS 2 (consented), Littleton Wind Farm's grid connection (in-planning) and the potential Killoshulan Wind Farm Project (pre-planning) within the same sub-catchments as the Gathabawn Windfarm, there is potential for significant adverse effects to the SAC in the worst case scenario where all projects build during the same period.

There is also potential for in-combination effects with the draft plans for the Ballyragget town, which promote a potential River Park alongside the banks of the River Nore and a looped walk around the town due to the proximity of the projects and plans to the River Barrow and River Nore SAC. Screening Conclusion: It is considered that **there is potential for significant** impacts to the River Barrow and River Nore SAC as a result of the Proposed Gathabawn Windfarm, both alone and in-combination, and therefore the River Barrow and River Nore SAC is **screened in** for further evaluation at Stage 2 of the Appropriate Assessment process.

5.2.2.2.2 Cullahill Mountain SAC

Due to the proximity of the Gathabawn Windfarm Project to the Cullahill Mountain SAC, aspects of the Gathabawn Windfarm Project have the potential to affect the Natura 2000 site through the following impacts:

- Habitat degradation
- Changes in ecological functions (e.g. dust emissions, spread of invasive species)
- Potential for interference with the key relationships that define the structure/function of the Site.

In relation to cumulative impacts, due to the intervening distance over land and the terrestrial nature of the SAC, the Seskin Wind Farm Project (in-planning), Briskalagh Wind Farm and Grid Connection (consented), Ballynalacken Windfarm Project (consented), BESS 1 and BESS 2 (consented), Littleton Wind Farm's grid connection (in-planning), the potential River Park and the potential Killoshulan Wind Farm Project (pre-planning), there is no potential for significant adverse effects to the SAC in the worst-case scenario where all projects are built during the same period. Screening Conclusion: It is considered that **there is potential for significant** impacts to the Cullahill Mountain SAC as a result of the Proposed Gathabawn Windfarm, and therefore the Cullahill Mountain SAC is **screened in** for further evaluation at Stage 2 of the Appropriate Assessment process.

5.2.3 Examination of Connectivity to SPA Sites

Impact Sources:

The following project works during construction are potential sources of impact: excavations, groundworks; earthworks and temporary storage of overburden material; removal of vegetation; use of cement-based compounds; importation of aggregate (stone), use and movement of machinery; use of hydrocarbons; noise emissions; vibration from construction works; presence of humans; waste generation; increase extent of built/artificial surfaces; and reinstatement works.

The following sources have potential to cause impacts during operation and decommissioning: groundworks and reinstatement works; use and movement of machinery; use of hydrocarbons; noise and presence of humans; and waste generation; operating turbines and the presence of wind turbines during the operational lifetime of the windfarm.

Connectivity Pathways to European Sites: Air, visibility; surface water and groundwater flow paths; landcover; migratory routes or important flightpaths through the windfarm.

Receptor: Special Protection Areas (SPA) Natura 2000 sites

Description of the Potential Impact:

- **SPA Impact A**: **Direct Impact to SCI species within SPA**: Disturbance or Mortality of Special Conservation Interest bird species or of prey item species within an SPA;
- **SPA Impact B**: **Indirect Impact to SCI species:** *ex-situ* disturbance/displacement of Special Conservation Interest species;
- **SPA Impact C: Indirect Impact to SCI species:** *ex-situ* Mortality or Barrier effects on SCI bird species;
- **SPA Impact D: Direct impact to SCI habitat**s: direct habitat loss, degradation, fragmentation or direct reduction/loss of connectivity effects to Wetland or other suitable habitats as a result of groundworks or vegetation clearance;
- **SPA Impact E: Indirect Impacts to SCI habitats** –indirect loss, reduction or loss of connectivity of wetland or other suitable habitat via reductions in water quality, reduction in prey item species or spread of invasive species.

See Figure: AA Figure 22: Locational Context of Gathabawn Windfarm Project and Surrounding Landuse in relation to River Nore SPA (over)

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AA Figure 22 - Locational Context of Gathabawn Windfarm Project and Surrounding Landuse in relation to River Nore SPA

Legend:

- Underground Cabling
- Parksgrove Substation
- Drill Pits
- Joint Bay
- Existing EirGrid Ballyragget Substation
- Long Term Storage Berm
- Briskalagh WF Grid Connection (Consented)
- Seskin WF Grid Connection (Under Appeal, ACP)
- Construction Works Area Boundary
- River Nore SPA
- N77 Public Road Identification Number

Gathabawn Drill Pits (Crossing the River Nore)

Existing Eirgrid Ballyragget Substation

Seskin WF Grid Connection (Under Appeal, ACP)

River Nore SPA

Briskalagh WF Grid Connection (Consented)

Parksgrove - Moatpark UGC

Gathabawn Drill Pits (Crossing the N77)

Parksgrove Substation

Temporary Construction Compound

Access Road

Long Term Storage Berm

Ballyring - Parksgrove UGC

N432

N77

Cemetery

Páirc an Mhóta
Moatpark

Tank

N

5.2.3.1 Examination of Connectivity with Potential Impacts – SPA sites

Table 5-1: Examination of the Connectivity to SPA European Sites

European Site (Receptor)	**Examination of Source/Pathway Connectivity - SPA Sites** A: Direct Impact to SCI species within SPA: Disturbance or Mortality of Special Conservation Interest bird species or of prey item species within an SPA B: Indirect Impact to SCI species: *ex-situ* disturbance/displacement of SCI C: Indirect Impact to SCI species: *ex-situ* Mortality or Barrier effects on SCI bird species D: Direct impact to SCI: direct habitat loss, degradation, fragmentation or reduction/loss of connectivity effects to Wetland or other suitable habitats as a result of groundworks, vegetation clearance E: Indirect Impacts to SCI indirect loss, reduction or loss of connectivity of wetland or other suitable habitat via reductions in water quality, reduction in prey item species or spread of invasive species.
River Nore SPA (004233)	A: YES – While the Proposed Gathabawn Windfarm is located outside of the boundary of this SPA, the Candidate Gathabawn Grid Connection element of the whole project overlaps the boundary of the SPA where underground cables will be laid under the River Nore by HDD technique.
	B & C: YES - connectivity for impacts, (i) grid connection works interact with watercourses upstream of the SPA which have suitable habitat; (iv) machinery movements and presence of personnel through or in close proximity to this SPA and to ex-situ suitable habitat.
	D: YES – While there will be no groundworks or vegetation clearance within the boundary of the SPA. There is potential for vegetation clearance and groundworks to affect suitable habitat ex-situ the SAC.
	E: YES - connectivity for impacts, (i) windfarm and grid connection locations are hydrologically connected: (ii) grid connection works in close proximity, in addition to works overlapping the SPA boundary at HDD location, with watercourse crossing works upstream of the SPA; (iv) works and machinery movements and material delivery within or in close proximity to this SPA or in close proximity to suitable habitat ex-situ the SPA.
Wicklow Mountains SPA (004040) Wexford Harbour and Slobs SPA (004076) Mid Waterford Coast SPA (004193) Helvick Head to Ballyquin SPA (004192)	A: No connectivity for impacts – no part of the Proposed Gathabawn Windfarm, nor the Candidate Gathabawn Grid Connection, is located within the boundary of these SPAs
	B: No connectivity for impacts, (i) not hydrologically connected: (ii) considerable overland separation distance; (iii) no machinery movements through or in close proximity to these SPAs.
	C & D: No Connectivity: The SCIs associated with these SPAs that were recorded during bird surveys (Peregrine, Golden Plover, Whooper Swan, Mute Swan, Mallard, Teal, Wigeon, Black-headed Gull and Lesser Black-backed Gull) and also recorded on the NBDC were considered to be potentially affected by the Whole Gathabawn Windfarm. The nearest European sites designated for Peregrine recorded during field surveys are located 64km from the Gathabawn Windfarm and 58km from the Candidate Gathabawn Grid Connection. These separation distances far exceed the biological dispersal capability of Peregrine, and therefore no connectivity or pathway exists between any raptor SCI populations which may exist in the local environment and the designated European populations in these Sites. The nearest European sites designated for waders and waterbirds recorded during field surveys are located 65km from the Gathabawn Windfarm and 61km from the Candidate Gathabawn Grid Connection. These separation distances far exceed the mean foraging ranges of these SCIs (Golden Plover, Whooper Swan, Mute Swan, Mallard, Teal, Wigeon, Black-headed Gull and Lesser Black-backed Gull) (SNH, 2016; Power *et al.,* 2021), and therefore no connectivity or pathway exists between any wader or waterbird SCI populations which may exist in the local environment to the designated European populations in these Sites.

European Site (Receptor)	**Examination of Source/Pathway Connectivity - SPA Sites** A: Direct Impact to SCI species within SPA: Disturbance or Mortality of Special Conservation Interest bird species or of prey item species within an SPA B: Indirect Impact to SCI species: *ex-situ* disturbance/displacement of SCI C: Indirect Impact to SCI species: *ex-situ* Mortality or Barrier effects on SCI bird species D: Direct impact to SCI: direct habitat loss, degradation, fragmentation or reduction/loss of connectivity effects to Wetland or other suitable habitats as a result of groundworks, vegetation clearance E: Indirect Impacts to SCI indirect loss, reduction or loss of connectivity of wetland or other suitable habitat via reductions in water quality, reduction in prey item species or spread of invasive species.
Wexford Harbour and Slobs SPA (004076) Tramore Back Strand SPA (004027) Mid Waterford Coast SPA (004193) Helvick Head to Ballyquin SPA (004192) Middle Shannon Callows SPA (004096) Little Brosna Callows SPA (004086)	A: No connectivity for impacts – no part of the Proposed Gathabawn Windfarm, nor the Candidate Gathabawn Grid Connection is located within with boundary of these SPAs
	B: No connectivity for impacts, (i) not hydrologically connected: (ii) considerable overland separation distance; (iii) no machinery movements through or in close proximity to these SPAs.
	C & D: No Connectivity: The SCIs associated with these SPAs that were recorded during bird surveys (Peregrine, Golden Plover, Whooper Swan, Mute Swan, Mallard, Teal, Wigeon, Black-headed Gull and Lesser Black-backed Gull) and also recorded on the NBDC were considered to be potentially affected by the Whole Gathabawn Windfarm. The nearest European sites designated for raptors recorded during field surveys are located 64km from the Gathabawn Windfarm and 58km from the Candidate Gathabawn Grid Connection. These separation distances far exceed the biological dispersal capability of Peregrine, and therefore no connectivity or pathway exists between any raptor SCI populations which may exist in the local environment and the designated European populations in these Sites. The nearest European sites designated for waders and waterbirds recorded during field surveys are located 65km from the Gathabawn Windfarm and 61km from the Candidate Gathabawn Grid Connection. These separation distances far exceed the mean foraging ranges of these SCIs (Golden Plover, Whooper Swan, Mute Swan, Mallard, Teal, Wigeon, Black-headed Gull and Lesser Black-backed Gull) (SNH, 2016; Power *et al.,* 2021), and therefore no connectivity or pathway exists between any wader or waterbird SCI populations which may exist in the local environment to the designated European populations in these Sites.

5.2.3.2 Screening of the Connected SPA Sites

As described in Section 5.2.3.1 above, an examination of connectivity pathways between the project and the European Sites found that 7 of the 8 European Sites were considered to have no connectivity with the Gathabawn Windfarm Project. As a result, it is evaluated that there is no potential for effects from the Proposed Gathabawn Windfarm either alone, or in-combination on these European Sites and they are therefore screened out from further evaluation.

The remaining one European Site is considered further below. The site-specific conservation measures for the SAC and SPA sites have been taken into account in the examinations hereunder.

5.2.3.2.1 River Nore SPA

While the Proposed Gathabawn Windfarm does not overlap or occur in proximity to the SPA, due to the proximity and overlap of the Candidate Gathabawn Grid Connection element of the Whole Gathabawn Windfarm Project to the River Nore SPA, and the hydrological connectivity with the Whole Gathabawn Windfarm Project, and the mobility of the special conservation interest species, Kingfisher, there is potential for aspects of the Project to cause a number of impacts:

- Habitat degradation of suitable habitat
- Mortality, disturbance, or displacement of species, or reductions in populations/densities
- Changes in ecological functions (e.g. water quality)
- Potential for interference with the key relationships that define the structure/function of the Site.

In relation to cumulative impacts, due to the location of the Seskin Wind Farm Project (in-planning), Briskalagh Wind Farm and Grid Connection (consented), Ballynalacken Windfarm Project (consented), BESS 1 and BESS 2 (consented), Littleton Wind Farm's grid connection (in-planning) and the potential Killoshulan Wind Farm Project (pre-planning)within the same sub-catchments as the Whole Gathabawn Windfarm Project, there is potential for significant adverse indirect effects to the SPA via reductions in water quality in the River Nore in the worst case scenario where all projects build during the same period.

There is also potential for in-combination effects with the draft plans for the Ballyragget town which promote a potential River Park alongside the banks of the River Nore and a looped walk around the town, due to the proximity of the plan to the River Nore SPA.

Screening Conclusion: It is considered that there is potential for significant impacts to the River Nore SPA as a result of the Proposed Gathabawn Windfarm, both alone and in-combination, and therefore the River Nore SPA is screened in for further evaluation at Stage 2 of the Appropriate Assessment process.

5.3 Screening Conclusion

This Screening evaluation was completed in compliance with the relevant EC guidance, national guidance, and case law and has been prepared to inform an Appropriate Assessment screening by the Competent Authority.

This Screening evaluation considers the potential effects of the Gathabawn Windfarm Project on each of the European Sites, both alone and in combination with other projects or plans, and considers whether it can be objectively concluded, in view of best scientific knowledge, that any effects on European Sites, their Qualifying Interests or Special Conservation Interests and their Conservation Objectives will not be significant.

Through an assessment of the source-pathway-receptor model, which considered the Zone of Influence of effects from the proposed works, the following findings were reported:

1. Neither the Proposed Gathabawn Windfarm nor the Whole Gathabawn Windfarm project is directly connected with, or necessary to, the management of any European Site;

2. The findings of the screening exercise undertaken at Stage 1 conclude that the Proposed Gathabawn Windfarm, both alone and in-combination, is not likely to result in significant effects on the Qualifying Interests or Special Conservation Interests of the following European Sites:

Galmoy Fen SAC (001858)	Wexford Harbour and Slobs SPA (004076)
The Loughans SAC (000407)	Tramore Back Strand SPA (004027)
Lisbegney Bog SAC (000869)	Mid Waterford Coast SPA (004193)
Spahill and Clomantagh Hill SAC (000849)	Helvick Head to Ballyquin SPA (004192)
Ballynafagh Lake SAC (001387)	Middle Shannon Callows SPA (004096)
East Burren Complex SAC (001926)	Little Brosna Callows SPA (004086)
Wicklow Mountains SPA (004040)	

FONSE Report; In accordance with the recommendations of the Guidance Document *Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC (*EC, 2021*)*, a Finding of No Significant Effects (FONSE) Report has been completed in respect of the European Sites which are screened out from further evaluation at Stage 2. The FONSE report is included at the end of this document for the Competent Authority to consider. See Appendix A: Finding of No Significant Effects (FONSE) Report.

3. One SPA and two SACs are brought forward for further examination at Stage 2 due to pathways for potential indirect effects in respect of QI/SCI habitats and species for which the site is designated:

River Nore SPA (004233)
Cullahill Mountain SAC (000831)
River Barrow and River Nore SAC (002162)

5.3.1 European Sites Screened in for further examination at Stage 2 NIS

The potential impacts screened in for each of these European Sites is outlined on the table below.

European Site (Receptor)	Potential Impact
Cullahill Mountain SAC (000831)	B: Indirect Impact to QI habitat – Loss or degradation of terrestrial or aquatic habitats, or loss of connectivity of habitats, within or ex-situ SAC sites (via reductions in water quality, dust emissions or the spread of invasive species).
River Barrow and River Nore SAC (002162)	A: Direct impact to QI habitat - Direct loss, fragmentation or degradation of QI habitats, direct loss or reduction in connectivity of QI habitats or plant species B: Indirect Impact to QI habitat – Loss or degradation of terrestrial or aquatic habitats, or loss of connectivity of habitats, within or ex-situ SAC sites (via reductions in water quality, dust emissions or the spread of invasive species). C: Indirect Impacts to QI species loss, reduction, fragmentation of loss of connectivity of suitable habitat or reduction in prey item species (via reductions in water quality, dust emissions, changes in flow, or spread of invasive species) D: Direct or Indirect Impacts to QI species via mortality, disturbance or displacement
River Nore SPA (004233)	A: Direct Impact to SCI species within SPA: Disturbance or Mortality of Special Conservation Interest bird species or of prey item species within an SPA B: Indirect Impact to SCI species: *ex-situ* disturbance/displacement of SCI C: Indirect Impact to SCI species: *ex-situ* Mortality or Barrier effects on SCI bird species D: Direct impact to SCI: direct habitat loss, degradation, fragmentation or reduction/loss of connectivity effects to Wetland or other suitable habitats as a result of groundworks, vegetation clearance E: Indirect Impacts to SCI indirect loss, reduction or loss of connectivity of wetland or other suitable habitat via reductions in water quality, reduction in prey item species or spread of invasive species.

6. Stage 2 Natura Impact Statement

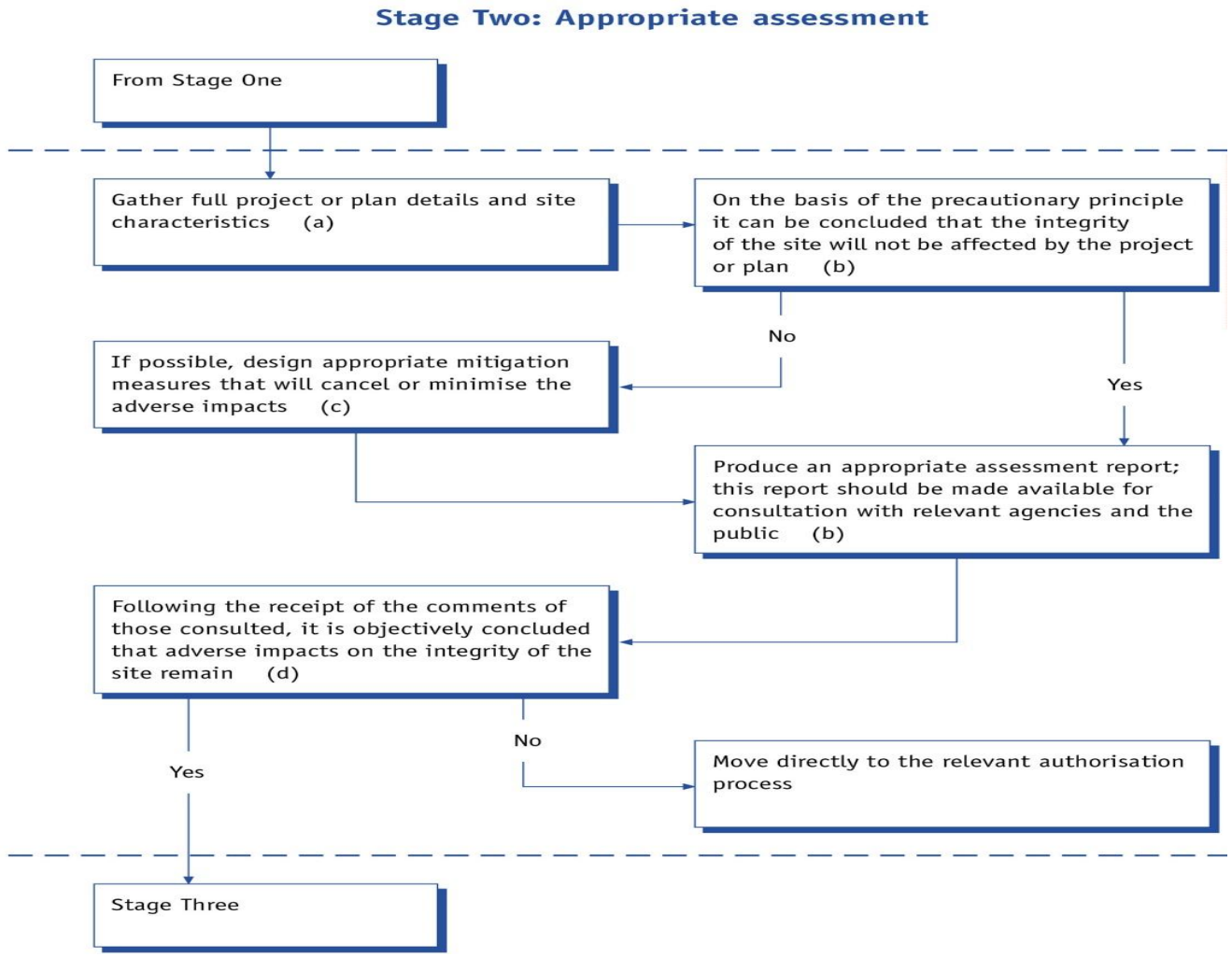
6.1 Introduction to the Natura Impact Statement

As set out in Section 7, the potential for significant in-combination effects could not be excluded, with regard to the following three European Sites: Cullahill Mountain SAC, River Nore SPA, and River Barrow and River Nore SAC.

This section comprises a detailed appraisal of the impacts of the Proposed Gathabawn Windfarm alone (either directly or indirectly) and in-combination with the other elements of the Whole Gathabawn Windfarm Project and in-combination with other projects or plans, on the integrity of the above listed European Sites, and is considered with respect to their conservation objectives and to their structure and function.

Note: A description of the Proposed Gathabawn Windfarm is provided in Section 3 of this AA Report. The other elements of the Whole Gathabawn Windfarm Project – the Candidate Gathabawn Grid Connection and the Off-Site Activities along the Turbine Delivery Route are also described in Section 3. Other plans and projects considered for in-combination effects herein, are described at Section 3.14 of this AA Report. A description of the Receiving Environment, including the results of desktop and field surveys can be found in Section 4.2.

The **Appropriate Assessment Evaluation Process** considers the impact on the integrity of a Natura 2000 Site of the project or plan, either alone or in combination with other projects or plans, with respect to the Site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts. The process is illustrated below.



6.2 Cullahill Mountain SAC [000831]

Cullahill Mountain SAC lies on a western outlier of the Castlecomer plateau, 6km north-east of Johnstown in Co. Kilkenny. In this area, the underlying limestone has been exposed relatively recently by erosion of the higher shales. The rock is in the form of an escarpment, with a steep side facing the central plain (and the Cork-Dublin road) and more gradual slopes to the south-east where the shale soon appears.

The vegetation of most of the site comprises a herb-rich grassland over limestone. The orchid flora of the grassland is notably rich, with Common Twayblade (*Listera ovata*), Frog Orchid (*Coeloglossum viride*), Bee Orchid (*Ophrys apifera*), Early-purple Orchid (*Orchis mascula*) and Green-winged Orchid (*Orchis morio*) occurring. Green-winged Orchid is an uncommon species and the site is particularly notable for the abundance of this species.

On its west side, the site extends downslope to some Ash (*Fraxinus excelsior*)/Hazel (*Corylus avellana*) woodland which is regenerating well and spreading on the hill.

The Site Synopsis for this SAC site is included in full in Appendix G1 of this AA Report.

The site is a Special Area of Conservation (SAC) selected for the Annex I habitat: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) (EU Code: 6120).

6.2.1 Conservation Objectives, Conservation Plan, Conservation Measures, Pressures/Threats

The site-specific conservation objectives of the Cullahill Mountain SAC aim to define favourable conservation condition for the particular habitats and species at that site:

QI:	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) (EU Code: 6120)
Objective	To restore the favourable conservation condition of Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) in Cullahill Mountain SAC, which is defined by the following list of attributes and targets:

Attribute	**Target**
Habitat area	Area stable or increasing, subject to natural processes
Habitat distribution	No decline, subject to natural processes. See map 2 for the grassland areas surveyed by Martin et al. (2018) [Map 2 is reproduced as AA Figure 23]
Vegetation composition:	
positive indicator species	At least 7 positive indicator species present in monitoring stop or, if 5–6 present in stop, additional species within 20m of stop; this includes at least two 'high quality' positive indicator species present in stop or within 20m of stop
Vegetation composition:	
negative indicator species	Negative indicator species collectively not more than 20% cover, with cover of an individual species not more than 10%
Vegetation composition: non-	
native species	Cover of non-native species not more than 1%
Threats & Pressures (as per Conservation Measures for the Site): Low: PC01 Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell); Low: PA08 Extensive grazing or undergrazing by livestock; Low: PI02 Other invasive alien species (other than species of Union concern); along with N/A: All/Other Relevant Threats and Pressures	

6.2.1.1 Conservation Plan for Cullahill Mountain SAC (2005)

The main strategies to achieve the Conservation Objectives for the SAC were identified in a Conservation Plan (2005), as follows:

- Determine the traditional and present grazing numbers and establish a stocking rate and grazing period in line with traditional levels;
- Control damaging activities and implement the prohibition of particular activities, such as the application of artificial fertilisers;
- Fence off the woodland and control felling;
- Monitor the orchid-rich calcareous grassland, orchid populations and general ecological site conditions.

6.2.1.2 Identified Conservation Measures for the Site (2026)

Conservation Measures identified in Conservation Measures (2026) for the Site, include:

- Consent is required for digging, ploughing, harrowing or otherwise disturbing soil or substrate;
- Consent is required for the planting of trees or multi-annual bioenergy crops;
- Consent is required for blasting, drilling, dredging or otherwise removing or disturbing fossils, rock, minerals, mud, sand, gravel or other sediment;
- Consent is required for significant changes in livestock density;
- Participation in Agri-Climate Rural Environment Scheme (ACRES);
- Traditional Dry Stone Wall Maintenance (<450 metres) by ACRES participants;
- Production of an accredited Farm Sustainability Plan by ACRES participants;
- Monitoring and reporting of relevant farm activity at the SAC;
- Development of a Conservation Grazing Programme on the site (2025+);
- Monitoring by regional staff at this SAC between 3/4 times per year;
- Scrub and bracken encroachment by cattle and mechanical means approx. 2Ha cleared mechanically;
- Sustainable Deer Management Strategy for Ireland;
- Control of activities, if not covered by other regulations, which could negatively impact on this SAC;
- Roadmap of actions to assist in the achievement of climate change objectives by no later than 2050;
- Regulation controlling unconsented development at this site.

The Conservation Objectives, Conservation Measures and Conservation Plan for the Cullahill Mountain SAC [000931] are reproduced in Appendix G2, and available in full on the National Parks & Wildlife Service website at https://www.npws.ie/protected-sites, and should be read in conjunction with any other supporting documentation on the website or as referenced in the Conservation Objective Series for the SAC.

It should be noted that Cullahill Mountain SAC is now under the ownership of the State. Adjoining lands were also purchased at the time, and these lands are part of the Gales Hill Nature Reserve. This area is now managed by NPWS and includes low intensity grazing by native Dexter cattle.

6.2.2 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

Grassland Monitoring Surveys were carried out between 2015 and 2017 on three Annex I grassland habitats for NPWS in 2018, with the results published in '*The Monitoring and Assessment of three EU Habitats Directive Annex I Grassland Habitats'* (Martin *et al.,* 2018). A total of 55 sites were surveyed for 6210/*6210 habitat, of which the Cullahill Mountain SAC was one (identified as Site 2500 in the Report). An excerpt from this report is reproduced below. The full report is attached as Appendix G2 to this AA Report.

Only the orchid-rich variant of 6210 (*6210) is accorded priority status (i.e., habitats in danger of disappearance and whose natural Range falls within the territory of the European Union). The Annex I habitat at Cullahill Mountain SAC falls under the orchid-rich variant classification and is accorded priority status.

The Cullahill Mountain SAC (000831) is identified with Site ID 2500 within the 2018 report. It should be noted that a GMS was previously carried (2013), which did not include the Cullahill Mountain SAC area as a survey site. During the GMS (2018) survey, this site was assessed as having a Favourable area, having Favourable structure and functions and Favourable future prospects, with no negative impacts recorded, The overall conservation assessment for the Annex I habitat at the SAC was considered to be Favourable.

This is in contrast to the national overall conservation assessment result for the 6210/*6210 habitat which is Unfavourable-Bad, as it was when it was previously reported in NPWS (2013). The overall national trend has changed from stable, as reported in NPWS (2013), to decreasing and the reason for this change is the 31% of the surveyed area of 6210/*6210 was reported lost due to pressures such as agricultural intensification.

During the GMS, it was noted that the area of 6510 habitat within Cullahill Mountain SAC (site code 000831) in Co. Kilkenny increased due to a change in management at the site, with a small 0.25ha area of 6510 habitat now managed by annual mowing.

Within Ireland, the Annex I habitat 6210/*6210 comprises species-rich plant communities found on shallow, well-drained calcareous substrates. The Annex I habitat includes a mixture of grasses and herbs, with calcicole species typically frequent. It usually occurs on obvious geological features such as eskers, outcropping limestone rock and in association with limestone pavement. The 6210/*6210 habitat is comprised of a species diverse group of plant communities belonging to the *Bromion-erecti*, including GL3A *Briza media – Thymus polytrichus* grassland (Perrin 2018a) and NVC communities CG1/CG2 (Rodwell, 1992).

Conservation Measures (DMS, 2018):

Some measures identified in the GMS 2018 include: grazing the site with 'flying flock' for short periods each year, with the timing of grazing managed to target Molinia caerulea where it has become abundant, and the participation of landowners in the ACRES agri-environmental scheme. Conservation Measures were also published for the site in 2026; these measures are outlined in Section 6.2.1, and attached as Appendix G3.

Habitat Distribution:

The GMS survey sites within the Cullahill Mountain SAC are identified on AA Figure 23: Map 2 Extract from Conservation Objectives Series for the Cullahill Mountain SAC (over).

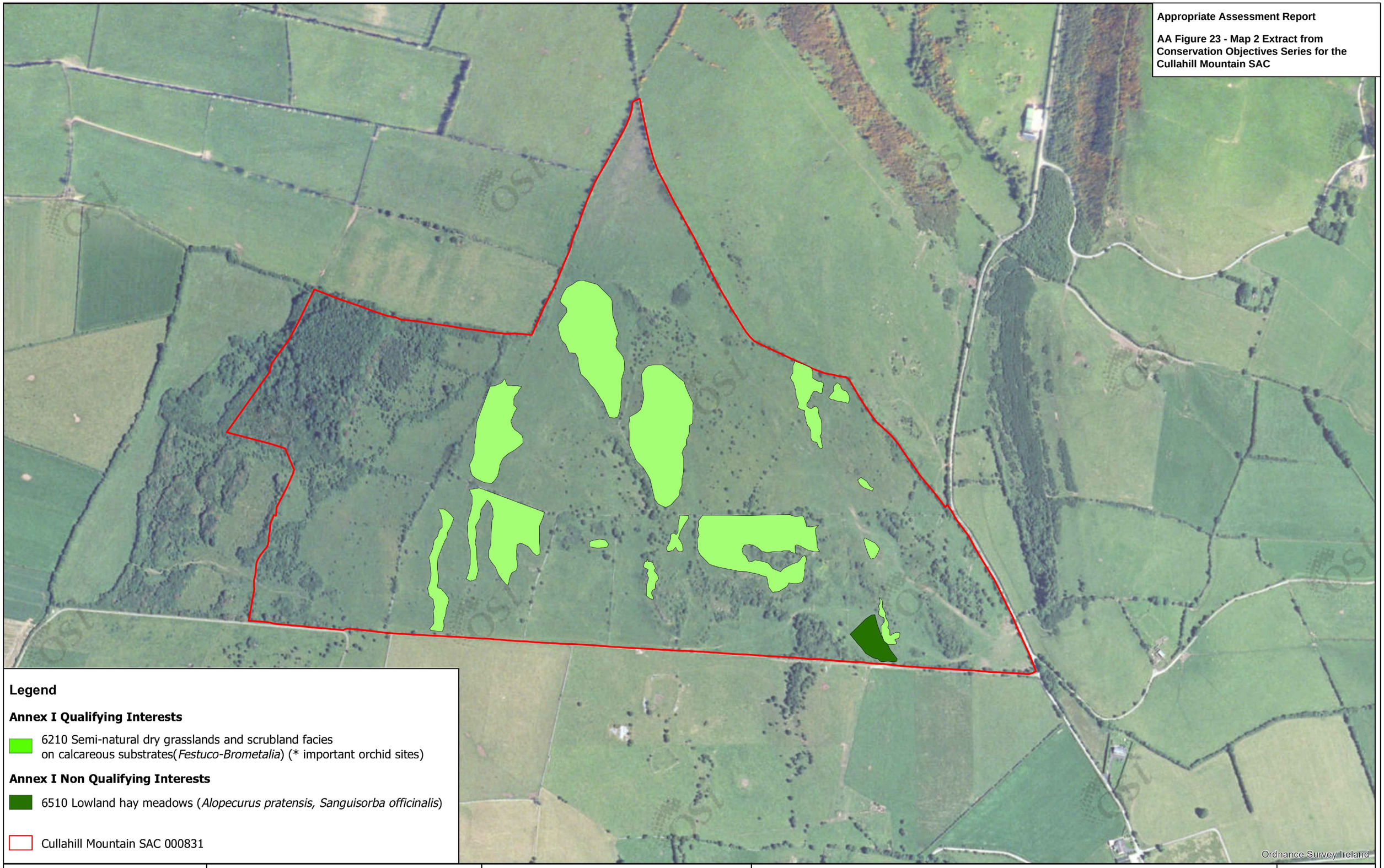
The following Orchids are identified in the DMS 2018 as representative of priority habitat:

Anacamptis pyramidalis	*Ophrys apifera*
Coeloglossum viride	*Ophrys insectifera*
Dactylorhiza fuchsii v. okellyi	*Orchis mascula*
Epipactis atrorubens	*Orchis morio*
Gymnadenia conopsea	*Platanthera bifolia*
Listera ovata	*Platanthera chlorantha*
Neotinea maculata	*Spiranthes spiralis*

No orchids were recorded at the Gathabawn Windfarm site during habitat surveys.

Appropriate Assessment Report

AA Figure 23 - Map 2 Extract from Conservation Objectives Series for the Cullahill Mountain SAC



An Roinn Tithíochta, Rialtais Áitiúil agus Oidhreachta
Department of Housing, Local Government and Heritage

MAP 2:
CULLAHILL MOUNTAIN SAC
CONSERVATION OBJECTIVES
GRASSLAND HABITATS

Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SAC 000831; version 3.
CO. KILKENNY

0 0.05 0.1 0.2 Kilometres

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
Ordnance Survey of Ireland Licence No OSI-NMA-014. © Ordnance Survey of Ireland Government of Ireland

Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann

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Date: October 2021

Positive indicator species for Semi-natural dry grasslands (6210, as outlined in the GMS 2018 are identified on the table below:

Table 6-1: 6210: Positive Indicator Species

Antennaria dioica – Mountain Everlasting (or Cat's-foot)	***Gentianella amarella / G. campestris*** – Autumn Gentian (Felwort) / Field Gentian
Anthyllis vulneraria – Kidney Vetch	***Geranium sanguineum*** – Bloody Crane's-bill
Arabis hirsuta – Hairy Rock-cress	***Helictotrichon pubescens*** – Downy Oat-grass
Asperula cynanchica – Squinancywort	***Homalothecium lutescens*** – Yellow Feather-moss
Blackstonia perfoliata – Yellow-wort	***Knautia arvensis*** – Field Scabious
Brachypodium pinnatum – Tor-grass (or Heath False-brome)	***Koeleria macrantha*** – Crested Hair-grass
Briza media – Quaking-grass	***Leontodon hispidus / L. saxatilis*** – Rough Hawkbit / Lesser Hawkbit
Bromopsis erecta *(syn. Bromus erectus)* – Upright Brome	***Linum catharticum*** – Fairy Flax
Campanula rotundifolia – Harebell	***Lotus corniculatus*** – Bird's-foot-trefoil
Carex caryophyllea – Spring Sedge	***Origanum vulgare*** – Wild Marjoram
Carex flacca – Glaucous Sedge	***Pilosella officinarum*** – Mouse-ear Hawkweed
Carlina vulgaris – Carline Thistle	***Primula veris*** – Cowslip
Centaurea scabiosa – Greater Knapweed	***Ranunculus bulbosus*** – Bulbous Buttercup
Ctenidium molluscum – Chalk Comb-moss *(feather-moss species)*	***Sanguisorba minor*** – Salad Burnet
Daucus carota – Wild Carrot	***Sesleria caerulea*** – Blue Moor-grass
Filipendula vulgaris – Dropwort	***Thymus polytrichus*** – Wild Thyme
Galium verum – Lady's Bedstraw	
Gentiana verna – Spring Gentian	
Additional positive indicator species include the following moses and liverworts	
Ditrichum gracile (recently renamed *Flexitrichum gracile*) – *Slender Ditrichum*	**Scapania aspera** *(this is a leafy liverwort, not a moss)* – Rough Earwort
Hypnum lacunosum – Great Plait-moss (sometimes referred to as Chalk Plait-moss)	**Tortella tortuosa** – Frizzled Crisp-moss *(also frequently called Twisted-moss)*

One semi-natural grassland type (dry calcareous and neutral grassland (GS1)) was recorded within the Gathabawn Windfarm and Candidate Gathabawn Grid Connection; one positive indicator species relating to the GMS 2018 study was recorded during multi-year habitat surveys (Lady's Bedstraw). Overall, grassland at the windfarm site is intensively managed, and it is considered that any existence of positive indicator species would be very low, likely limited to field boundaries.

Other Species

Marsh Fritillary butterfly, though the current authors note that its food plant, Devils Bit Scabious, is not listed as a positive indicator species. A review of the NBDC database finds 22 records of Marsh Fritillary in the 10km square S37. Two of these records relate to butterfly data compilation covering the period 1995 – 2009 (Nash *et al.,* 2012), which recorded Marsh Fritillary in the S37 mapped hectad. The other 20 records relate to more recent (2016 to 2023) NBDC records.

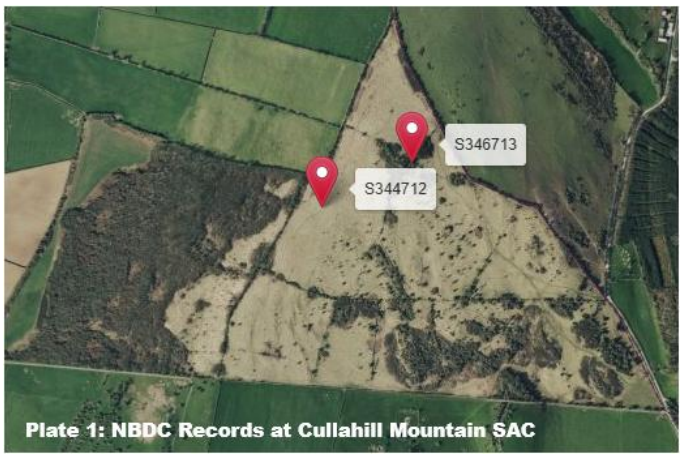


Plate 1: NBDC Records at Cullahill Mountain SAC

Two single adult Marsh Fritillary were recorded during May 2023 in the north of the SAC (Grid References: S344712 and S346713); these locations are marked on Plate 1.

The remaining 18 records are at least 5km further northwest/northeast, 16 of which record low numbers of adult Marsh Fritillary (<5). In the area of

Ballyboden, c,6.7km to the north of the records in Cullahill Mountain SAC, 650 eggs were recorded in June 2017, with 20 adults recorded just to the north in June 2018.

Marsh Fritillary surveys undertaken at the Gathabawn Windfarm site in 2025 and 2026 have yielded no suitable patches of this species' host plant or larval webs (5 individual plants scattered across large fields).

Vulnerability to potential impacts:

The data collected during the GMS indicated that habitat loss is the largest threat to the 6210/*6210 habitat, with 31% of the national surveyed area of 6210/*6210 reported lost during the GMS due to pressures such as agricultural intensification. No habitat loss was reported at the Cullahill Mountain SAC. In the short-term future the current pressures, such as agricultural intensification, abandonment and quarries, that are causing these losses in area are expected to continue to threaten the habitat. The 2026 Conservation Measures for the site also identified over/under grazing, mineral extraction and invasive species as pressures/threats to the SAC.

Negative indicator species are identified in the GMS 2018, and include:

Arrhenatherum elatius – False Oat-grass	*Rumex crispus* – Curled Dock
Cirsium arvense – Creeping Thistle	*Rumex obtusifolius* – Broad-leaved Dock
Cirsium vulgare – Spear Thistle	*Senecio jacobaea* – Common Ragwort
Dactylis glomerata – Cock's-foot	*Trifolium repens* – White Clover
Lolium perenne – Perennial Ryegrass	*Urtica dioica* – Common Nettle

6.2.3 Proposed Gathabawn Windfarm

The location of the Proposed Gathabawn Windfarm in relation to Cullahill Mountain SAC is provided in this Section. Details of the design of the windfarm in the context of avoiding impacts to the SAC are outlined, and the key works and activities which are relevant to the evaluation of effects are identified across the various life-cycle stages of the development.

6.2.3.1 Locational Context

A windfarm site road at the Proposed Gathabawn Windfarm development is partially located (230m) adjacent to the southern boundary of the Cullahill Mountain SAC, in addition c800m of Windfarm Cabling is located parallel to the boundary, with the Ballylehaun Control building located 17m from the SAC. The first 400m of the Candidate Gathabawn Grid Connection (Ballylehaun-Ballyring UGC) is also routed parallel to the boundary, before turning south and away from the SAC.

See AA Figure 19: Locational Context of the Gathabawn Windfarm Project and Surrounding Landuse in relation to Cullahill Mountain SAC (over).

6.2.3.2 Design Features of the development

The following constraints were implemented during the design of the windfarm development:

- No works or activities within the boundary of the SAC;
- No interference with the southern boundary wall;
- No oversail of turbine blades of the SAC;
- The T3 hardstand is located to the south and beyond the foundation;
- Implementation of at least 5m buffer from road construction or cable trenching works;
- Paving of the windfarm site road where it is routed up the hill between T2 and T3.

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AA Figure 19 - Locational Context of the Gathabawn Windfarm Project and Surrounding Landuse in relation to Cullahill Mountain SAC

Legend:

- Turbine Foundation
- Turbine Hardstanding Area
- Ballylehaun Control Building
- New Windfarm Site Road
- Windfarm Cabling
- Candidate Gathabawn Grid Connection
- Public Road
- Existing Private Road
- Cullahill Mountain SAC

T2

Cullahill Mountain SAC

Windfarm Site Road

T3

Windfarm Cabling

Ballylehaun Control Building

Candidate Gathabawn Grid Connection

T4

6.2.3.3 Impact Potential Across the Project Life Cycle

In addition to the descriptions of the project provided in Section 3 of the AA Report, an overview those project activities which are in close proximity to the SAC are identified below, to establish the specific source-pathway mechanisms for the evaluation of potential impacts on the Qualifying Interest (QI) of the SAC.

Construction Phase: The main potential for effects arises during the construction phase as a result of:

- Excavations and groundworks during cut and fill works along the new windfarm access road between T2 and T3, and the installation of Windfarm Cabling ducts along same road. These works will include rockbreaking of limestone bedrock – potential sources of dust and vibration.
- Site clearance groundworks, earthworks and rockbreaking for turbine foundations and hardstandings though these are at least 60m from the SAC boundary at T3, and at least 300m from the SAC at T1 and T2. Access track between T2 and T3 5m from the SAC boundary. These works are also sources of dust and vibration. However, no impact to local drainage patterns in the SAC are expected to occur due to the separation distances to the SAC and intervening topography, and the characteristics of soils and bedrock;
- Construction machinery and HGV transport movement along windfarm site roads. These movements are a potential source of vehicular emissions, and a risk of accidental fuel spillages near calcareous substrates. Construction machinery and vehicles are likely to be run on hydrocarbons, with associated vehicular emissions.
- Cable trenching works for the Internal windfarm cabling and candidate grid connection have potential to modify localized drainage pathways.

Operational and Decommissioning Phases: Sources of impacts reduce substantially during the operational and decommissioning phases, mainly limited to vehicular emissions from operation and maintenance vehicles and machinery (where electric vehicles are not used) travelling up the hill on the windfarm site road between T2 and T3. Works along this road will be limited to maintenance of the drainage network and road surface. This road will remain in place following decommissioning, for use by the landowner.

Works and activities during operation and decommissioning mainly relate to the turbine locations, which will be >60m from the SAC at the closest point (T3). Operational and decommissioning works will take place from the hardstanding area at the turbines. All works and activities during the operational phase will take place inside the site drainage network. During decommissioning, soils stored in berms at the turbine locations will be used cover over the turbine hardstand and foundation areas and associated drainage network. Decommissioning is expected to take 1-2 weeks to complete at each turbine location

6.2.4 Potential Impact Screened-In for Detailed Evaluation

The findings of the screening exercise carried out for the Cullahill Mountain SAC (Section 5.2.2) identified connectivity with the following potential impact:

***SAC Impact B**: **Indirect Impact to QI habitat** – Loss or degradation of terrestrial or aquatic habitats, or loss of connectivity of habitats, within or ex-situ SAC sites (via reductions in water quality, dust emissions or the spread of invasive species).*

6.2.4.1 Breakdown of Specific Pathways under SAC Impact B

SAC Impact B comprises several distinct environmental pathways that could indirectly affect the Qualifying Interest (QI) habitat. To ensure a robust assessment, these specific pathways are characterised individually below to establish their scale and mechanisms. However, they are fundamentally considered as interconnected components of a single impact type, and their collective, cumulative effects on the conservation objectives of the SAC are fully evaluated in Section 6.2.5.2 below.

AA Table 14: Breakdown of Specific Pathways under SAC Impact B

Impact	Evaluation can be found in:
Indirect habitat loss, degradation or loss of connectivity, via - reductions in water quality - dust emissions - spread of invasive species	Section 6.2.4.3

6.2.4.2 Consideration of In-Combination Effects

The evaluations take into account the in-combination effect with the following other projects and activities:

- Candidate Gathabawn Grid Connection – in close proximity (8m) to the SAC boundary for c.400m in Ballylehaun townland between the Ballylehaun Control Building and the public road L5818, it then heads south and away from the SAC – See Section 3.5 to Section 3.12 for a description of this other element of the whole project.
- Agricultural land use and management practices
- Oher projects. Seskin Wind Farm (in-planning), Briskalagh Wind Farm and Grid Connection (consented), Ballynalacken Windfarm Project (consented), BESS 1 and BESS 2 (consented), Littleton Wind Farm's grid connection (in-planning), and potential Killoshulan Wind Farm (pre-planning) are not located in close proximity to the Cullahill Mountain SAC.

All stages of the project lifecycle, in addition to other plans, projects and activities are considered. Where it is determined that the potential for significant effects on the Conservation Objectives cannot be excluded, the requirement for mitigation measures is identified in view of reducing, avoiding, or eliminating adverse impacts.

The Conservation Objectives, Conservation Plan and Conservation Measures for the SAC, in addition to the specific impact pathways identified for the evaluation of *SAC Impact B*, are considered sufficient to inform a considered and reasoned examination and analysis of effects of the Proposed Gathabawn Windfarm (either alone or in-combination) on the conservation status of the Qualifying Interest habitat and thus on the overall integrity of the Cullahill Mountain SAC.

6.2.4.3 Cullahill Mountain SAC – Indirect habitat loss, degradation or loss of connectivity

QI Habitat

[6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)

Description of potential Impacts Considered

Indirect Impact to QI habitat loss or degradation of terrestrial habitats, or loss of connectivity of habitats, within or ex-situ SAC sites (via reductions in water quality, dust emissions or the spread of invasive species).

Sensitivity of QI Habitat

[6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites habitat comprises species-rich plant communities found on shallow, well-drained calcareous substrates. It is considered a priority habitat only if it is an important orchid site (NPWS, 2025a). Habitat loss is the largest threat to the 6210 habitat, mainly associated with unsuitable grazing regimes, agricultural intensification causing loss of species-rich communities, and abandonment of farmland resulting in succession to scrub. This result is unchanged from 2019 (NPWS, 2025a). These pressures are addressed in the conservation objectives targets for this QI, which aim for the habitat to be stable or increasing, with no decline in habitat area (NPWS, 2021).

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Potential impacts to the QI habitats as a result of Construction Works:

In relation to reductions in water quality, it is considered that due to the terrestrial nature of the QI, and lack of hydrological connectivity to the SAC via surface water pathways, the potential for significant impacts to this QI habitat can be excluded.

In relation to dust emissions, given the proximity of the SAC to the construction works boundary (0m), dust emissions arise from the transportation of aggregate, movement of delivery vehicles and the movement of excavated materials and from bare soils at excavated areas and overburden storage areas. There is **potential for dust emissions, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

In relation to the spread of invasive species, within the 10km squares S36 and S37, four High Impact Invasive Species plants are recorded: Rhododendron (*Rhododendron ponticum*), Giant Hogweed (*Heracleum mantegazzianum*), Japanese Knotweed (*Fallopia japonica*), and Bohemian Knotweed (*Fallopia japonica* x *sachalinensis* = F. x *bohemica*), it is considered that there is a presence of invasive species within the study area, due to the scale of construction activities and groundworks at the windfarm site, movement of overburden, importation of materials and the volume of machinery and deliveries entering the site during the construction phase, that there is **potential for the dispersal of invasive species, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Potential impacts to the QI habitats during the Operational Phase;

Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to this QI habitat can be excluded.

Potential impacts to the QI habitats during the Decommissioning Phase;

Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm control buildings and reinstatement and restoration of the windfarm site. Machinery involved will

include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection is located 8m from the SAC boundary for c.400m in Ballylehaun townland between the Ballylehaun Control Building and the public road L5818; it then heads south and away from the SAC.
Due to the separation distance (27km) to the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects on the SAC can be excluded.

Overlap of construction periods: The construction stage of the Candidate Gathabawn Grid Connection will take place during the same period as the Proposed Gathabawn Windfarm.
Lifecycle stages: It is considered that only the construction stage of the Candidate Gathabawn Grid Connection has potential to cause effects to the QI habitats, as works and activities during the operational and decommissioning stages will be limited in scale and mainly carried out at the windfarm hardcore footprint. It is considered that any potential for significant in-combination impacts during operation or decommissioning of the Whole Gathabawn Windfarm Project can be excluded.
Evaluation of the Other Elements: In relation to reductions in water quality, it is considered that due to the terrestrial nature of the QI, and lack of hydrological connectivity to the SAC from the Candidate Gathabawn Grid Connection via surface water pathways, the potential for significant impacts to this QI habitat can be excluded.

In relation to the construction of the Candidate Gathabawn Grid Connection, the spread of invasive species, when the whole project is considered in-combination, construction activities and groundworks, movement of overburden and materials, and the volume of machinery and deliveries entering the project works locations increase, and therefore it is considered that there is **increased potential for the dispersal of invasive species, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

In relation to dust emissions, given the proximity of the SAC to the Candidate Gathabawn Grid Connection (8m), when the whole project is considered in-combination, dust emissions originating from the construction works areas, machinery and vehicles and from the works areas, there is **increased potential for dust emissions, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

There is some increased potential for the Whole Gathabawn Windfarm Project works to release sediment or contaminants or nutrients to downstream watercourses. However, as per the Conservation Objectives – this QI habitat is not sensitive to changes in water quality, and therefore the potential for significant impacts to semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) via reductions in water quality can be excluded.
There is some increased potential for whole project works to release dust emissions and spread of invasive species, as per the Conservation Objectives – this QI habitat is sensitive to habitat loss. In relation to the spread of invasive species and dust emissions, when the Whole Gathabawn Windfarm Project is considered in-combination, construction activities and groundworks, movement of overburden and materials, and the volume of machinery and deliveries entering the project works locations increase, and therefore it is considered that there is **increased potential for the dispersal of dust emissions and invasive species, and**

in the absence of mitigation measures, these effects could be significant. Mitigation measures to avoid or reduce the in-combination effects will be required.
Evaluation of Potential In-Combination Effects with Other Projects/Activities
Other projects- Seskin Wind Farm (in-planning), Briskalagh Wind Farm and Grid Connection (consented), Ballynalacken Windfarm Project (consented), BESS 1 and BESS 2 (consented), Littleton Wind Farm's grid connection (in-planning) and the potential Killoshulan Wind Farm Project (pre-planning), due to the intervening distance over land and the terrestrial nature of the SAC, significant impacts to the SAC can be excluded.
Summary of Effects (in the absence of mitigation)
Approximately 6.7ha of the QI habitat [6210] semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) is located within the Cullahill Mountains SAC (NPWS, 2021). This habitat is not sensitive to water quality effects, and due to the absence of hydrological connectivity to the SAC from the Whole Gathabawn Windfarm Project, and the implementation of a site drainage system, no effects on water quality will occur on this SAC as a result of the development of the Gathabawn Windfarm project. The potential impacts to semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) relate to dust emissions and the potential spread of invasive species during the construction stage of the Gathabawn Windfarm, both alone and in combination with the following other elements of the whole Gathabawn Windfarm– Candidate Gathabawn Grid Connection. **Mitigation measures which will avoid or reduce these potential in-combination effects are described in full in Section 6.2.6 of this document.**

6.2.5 Requirement for Mitigation Measures

The potential for adverse impacts on the integrity of the Cullahill Mountain SAC cannot be ruled out in relation to

(i) loss or degradation of habitats due to dust emissions from construction work areas (construction phase),

(ii) the risk of spread of invasive species (all phases).

Mitigation measures are proposed for the Cullahill Mountain SAC in order to remove, avoid or reduce the impacts identified in the appropriate assessment evaluation to a level where they will no longer affect the integrity of the SAC site.

These mitigation measures and monitoring arrangements are presented below in Section 6.2.6.

6.2.6 Mitigation Measures and Monitoring Arrangements for the protection of the Cullahill Mountain SAC (000831)

Mitigation measures are proposed for the Proposed Gathabawn Windfarm *(WF)* and for the Candidate Gathabawn Grid Connection *(GC)* in order to remove, avoid or reduce the impacts identified in the appropriate assessment to a level where they will no longer affect the integrity of the Cullahill Mountain SAC. The mitigation measures and monitoring arrangements will be implemented through the Environmental Management Plan for the Whole Gathabawn Windfarm Project (EMP 2026). The EMP 2026 accompanies the subject planning application. These mitigation measures and monitoring arrangements are based on accepted best practice standards and our experience of supervising and reviewing the implementation and operation of such measures

6.2.6.1 Mitigation Measures and Monitoring Arrangements specifically for the protection of Cullahill Mountain SAC

Table 6-2: Mitigation Measures and Monitoring Arrangements specifically for the protection of Cullahill Mountain SAC

ID	Description of the Measure – specific to Cullahill Mountain SAC	Effectiveness of the measure
Design	No works or activities within the boundary of the SAC	This measure will ensure that no direct habitat loss occurs within the SAC boundary.
Design	No interference with the southern boundary wall	This measure will ensure that no direct habitat loss occurs within the SAC boundary and preserves the landscape feature.
Design	No over-sail of turbine blades of the SAC	This measure places the turbine foundations at least 60m from the boundary of the SAC location, so that no direct habitat loss occurs within the SAC boundary and that dust emissions from these works do not enter the SAC. This is also the accepted practice to ensure machinery and personnel do not inadvertently cause the transportation of invasive species either within the construction area sites or across the wider receiving environment.
Design	The T3 hardstand is located to the south and beyond the foundation.	This measure places the turbine foundations at least 60m from the boundary of the SAC location, so that no direct habitat loss occurs within the SAC boundary.
Design	Implementation of at least 5m buffer from road construction or cable trenching works.	This measure will ensure that no direct habitat loss occurs within the SAC boundary.
Design	Paving of the windfarm site road where it is routed up the hill between T2 and T3	This measure reduces the potential for dust emissions as pavement does not emit dust when driven over by vehicles.
WM27	Ecological Monitoring of initial groundworks and road construction works within 50m of the boundary of the Cullahill Mountain SAC. This monitoring will be conducted by the Ecological Clerk of Works, who will have a have a 'stop-works' authority to temporarily stop construction works and the Contractor will implement the necessary actions and measures	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. In addition, the presence of an ECoW and ecologist will facilitate the Project Manager to be alerted to any emergent changes during the construction phases.

ID	Description of the Measure – specific to Cullahill Mountain SAC	Effectiveness of the measure
	to the satisfaction of the Ecological Clerk of Works, before construction works can once again commence.	
WM28	Marsh Fritillary: A pre-construction survey of construction works plus 100m in all directions to determine the distribution of the Marsh Fritillary's food plant Devil's Bit Scabious (DBS) will be carried out by an ecologist during the last available August/September prior to commencement of construction works. Any areas of DBS that are located within construction works boundary during the Aug/September survey will be strimmed/cut to ground level in the last available April/early May period prior to commencement of construction.	Pre-construction monitoring prior to any works commencing near Marsh Fritillary's food plant DBS locations will allow works and plans to be the most accurate and prevent any impacts to typical species of the SAC such as Marsh Fritillary.
WM55	A barrier fence to control the extent of construction works will be erected 5m from the boundary of the Cullahill Mountain SAC where works are within 75m of the SAC boundary. The placement of this barrier will be carried out before construction works commence in the area and under the supervision of the Ecological Clerk of Works. No works will take place beyond this barrier.	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. It will assist in the reduction of dust emissions by setting up an exclusion zone from the SAC boundary. In addition, the presence of an ECoW will facilitate the Project Manager to be alerted to any emergent changes during the construction phases (i.e. appearance of new invasive plant species locations).
WM56	Timing of Construction Works: The construction of the windfarm site road between T2 and T3, and the main groundworks at T3 be limited to the Autumn and Winter period, i.e. September to February inclusive). Paving of the section of uphill section of this windfarm site road will take place before May of the year.	This measure will allow for construction works to coincide with the period of dormancy of orchid species. The paving of the uphill section of the windfarm will remove the sources of dust emissions.
WM57	Dry Stone Walls: following the completion of construction works, historic dry-stone walls within the Ballylehaun Area of the Gathbawn Windfarm will undergo restorations by an experienced dry stone wall builder. The methodology will be provided to and agreed with the Conservation Officer of Kilkenny County Council before restoration works commence. Sections of walls affected by the construction works will undergo restorations where possible, any sections of wall at the Ballylehaun Area which show existing damage or collapse will be included in the restoration programme.	This measure preserves landscape features in the area to the south of the SAC, which is a conservation measure for this site (traditional dry stone wall maintenance (ACRES)).
WM59	Parking Exclusion Zone: Overnight parking of plant and machinery will only be permitted at locations which are greater than 50m from the Cullahill Mountain SAC.	This measure provides an exclusion zone that prevents the spread of invasive species to the SAC and also prevents the generation of dust emissions within 50m of the SAC boundary during parking.
WM60	Road Paving: In order to reduce the potential for dust emissions, the uphill section of the windfarm site road between T2 and T3 will be paved with tarmacadam. A dry wheel wash will be installed on level ground before and after this road to reduce dirt on the wheels of vehicles travelled near to the boundary of the Cullahill Mountain SAC.	This measure will greatly reduce the potential for dust emissions as pavement does not emit dust when driven over by vehicles. Regular wheel washing of vehicles will maintain negligible dust emissions.
WM61	Marsh Fritillary: In the event that Marsh Fritillary larval webs were detected within construction works areas during preconstruction surveys, then turves containing Devil's-bit	Pre-construction monitoring prior to any works commencing near Marsh Fritillary larval web locations will allow works and plans to be as accurate. This

ID	Description of the Measure – specific to Cullahill Mountain SAC	Effectiveness of the measure
	Scabious will be translocated to a nearby location that would be suitable for the establishment of Devil's-bit Scabious. Before translocation, the soil of the mitigation site will be scarified to allow the roots of the plants take hold. These actions will help increase the success of the translocation of Devil's-bit Scabious from the donor site to the mitigation site. Weather conditions will be monitored, and where possible turves will be translocated when the soil is damp but not waterlogged, with a forecast for rain in the following days to aid establishment to ensure that the donor turves succeed. Long periods of drought will be avoided. All translocation works must be supervised by an ecologist with experience of habitat management and establishment of Devil's-bit Scabious.	measure will ensure the protection and success of a typical species (Marsh Fritillary) recorded within the SAC.

6.2.6.2 Mitigation Measures and Monitoring Arrangements – general measures for the protection of habitats

Table 6-3: General Mitigation Measures and Monitoring Arrangement for the protection of habitats

ID	Description of the Measure – protection of habitats	Effectiveness of the measure
WM03 GM03	Pre-construction surveys for invasive species will be carried out to determine if any new infestations of invasive species have been established in the interim period between the submission of the planning application and the commencement of construction works. These pre-construction confirmatory surveys for invasive species will be carried out at the construction works areas plus 7m, by the Project Ecologist, to accurately determine the extent of new invasive species infestations. Mapping, showing the most up to date distribution and extent of each infestation, will be distributed to the Environmental Clerk of Works and to the Project Engineer.	These pre-construction surveys will confirm the identified locations of invasive species have not expanded or changed between the time of submission for planning and the commencement of construction works.
WM12 GM12	The Environmental Management Team will monitor construction works for compliance with the Environmental Management Plan. The project Environmental Management Team which includes an Environmental Clerk of Works, the Project Ecologist and specialists as required such as archaeologists, invasive species specialists and hydrologists, who are independent of the site contractors. The Environmental Management Team will report to the owner's Project Manager.	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. In addition, the presence of an ECoW and ecologist will facilitate the Project Manager to be alerted to any emergent changes during the construction phases (i.e. changes in soil integrity surrounding work area, weather changes impact timing of works at watercourses and drains)
WM13 GM13	A Landowner Liaison Officer (LLO) will be appointed and will monitor the erection and maintenance of the construction works area boundary fences and will liaise with the landowners regarding the location of access gateways along the fence, and of livestock water supply pipes and livestock water supply sources. The LLO will keep the landowners up to date with relevant construction work schedules.	The measure provides a clear point of contact between the contractor and landowners, helping to ensure that boundary fencing, access gateways, and livestock water supplies are appropriately located and maintained. Regular communication on construction schedules also allows landowners to plan, reducing disruption to agricultural activities and helping to address issues promptly.

ID	Description of the Measure – protection of habitats	Effectiveness of the measure
WM01 GM01	Engineering Review: A suitably qualified engineer will review and approve the civil contractor's method statements and final detailed design prior to the commencement of construction works.	This will ensure that all such works are undertaken in accordance with best practise and in such a way as to minimise the potential for pollution (aquatic and air quality) and minimise disturbance. This will help identify and address potential slope stability and landslip risks, while ensuring that appropriate construction techniques and control measures are incorporated and implemented.
WM14 GM14	Engineer Supervision: a suitably qualified engineer will supervise all excavations and construction works.	This will ensure that all such works are undertaken in accordance with best practise and in such a way as to minimise the potential for pollution (aquatic and air quality) and minimise disturbance. This will help identify and address potential slope stability and landslip risks, while ensuring that appropriate construction techniques and control measures are incorporated and implemented.
WM15	Drainage Network Inspections: The windfarm drainage network will be inspected regularly during the construction phase under the following schedule: Daily visual inspections by the Contractor; weekly inspections by the Environmental Management team; Event based inspections by the Contractor as follows: >10 mm/hr (i.e. high intensity localised rainfall event); or >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day); or, rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week). All inspections will include all elements of the drainage systems to ensure that the systems are operating correctly. Inspections will examine the functioning of the various elements of the drainage system, and if evidence of sedimentation or scouring and any changes in the drainage water including discolouration, odour, oily sheen or the presence of litter, then the required corrective maintenance or actions will be identified and will be implemented immediately the Contractor. Weekly site inspections of the drainage network will be carried out by members of the Environmental Management Team during construction phase and for a period of 6 months following construction. If monitoring identifies sediment or contaminant polluted waters, then the Environmental Clerk of Works will establish the cause of the pollution, and if caused by the Project, then the Environmental Clerk of Works will have a 'stop-works' authority to temporarily stop construction works at the Project site and the Contractor will implement the necessary actions and measures to resolve the cause of the pollution.	Regular inspections of drainage network will facilitate the monitoring of any unforeseen sediment build up and allow construction crew to amend actions to prevent further build up and ensure drainage network is flowing neatly and cleanly in line with the intended pathways.
WM18 GM18	Fit for Purpose: All plant and machinery which will be used during construction will be fit for purpose and in good working order prior to mobilisation to works areas. The plant and machinery will be regularly inspected by the Contractor for leaks and maintained in good working order for the duration of the works.	This measure is a key measure to ensure any accidental spills/leaks of hydrocarbons are caught immediately. This measure is majorly effective in removing the likelihood for machinery to be a source of habitat degradation impacts

ID	Description of the Measure – protection of habitats	Effectiveness of the measure
WM20 GM20	Liaison with Contractor: The Project Ecologist will liaise with the Contractors on a weekly basis regarding the upcoming schedule of works and will advise the Contractors of any particular ecological protection requirements at specific locations on site.	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. In addition, the presence of a ECoW and ecologist will facilitate the Project Manager to be alerted to any emergent changes during the construction phases (i.e. appearance of new invasive plant species locations)
WM22 GM21	Any excavation works in close proximity (7m) to an invasive species infestation location will be carried out under the direct supervision of an invasive species specialist ecologist.	These are best practice measures related to managing invasive species that change their locations, or related to new infestations which have established, between the time of surveying for invasive plant species and the commencement of construction works.
WM23 GM22	Invasive Species Control: Visual inspections will be carried out by the Contractor on all machinery and equipment (particularly for machinery and equipment which has come into contact with water or soils) for evidence of attached plant or animal material, or adherent mud or debris. Any attached or adherent material will be removed before entering or leaving the site, securely stored away from traffic for removal to a contaminated waste Community Liaison Officer bin at the temporary constructions.	This is the accepted practice to ensure machinery and personnel do not inadvertently cause the transportation of invasive species either within the construction area sites or across the wider receiving environment
WM24 GM23	Monitoring – Dust: During working hours, the construction contractor will monitor dust control methods and weather forecasts for dry and windy conditions and will carry out weekly on-site and off-site inspections to monitor dust caused by the construction works. Public roads will be regularly inspected for cleanliness and regular dust soiling checks of surfaces along public roads and within 100m of site access points will also be carried out. The frequency of monitoring will be increased when construction activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. In addition, the presence of an Environmental Clerk of Works will facilitate the Project Manager to be alerted to any emergent changes during the construction phases (i.e. dust emissions). Regular inspections of the site, public roads and surrounding areas will also help identify and address dust soiling at an early stage, reducing the potential for dust emissions to affect the SAC.
WM29 GM26	Environmental Management Plan: The construction of the Gathabawn Windfarm Project will be carried out in accordance with the Environmental Management Plan (EMP). The EMP will include all of the mitigation measures and monitoring arrangements for the Project. An Environmental Clerk of Works will be appointed, independent of the main construction Contractor, and will carry out weekly audits on EMP compliance. If non-compliance is detected, then, prompt corrective action will be agreed and committed to by the Contractor, with a view to the swift and effective resolution of any deviations from the EMP requirements. The EMP will be an important contract document for the main construction contractor (Contractor) who will be contractually obliged to comply with the EMP and the requirements of the Environmental Clerk of Works.	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. In addition, the presence of an ECoW and ecologist will facilitate the Project Manager to be alerted to any emergent changes during the construction phases (i.e. changes in soil integrity surrounding work area, weather changes impact timing of works at watercourses and drains)

ID	Description of the Measure – protection of habitats	Effectiveness of the measure
	Furthermore, if a significant unforeseen environmental effect takes place, then, the Environmental Clerk of Works will have a 'stop-works' authority to temporarily stop works until the issue is resolved.	
WM30 GM27	Fencing of works areas: The boundaries of construction works areas in agricultural lands will be fenced to prevent the encroachment of construction phase personnel, machinery or materials beyond this boundary. Livestock proof fencing will be used, with landowner access maintained through the provision of openings along the boundary fences.	This measure will prevent any expansion of construction works impacts beyond the established Construction Works Area Boundary. This is an accepted measure to prevent works expanding beyond the consented areas for machinery and human activity where the pathways and potential impacts were not considered for additional adverse effects.
WM31	Control of Movement of Machinery/Vehicles - windfarm: Construction traffic, personnel and materials will be restricted to the hardcore surfaces, particularly with respect to the newly constructed access roads. This means that machinery will be kept on the windfarm site roads and hardstanding areas, and, aside from advancing excavations, will avoid moving onto areas not delineated on the site drawings. Control of Movement of Machinery/Vehicles - grid connection: Construction traffic, personnel and materials will be restricted to within the construction works area fence and will avoid moving onto areas not delineated on the site drawings.	This measure will prevent any expansion of construction works impacts beyond the established Construction works Area Boundary. This is an accepted measure to prevent works expanding beyond the consented areas for machinery and human activity where the pathways and potential impacts were not considered for additional adverse effects. This measure will ensure that the only adverse effects needing mitigation are the ones considered within the relevant works area boundaries provided for the development.
WM32 GM29	Land reinstatement will not be carried out during very wet weather or when the soil is waterlogged. If any compaction has occurred along the construction works area, these areas will be ploughed with a sub-soiler to loosen the subsoil layer.	Carrying out reinstatement works during very wet weather can result in sediment run off occurring in potential significant levels. All efforts should be to conduct work in weather and conditions that limit or reduce any such run-off potential. This measure will ensure even unlikely worst-case scenario effects are of negligible to no effect on the integrity of the SACs QIs.
WM33 GM30	Excavation of Materials: The excavation of earth materials during the construction stage will be kept to a minimum. The excavation of materials will be completed in accordance with best practices for the management and treatment of such materials. (i.e. British Standards BS6031:2009 Code of Practice for Earthworks, and MAFF (2000) Good Practice for Handling Soils).	Backfilling is a recommended and accepted measure to prevent any substantial change to the receiving environment at landscape level.
WM34 GM31	Storage of Overburden: During construction works, excavated material will be removed for temporary or permanent storage at designated berms. All storage berms will be placed more than 50m away from any watercourse or wet drainage channel. Temporary silt control methods such as silt fencing or curtains will be placed around all overburden storage areas and/or installed between the berms and local watercourses or wet drainage channel, depending on the location, and the existing vegetative between the berms and watercourse / drainage features will be left in place.	This measure will remove any potential for excavated sediment to experience surface run-off should a rain event occur before backfilling of excavations takes place. Silt control and vegetative buffers are key measures to avoid the potential for any adverse effects from both likely and unlikely impacts.

ID	Description of the Measure – protection of habitats	Effectiveness of the measure
GM32	Protection of Soils in Berms; All storage berms will be graded and sealed following emplacement. Topsoil and subsoil will be stockpiled separately. Re-seeding of permanent berms will be carried out as soon as practical in these areas. Construction works areas along cable routes in agricultural lands will be reseeded as son as practical after reinstatement. Measures such as silt curtains around the bases of these areas and sediment traps will also be incorporated to prevent runoff of suspended solids, dust and soil erosion, if required.	This measure will minimise the potential for mobilisation of silts, sediments and/or dust through the establishment of vegetation.
WM43	Drainage network: Windfarm site roads and hardstanding areas are designed to have a permanent surface water drainage network in place. Temporary works areas, such as turning heads, borrow pits and compounds will have a temporary surface water drainage network in place during works. The drainage infrastructure will not be installed during heavy or prolonged rainfall events or when the soil is waterlogged. The site drainage network will ensure that all surface water runoff from upgraded roads and new road surfaces (including hardstand areas) will be captured and treated prior to discharge/release. Transverse drains ('grips') will be constructed, where appropriate, in the surface layer of access tracks to divert any runoff into swales/track side drains; The site drainage network will include check dams and settlement ponds which will settle suspended solids in water runoff while also slowing down the rate of water run-off from these areas. Water will be released to surrounding vegetation at regular intervals via buffered outfall weirs, which also form part of the drainage network.	These measures will avoid even a negligible event of sediment run-off resulting from the use of site roads and operation of borrow pits via surface runoff by capturing and treating water before it can interact with drains or watercourses downstream of the works.
WM47 GM44	Concrete control procedures will be implemented and will include the following: No concrete batching will take place on site, all concrete will be ready-mixed and delivered just-in-time. The pouring of concrete will be scheduled for dry days. If a sudden rainfall event should occur, then suitable covers will be ready and available at the pour site to cover the concrete. The pour site will be kept free of standing water. All operators involved in pouring concrete will be trained and experienced in working with concrete. Run-off from wind turbine foundation concrete pours will not be permitted to flow over adjacent lands or enter drainage channels. The run-off will be contained within the foundation area and pumped into a skip to settle out; settled solids will be appropriately disposed of off-site. The Contractor will not permit the discharge of cement contaminated waters to the construction phase drainage system, onto adjacent lands or directly to any artificial drain or watercourse. Concrete trucks will be washed out at the supplier's facilities and not on site. The only concrete washing that will occur on site is the hand washing of the chutes at the rear of the trucks.	This measure is to avoid wet cement being flushed out to watercourses where the integrity of the cement could be compromised prior to or during installation of hardstands and other foundations or flow into watercourses with connectivity to the SAC.

ID	Description of the Measure – protection of habitats	Effectiveness of the measure
	Washing of chutes will only take place at the designated area and into a Roadside Concrete Washout unit.	
GM45	Fuel/Oil control procedures will be implemented and will include the following: On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double axel custom-built refuelling trailer, will be refuelled off-site, and will be towed around the site by a 4x4 jeep to where machinery is located. The 4x4 jeep will carry fuel absorbent material and pads in the event of any accidental spillage. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations. In addition, spill response apparatus including spill-kits and fuel absorbent mats will be stored in the cabin of each vehicle and operators will be fully trained in the use of this equipment and in the implementation of the Emergency Response Plan, as contained in the Environmental Management Plan. The fuel bowser will be parked on a level area, away from main traffic activity, in a designated part of the construction compound when not in use. Taps, nozzles or valves associated with mobile fuel bowser will be fitted with a lock system. Only designated trained and competent operatives will be authorised to refuel plant on site. A Permit to Fuel system will be put in place.	This measure is a key measure to control the use/handling of fuels and oils, and to ensure any accidental spills/leaks of hydrocarbons are caught immediately . This measure is majorly effective in removing the likelihood for refuelling or use of oils/fuels on the construction site to be a source of habitat degradation impacts.
WM50 GM48	Overnight parking of plant and machinery will only be permitted at an existing hard-core surface at locations which are greater than 50m from watercourse/drainage features/Cullahill Mountain SAC. Drip trays and fuel traps will be used under and around parked plant and machinery to contain any potential leaks.	This measure reduces the risk to water quality through separation distance, and by ensuring any accidental spills/leaks of hydrocarbons are caught immediately. This measure is majorly effective in removing the likelihood for machinery to be a source of habitat degradation impacts.
WM51 GM50	Treatment/management of invasive species infestations: Any infestations of Japanese knotweed or other high-impact invasive species within 7m of works will be covered with high density polyethylene grass carpet terram prior to any works commencing at the location. The covering of any new infestations will only be carried out under the direct supervision of a specialist invasive species ecologist, and works within 7m of the infestation will be under the direct supervision of this specialist invasive species ecologist.	This biosecurity measure is in line with best practice for construction works to prevent the expansion and/or spread of invasive plant material.
WM52	Monitoring of invasive species: Works within 7m of an invasive species infestation will only be carried out under the direct supervision of a specialist invasive species ecologist with prior experience of this type of work.	These are best practice measures related to managing invasive species that change their locations, or related to new infestations which have established, between the time of surveying for invasive plant species and the commencement of construction works.

6.2.6.3 Monitoring of the Implementation and Effectiveness of the Mitigation Measures

Monitoring:

The construction of the Whole Gathabawn Windfarm Project will be carried out in accordance with the Environmental Management Plan 2026, which accompanies the planning application. The Environmental Management Plan 2026 includes a Sediment & Erosion/Storm Water Control Plan, a Fuel Management Plan, a Waste Management Plan, a Dust Minimisation Plan and an Invasive Species Management Plan. The implementation of the Environmental Management Plan including all of the mitigation and monitoring measures proposed herein, will be monitored by an Environmental Clerk of Works and an Environmental Manager during the construction works.

Weekly auditing of the construction works for compliance with the Mitigation Measures will be carried out by the Environmental Clerk of Works, who will also monitor construction works in order to Identify any unforeseen adverse effects to the environment. The Environmental Clerk of Works will be appointed by the Project Promoter, be independent of the Construction Contractor, and will report directly to the Promoters Project Manager.

Once the Gathabawn Windfarm Project is constructed, the environmental management of the project will be carried out by the Gathabawn Windfarm site manager, who will be responsible for the implementation of mitigation and monitoring measures during any operational maintenance and decommissioning works.

On-going monitoring of the implementation and effectiveness of the Mitigation Measures will ensure that the above mitigation measures are implemented and working effectively which will ensure that the Gathabawn Windfarm Project will not adversely affect the integrity of a European Site.

Effectiveness:

It is considered that the measures provided in 6.2.6 above are appropriate and comprehensive to prevent any habitat loss and degradation effects from resulting in even a negligible magnitude adverse effect on the QI habitat and typical species of the Culllahill Mountain SAC.

Dust emissions are a common impact source from developments across Ireland. In the absence of mitigation, this impact almost always poses low to high magnitude adverse effects on sensitive receptors. The measures provided in Section 6.2.6 above are accepted best practice to manage and prevent this impact from occurring. As such, these measures remove any potential for dust emissions within the boundaries of the SAC.

The spread of invasive species is a common and increasing impact source from developments across Ireland. In the absence of mitigation, this impact almost always poses low to high magnitude adverse effects on sensitive receptors. The measures provided in Section 6.2.6 above are accepted best practice to manage and prevent this impact from occurring. As such, these measures remove any potential for invasive species spread within the boundaries of the SAC.

Following the implementation of the mitigation measures, in view of best scientific knowledge and on the basis of objective information, it can be concluded that the Proposed Gathabawn Windfarm will not result in adverse effects on the integrity of the Cullahill Mountain SAC.

6.2.7 Evaluation of the Residual Effect of the proposed development on the Integrity of the Cullahill Mountain SAC [000831]

Using the checklist, in the table from the Commission Notice (2021) *Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC,* and taking into account the definition of Favourable Conservation Status mitigation measures and monitoring arrangements for the Proposed Gathabawn Windfarm and the Candidate Gathabawn Grid Connection, presented in Section 6.2.6, the Proposed Gathabawn Windfarm development is examined, both alone and in-combination with the other parts of the Whole Gathabawn Windfarm Project and with the other projects, plans and land-use activities, for adverse impacts on the integrity of Cullahill Mountain SAC.

AA Table 15: Integrity of Site checklist for the Cullahill Mountain SAC (Site Code: 000831)

***Does the project or plan have the potential to*:**	**(Yes/No)**
- cause delays in progress towards achieving the conservation objectives of the site?	No
- interrupt progress towards achieving the conservation objectives of the site?	No
- disrupt those factors that help to maintain the favourable conditions of the site?	No
- interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	No
- change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	No
- interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No
- reduce the area of key habitats?	No
- reduce the population of key species?	No
- change the balance between key species?	No
- reduce diversity of the site?	No
- result in disturbance that could affect population size or density or the balance between key species?	No

In summary, it can be objectively concluded that the Proposed Gathabawn Windfarm, whether considered alone or in-combination with the other parts of the whole Gathabawn Windfarm Project and with other projects, plans or land-use activities, will not result in adverse impacts on the integrity of the Cullahill Mountain SAC, in circumstances where no reasonable scientific doubt remains.

6.3 River Nore SPA [004233]

The River Nore SPA is a long, linear site that includes the following river sections: the River Nore from the bridge at Townparks, (north-west of Borris in Ossory) to Coolnamuck (approximately 3 km south of Inistioge) in Co. Kilkenny; the Delour River from its junction with the River Nore to Derrynaseera bridge (west of Castletown) in Co. Laois; the Erkina River from its junction with the River Nore at Durrow Mills to Boston Bridge in Co. Laois; a 1.5 km stretch of the River Goul upstream of its junction with the Erkina River; the Kings River from its junction with the River Nore to a bridge at Mill Island, Co. Kilkenny. The site includes the river channel and marginal vegetation.

The River Nore SPA is of high ornithological importance as it supports a nationally important population of Kingfisher, a species that is listed on Annex I of the E.U. Birds Directive. A survey in 2010 recorded 22 pairs of Kingfisher (based on 16 probable and 6 possible territories) within the SPA.

The Site Synopsis for this SPA site is included in full in Appendix H1 of this AA Report.

The site is a Special Protection Area (SPA) selected for the Annex I species: Kingfisher (EU Code: A229).

6.3.1 Conservation Objectives, Pressures/Threats

The site-specific conservation objectives of the River Nore SPA aim to define favourable conservation condition for the particular habitats and species at that site:

SCI:	**Kingfisher (A229)**
Objective	To restore the favourable conservation condition of Kingfisher in River Nore SPA, which is defined by the following list of attributes and targets:
Attribute	**Target**
Population size	No significant decline in the long term
Productivity rate	Sufficient productivity to maintain the population trend as stable or increasing
Spatial distribution of territories	No significant loss of distribution in the long term, other than that occurring due to natural patterns of variation
Extent and quality of nesting banks and other suitable nesting features	Sufficient area of high quality nesting habitat to support the population target
Forage spatial distribution, extent, abundance and availability	Sufficient number of locations, area of suitable forage habitat and available forage biomass to support the population target
Water quality	Both biotic (i.e. Q-value) and abiotic indices reflect overall good-high quality status
Barriers to connectivity	No significant increase
Disturbance to breeding sites	Disturbance occurs at levels that do not significantly impact upon breeding Kingfisher
Threats & Pressures (as per Standard Data Form): Medium: Port Areas Medium: Landfill, land reclamation and drying out, general	

The Conservation Objectives, and Standard Data Form for the River Nore SPA [004233] are reproduced in Appendix H2, and available in full on the National Parks & Wildlife Service website at https://www.npws.ie/protected-sites, and should be read in conjunction with any other supporting documentation on the website or as referenced in the Conservation Objective Series for the SPA.

6.3.2 Kingfisher (A229)

Kingfisher is found throughout Ireland (NBDC, 2021). Kingfisher favour slow flowing rivers and streams with abundant fish prey items and suitable nesting habitat in the form of vertical sandy banks. They breed in tunnels dug in vertical banks along streams and rivers. Kingfisher use plunge-diving methods to catch various species of small fish (Stickleback, Minnow and Chub) in the river habitats in which they are found and can often be seen perching over the water in search of prey. This species is measured by the number of suitable nesting habitats along the designated sites with the river Nore hosting the highest abundance of active nests per kilometre among 5 sites identified in Cummins *et al*. (2010).

Conservation status, threats and pressures:

It is on the Amber BOCCI List in Ireland and is included on the European Red List due to recent declines in breeding populations (BTO, 2021). The population short-term trend in Ireland over the period of 1991 to 2010 has been a slight decline (Cummins *et al*. 2010). The long-term trend (1980 – 2010) is also one of decline in specific designated sites but majority of the national population has remained unchanged (Cummins *et al*. 2010). Pressures and threats to this species include pollution to surface waters, invasive alien species and human induced changes in hydraulic conditions (Cummins *et al.* 2010).

Species Distribution:

Desk Study Results: Kingfisher are known to occur within the River Nore SPA, which is located 5km to the east of the closest turbines in the Proposed Gathabawn Windfarm. There are existing records (NBDC, 2021) for Kingfisher for 10km Irish Grid squares S36, S46 and S47 within which the Proposed Gathabawn Windfarm Project is located.

Field Study Results: Two Kingfishers were recorded flying along the River Nore, c.542m north of the Candidate Gathabawn Grid Connection. Kingfishers were **not observed** during ecological surveys undertaken at the Gathabawn Windfarm. There are no natural watercourses at the Gathabawn Windfarm site, however it is noted that turbine delivery route facilitating works at FW9 are located 5m from the Ballyring Upper Stream, while facilitating works at FW8 are ~50m from the Foyle South stream, which drains into the Gorteenahilla Stream. Suitability surveys at these stream locations found that habitats were not suitable for nesting Kingfisher.

The route of the Candidate Gathabawn Grid Connection crosses over a number of rivers and streams – River Nore, Gorteenamuck Stream, Gorteenahilla River, Lismaine Stream, Lisdowney Stream and Ballyconra Stream. Survey work carried out on 23rd April 2025, 1st and 9th of May 2025, 28th April 2026 and 21st May 2026 noted that the River Nore and Lisdowney Stream ranged from Negligible to High suitability. The Gorteenahilla River had Negligible to Low suitability. The Lisamine Stream had Negligible to Low suitability; the Ballyconra River had Negligible suitability,

See AA Figure 13: Locational Context of Aquatic Habitats at and downgradient of the Whole Gathabawn Windfarm Project site.

Vulnerability to potential impacts:

This species is vulnerable to pollution affecting surface waters and hence prey (fish), invasive alien species and riparian management affecting potential suitable nesting habitat and human induced changes in hydraulic conditions as well as disturbance.

6.3.3 Proposed Gathabawn Windfarm

The location of the Proposed Gathabawn Windfarm in relation to the River Nore SPA is provided in this Section. Details of the design of the windfarm in the context of avoiding impacts to the SPA are outlined, and the key works and activities which are relevant to the evaluation of effects are identified across the various life-cycle stages of the development.

6.3.3.1 Locational Context

The Proposed Gathabawn Windfarm development is not located within or in close proximity to any part of the River Nore SPA. However, the Candidate Gathabawn Grid Connection overlaps the boundary of the SPA at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel. The Candidate Gathabawn Grid Connection also includes cable crossing of tributary streams which occur along the Ballylehaun-Ballyring UGC and Ballyring to Parksgrove UGC. See AA Figure 22: Locational Context of Gathabawn Windfarm Project and Surrounding Landuse in relation to River Nore SPA (over).

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AA Figure 22 - Locational Context of Gathabawn Windfarm Project and Surrounding Landuse in relation to River Nore SPA

Legend:

- Underground Cabling
- Parksgrove Substation
- Drill Pits
- Joint Bay
- Existing EirGrid Ballyragget Substation
- Long Term Storage Berm
- Briskalagh WF Grid Connection (Consented)
- Seskin WF Grid Connection (Under Appeal, ACP)
- Construction Works Area Boundary
- River Nore SPA
- N77 Public Road Identification Number

Gathabawn Drill Pits (Crossing the River Nore)

Existing Eirgrid Ballyragget Substation

Seskin WF Grid Connection (Under Appeal, ACP)

River Nore SPA

Briskalagh WF Grid Connection (Consented)

Parksgrove - Moatpark UGC

Gathabawn Drill Pits (Crossing the N77)

Parksgrove Substation

Temporary Construction Compound

Access Road

Long Term Storage Berm

Ballyring - Parksgrove UGC

N432

N77

Cemetery

Páirc an Mhóta
Moatpark

Tank

N

6.3.3.2 Design Features of the development

The following constraints were implemented during the design of the windfarm development:

- No instream works within the boundary of the SPA, cables to be installed across the River Nore using HDD techniques which put the cables several metres under the river bed – to avoid direct effects to SPA habitats;
- No trenching works within riparian areas, and drill pits set back 30m from the riverbanks – to avoid direct effects to SPA habitats;
- Underground Cables associated with the Parksgrove-Moatpark UGC are located in the public road verge where possible – to reduce extent of works within the grassland fields on the western side of the river;
- An oversized cable will be installed for the Parksgrove-Moatpark UGC. This higher-capacity cable can support both the Gathabawn project and a future project, thereby avoiding consecutive construction works for an additional grid connection.

6.3.3.3 Impact Potential Across the Project Life Cycle

In addition to the descriptions of the project provided in Section 3 of the AA Report, an overview those project activities which are in close proximity to the SPA are identified below, to establish the specific source-pathway mechanisms for the evaluation of potential impacts on the Special Conservation Interest (SCI) of the SPA.

Construction Phase: The main potential for effects arises during the construction phase:

- Although the Proposed Gathabawn Windfarm is remote from the SPA site, with no natural watercourses at the Ballylehaun or Ballyring Areas, temporary turbine delivery facilitating works at Garrydague will be close (within 5m) to the Ballyring Upper Stream, a tributary stream of the Nuenna River;
- Works to install cables for the Candidate Gathabawn Grid Connection will involve works at tributary streams - under an existing culvert at the Gorteenamuck Stream (W1), HDD works at the Gorteenahilla Stream (W2), instream works at the Lismaine Stream (W3), Lisdowney Stream (w4) and Ballyconra Stream (W5); HDD crossing of the River Nore (W6);
- The Proposed Gathabawn Windfarm site is located in the Goul_SC_010 which drains into the River Nore via the Goul River and then via the Erkina River joining the Nore at Durrow, and the Nore_SC_070 sub-catchment which drains mainly into the Nuenna River, whose confluence with the River Nore is downstream of Freshford town. A small area of the windfarm in the Ballyring Area drains into the River Nore directly via the Lismaine Stream. Excavations, groundworks, emplacement of cementitious materials and use of machinery run on hydrocarbons are all sources of potential water quality impacts;
- The Candidate Gathabawn Grid Connection is also located in the Goul_SC_010 and Nore_SC_070, in addition to the Nore_SC_060, with similar type, albeit smaller scale, of works within the catchment;
- Grid works, along the Parksgrove-Moatpark UGC, will involve trenching works along the N77 verge, then across grassland fields on either side of the River Nore, with drilling pits located 30m from the river bank;
- Delivery of materials to the windfarm site and grid connection works areas will be via the national and regional road network through Ballyragget and Durrow which are both located along the SPA. Deliveries will involve the movement of HGVs run on hydrocarbons, which will emit GHG and noise, and present a collision mortality risk to some species.
- Noise and visual intrusion as a result of the presence of personnel, machinery and construction works, particularly in close proximity the Ballyring Upper Stream (at FW9), and to the River Nore and its tributary streams along UGC routes and in proximity to the Parksgrove Substation.

Operational Phase: Operational works for the Gathabawn Windfarm Project in proximity to the SPA or to its connecting tributary streams is limited to monthly inspections and testing at the Parksgrove Substation, with infrequent maintenance works required at this location. Annual or bi-annual inspection of cable routes with testing at jointing chamber locations. This works will involve the removal of the manhole cover and testing of cables inside the chamber. No excavation works are expected to be required along the cable trenches. The Parksgrove Substation and Parksgrove-Moatpark UGC are expected to be permanent infrastructure,

transferring into State ownership following their construction. The Ballylehaun-Ballyring UGC and Ballyring-Ballylehaun UGC may be decommissioned with the Gathabawn Windfarm, this would involve small discrete excavations at jointing chambers along the UGC routes to pull the cables from the cable ducts, followed by reinstatement of the chamber lid and reinstatement of the landcover. The closest jointing chamber to a natural watercourse is the Lismaine stream (36m), and 100m from all other watercourses, including the River Nore.

6.3.4 Potential Impact Screened-In for Detailed Evaluation – River Nore SPA

The findings of the screening exercise carried out for the River Nore SPA (Section 5.2.3) identified connectivity with the following potential impact:

SPA Impact A: Direct Impact to SCI species within SPA: Disturbance or Mortality of Special Conservation Interest bird species or of prey item species within an SPA

SPA Impact B: Indirect Impact to SCI species: ex-situ disturbance/displacement of SCI

SPA Impact C: Indirect Impact to SCI species: ex-situ Mortality or Barrier effects on SCI bird species

SPA Impact D: Direct impact to SCI: direct habitat loss, degradation, fragmentation or reduction/loss of connectivity effects to Wetland or other suitable habitats as a result of groundworks, vegetation clearance

SPA Impact E: Indirect Impacts to SCI indirect loss, reduction or loss of connectivity of wetland or other suitable habitat via reductions in water quality, reduction in prey item species or spread of invasive species.

6.3.4.1 Breakdown of Specific Pathways under SPA Impacts A to E

The SPA Impacts A - E comprises several distinct environmental pathways that could indirectly affect the Special Conservation Interest species Kingfisher, and its suitable habitat and prey item species. To ensure a robust assessment, these specific pathways are characterised individually below to establish their scale and mechanisms. However, they are fundamentally considered as interconnected components of a single impact type, and their collective, cumulative effects on the conservation objectives of the SPA are fully evaluated in Section 6.3.4.2 to Section 6.3.4.6 below.

AA Table 16: Breakdown of Specific Pathways under SPA Impacts A to E

Impact	Evaluation can be found in:
Disturbance or Mortality Effects within the SPA	Section 6.3.4.3
Ex-situ Disturbance or Displacement Effects	Section 6.3.4.4
Ex-situ Mortality or Barrier Effects	Section 6.3.4.5
Direct habitat loss, degradation, fragmentation or reduction/loss of connectivity	Section 6.3.4.6
Indirect habitat loss, reduction or loss of connectivity via: - reductions in water quality, reduction in prey item species or spread of invasive species.	Section 6.3.4.7

6.3.4.2 Consideration of In-Combination Effects

The evaluations take into account the in-combination effect with the following other projects and activities:

- Grid connections for the Briskalagh WF (consented) and Seskin WF (in-planning) both involve crossing the River Nore by HDD and connecting into the existing Eirgrid Ballyragget Substation. These projects could potentially all be built during the same period as the Gathabawn Windfarm Project.
- Works for the wind farms within the same sub-catchments and in the sub-catchments of the Upper Nore, would involve excavations, groundworks, use of cementitious material, hydrocarbons and noise and visual intrusion from personnel, machinery and delivery vehicles. Wind farms which are consented, currently in planning, or currently pre-planning, and could therefore potentially construct during the same period (worst case scenario), include: Briskalagh Wind Farm (consented) (partially within the upper Nore catchments) and the Seskin Wind Farm (in planning).
- Sub-catchments associated with the Whole Gathabawn Windfarm Project (Goul_SC_010, Nore_SC_070, Nore_SC_060 and Nore_SC_080) also include the Seskin Wind Farm (under appeal, ACP), Ballynalacken Wind Farm Project (consented), Moatpark BESS 1, Moatpark BESS 2 (associated with Seskin WF, Ballynalacken WF, and Briskalagh WF), and grid connections (associated with Seskin WF and Briskalagh WF).
- Two BESS projects have been consented in Moatpark, involving excavations, groundworks, presence of personnel and working machinery; while unlikely, these projects could potentially build during the same period as the Gathabawn Windfarm Project.
- Agricultural land use and management practices.
- Ballyragget River Walk plan.

All stages of the project lifecycle, in addition to other plans, projects and activities are considered. Where it is determined that the potential for significant effects to the Conservation Objectives cannot be excluded, the requirement for mitigation measures is identified in view of reducing, avoiding, or eliminating adverse impacts.

The Conservation Objectives for the SPA, in addition to the specific impact pathways identified for the evaluation of *SPA Impacts A to E*, are considered sufficient to inform a considered and reasoned examination and analysis of effects of the Proposed Gathabawn Windfarm (either alone or in-combination) on the conservation status of the Special Conservation Interest species, Kingfisher, and thus on the overall integrity of the River Nore SPA.

6.3.4.3 River Nore SPA – Disturbance or Mortality Effects within the SPA

SCI

[A229] Kingfisher

Description of potential Impacts Considered

Direct Impact to SCI species within SPA: Disturbance or Mortality of Special Conservation Interest bird species or of prey item species within an SPA

Sensitivity of SCI

There is potential for connectivity to the River Nore SPA via watercourses that drain works locations which drain into this SPA. Reductions in downstream water quality could result in the loss or reduction of wetland habitat, the loss or reduction of suitable habitat for the SCI species or a reduction in their prey item species.

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Potential impacts to the SCI as a result of Construction Works:

The Gathabawn Windfarm does not overlap the boundary of the River Nore SPA, it is located 4.6km from the SPA boundary. The sources for disturbance effects will be restricted to the construction works areas of the Gathbawn Windfarm, the potential for significant impacts to this SCI can be excluded.

Potential impacts to the QI habitats during the Operational Phase;

Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to this SCI can be excluded.

Potential impacts to the QI habitats during the Decommissioning Phase;

Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm control buildings and reinstatement and restoration of the windfarm site. Machinery involved will include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection overlaps the boundary of the SPA at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel.
Due to the separation distance 10.5km) to the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects to the SPA can be excluded.

Overlap of construction periods: The construction stage of the Candidate Gathabawn Grid Connection will take place during the same period as the Proposed Gathabawn Windfarm.
Lifecycle stages: It is considered that the construction and decommissioning stages of the Candidate Gathabawn Grid Connection have the potential to cause effects to the SCI. Works and activities during the operational and decommissioning stages for the Gathabawn Windfarm will be limited in scale and mainly carried out at the windfarm hardcore footprint. The Candidate Gathabawn Grid Connection will require very little on-site maintenance or inspection activities during the operational stage. However, the decommissioning stage will involve pulling internal windfarm cables and Ballylehaun-Parksgrove cables from ducting at jointing locations, loading and removal from site.

Evaluation of the Other Elements: In relation to direct impacts via disturbance, instream works and watercourse crossing works are required to install cable ducting across streams under the River Nore by HDD, **and in the absence of mitigation measures, effects due to HDD works could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

There is some increased potential for the Whole Gathabawn Windfarm Project works to cause direct disturbance to Kingfisher, as per the Conservation Objectives – this SCI is sensitive to disturbance. When the Whole Gathabawn Windfarm Project is considered in-combination, construction activities associated with the Candidate Gathabawn Grid Connection, which include HDD at the River Nore, and therefore it is considered that there is **increased potential for the disturbance of Kingfisher, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects with Other Projects/Activities

Other projects- Two windfarms (Siskin WF, Briskalagh WF) projects will involve HDD crossing works under the River Nore SPA. Both BESS projects at Moatpark will involve construction works in proximity to the River Nore and mature woodland along the banks of the River Nore. As such, potential disturbance to breeding Kingfisher within the River Nore SPA is possible and may result in **increased potential for the disturbance of Kingfisher, and in the absence of mitigation measures, these effects could be significant.** Mitigation measures to avoid or reduce the in-combination effects will be required.

Summary of Effects (in the absence of mitigation)

The potential direct impacts to Kingfisher within the SPA relate to disturbance during the construction stage of the Candidate Gathabawn Grid Connection. The risk of the potential disturbance is further increased when considering in-combination effects with other projects (Siskin WF, Briskalagh WF, both BESS projects at Moatpark).

Mitigation measures which will avoid or reduce these potential in-combination effects are described in full in Section 6.3.6 of this document.

6.3.4.4 River Nore SPA – Ex-Situ Disturbance or Displacement

SCI

[A229] Kingfisher

Description of potential Impacts Considered

Indirect Impact to SCI species: ex-situ disturbance/displacement of SCI

Sensitivity of SCI

There is potential for connectivity to the River Nore SPA via watercourses that drain works locations which drain into this SPA. Reductions in downstream water quality could result in the loss or reduction of wetland habitat, the loss or reduction of suitable habitat for the SCI species or a reduction in their prey item species.

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Potential impacts to the QI habitats as a result of Construction Works:

Kingfishers were not observed during ecological surveys undertaken at the Gathabawn Windfarm. There are no natural watercourses at the Gathabawn Windfarm site. As such, there is no potential for ex-situ disturbance or displacement of Kingfishers within the Gathabawn Windfarm; the potential for significant impacts to this SCI can be excluded.

Potential impacts to the QI habitats during the Operational Phase:

Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to this SCI via ex-situ disturbance or displacement can be excluded.

Potential impacts to the QI habitats during the Decommissioning Phase;

Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm control buildings and reinstatement and restoration of the windfarm site. Machinery involved will include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection overlaps the boundary of the SPA at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel.
Due to the separation distance (10.5km) to the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects to the SPA can be excluded.

Overlap of construction periods: The construction stage of the Candidate Gathabawn Grid Connection will take place during the same period of the Proposed Gathabawn Windfarm.
Lifecycle stages: It is considered that the construction and decommissioning stages of the Candidate Gathabawn Grid Connection have the potential to cause effects to the SCI. Works and activities during the operational and decommissioning stages for the Gathabawn Windfarm will be limited in scale and mainly carried out at the windfarm hardcore footprint. The Candidate Gathabawn Grid Connection will require very little on-site maintenance or inspection activities during the operational stage. However, the decommissioning stage will

involve pulling internal windfarm cables and Ballylehaun-Parksgrove cables from ducting at jointing locations, loading and removal from site.

Evaluation of the Other Elements: In relation to direct impacts via disturbance, instream works and watercourse crossing works are required to install cable ducting across streams under the River Nore SPA by HDD, **and in the absence of mitigation measures, ex-situ disturbance or displacement effects due to HDD works could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

There is some increased potential for the Whole Gathabawn Windfarm Project works to cause ex-situ disturbance or displacement to Kingfisher, as per the Conservation Objectives – this SCI is sensitive to disturbance. When the Whole Gathabawn Windfarm Project is considered in-combination, construction activities associated with the Candidate Gathabawn Grid Connection, which include HDD at the River Nore SPA, and instream works to install the ducting at three watercourse locations upstream of the SPA, these are the Lismaine Stream at W3, the Lisdowney Stream at W4 and the Ballyconra Stream at W5, and therefore it is considered that there is **increased potential for ex-situ disturbance or displacement of Kingfisher, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects with Other Projects/Activities

Other projects- Two windfarms (Siskin WF, Briskalagh WF) projects will involve HDD crossing works under the River Nore SPA. Both BESS projects at Moatpark will involve construction works in proximity to the River Nore and mature woodland along the banks of the River Nore. Potential ex-situ effects to breeding Kingfisher within the River Nore SPA are possible and may result in **increased potential for the disturbance or displacement of Kingfisher, and in the absence of mitigation measures, these effects could be significant.** Mitigation measures to avoid or reduce the in-combination effects will be required.

Summary of Effects (in the absence of mitigation)

The potential ex-situ impacts to Kingfisher within the SPA relate to ex-situ disturbance or displacement during the construction stage of the Candidate Gathabawn Grid Connection. The risk of the potential disturbance is further increased when considering in-combination effects with other projects (Siskin WF, Briskalagh WF, both BESS projects at Moatpark).

Mitigation measures which will avoid or reduce these potential in-combination effects are described in full in Section 6.3.6 of this document.

6.3.4.5 River Nore SPA – Ex-situ Mortality or Barrier Effects

SCI

[A229] Kingfisher

Description of potential Impacts Considered

Indirect Impact to SCI species: ex-situ Mortality or Barrier effects on SCI bird species

Sensitivity of SCI

Barriers limiting access to this SPA or ecologically important sites outside the SPA will ultimately affect the achievement of targets for Kingfisher population size and/or spatial distribution.

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Potential impacts to the QI habitats as a result of Construction Works:

Kingfisher flightline activity was not observed during ecological surveys undertaken at the Gathabawn Windfarm. There are no natural watercourses at the Gathabawn Windfarm site. As such, there is no potential for ex-situ mortality or barrier effects to Kingfishers within the Gathabawn Windfarm; the potential for significant impacts to this SCI can be excluded.

Potential impacts to the QI habitats during the Operational Phase:

Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to this SCI via ex-situ mortality or barrier effects can be excluded.

Potential impacts to the QI habitats during the Decommissioning Phase:

Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm control buildings and reinstatement and restoration of the windfarm site. Machinery involved will include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection overlaps the boundary of the SPA at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel.
Due to the separation distance (10.5km) to the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects to the SPA can be excluded.

Overlap of construction periods: The construction stage of the Candidate Gathabawn Grid Connection will take place during the same period as the Proposed Gathabawn Windfarm.
Lifecycle stages: It is considered that the construction and decommissioning stages of the Candidate Gathabawn Grid Connection have the potential to cause effects to the SCI. Works and activities during the operational and decommissioning stages for the Gathabawn Windfarm will be limited in scale and mainly carried out at the windfarm hardcore footprint. The Candidate Gathabawn Grid Connection will require very little on-site maintenance or inspection activities during the operational stage. However, the decommissioning stage will involve pulling internal windfarm cables and Ballylehaun-Parksgrove cables from ducting at jointing locations, loading and removal from site.

Evaluation of the Other Elements: In relation to ex-situ mortality, Kingfishers are not sensitive to mortality as per the Conservation Objectives. In relation to barrier effects, instream works and watercourse crossing works are required to install cable ducting across streams under the River Nore SPA by HDD. The grid connection works interact with watercourses upstream of the SPA which have suitable habitat, creating a barrier effect, and **in the absence of mitigation measures, barrier effects due to HDD works could be significant.** Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

There is some increased potential for the Whole Gathabawn Windfarm Project works to cause barrier effects to Kingfisher, as per the Conservation Objectives – this SCI is sensitive to barriers to connectivity. When the Whole Gathabawn Windfarm Project is considered in-combination, construction activities associated with the Candidate Gathabawn Grid Connection, which include HDD at the River Nore SPA and instream works to install the ducting at three watercourse locations upstream of the SPA (Lismaine Stream at W3, Lisdowney Stream at W4 and the Ballyconra Stream at W5). Therefore, it is considered to increase the **potential for barrier effects to Kingfisher, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects with Other Projects/Activities

Other projects- Two windfarm projects (Siskin WF, Briskalagh WF) will involve HDD crossing works under the River Nore SPA. Both BESS projects at Moatpark will involve construction works in proximity to the River Nore and mature woodland along the banks of the River Nore. Potential ex-situ barrier effects to breeding Kingfisher within the River Nore SPA are possible and may result in **increased potential for barrier effects to Kingfisher, and in the absence of mitigation measures, these effects could be significant.** Mitigation measures to avoid or reduce the in-combination effects will be required.

Summary of Effects (in the absence of mitigation)

The potential ex-situ impacts to Kingfisher within the SPA relate to barrier effects during the construction stage of the Candidate Gathabawn Grid Connection. The risk of barriers effects is further increased when considering in-combination effects with other projects (Siskin WF, Briskalagh WF, both BESS projects at Moatpark).

Mitigation measures which will avoid or reduce these potential in-combination effects are described in full in Section 6.3.6 of this document.

6.3.4.6 River Nore SPA – Habitat loss, degradation, fragmentation or reduction/loss of connectivity

SCI

[A229] Kingfisher

Description of potential Impacts Considered

Direct impact to SCI: direct habitat loss, degradation, fragmentation or reduction/loss of connectivity effects to Wetland or other suitable habitats as a result of groundworks, vegetation clearance

Sensitivity of SCI

Kingfishers occupy wetlands ecologically connected to the wider landscape; habitat destruction, degradation via pollution (e.g. agricultural run-off; pesticides; increased turbidity) and/or poor management of watercourses are a concern. Riparian birds are less abundant where stream acidity and aluminium concentrations increase; their territories are longer at low pH, and clutch and brood sizes are significantly smaller.

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Potential impacts to the QI habitats as a result of Construction Works:

The Gathabawn Windfarm does not overlap the boundary of the River Nore SPA; it is located 4.6km from the SPA boundary. The sources for disturbance effects will be restricted to the construction works areas of the Gathbawn Windfarm; the potential for significant impacts to this SCI can be excluded.

Potential impacts to the QI habitats during the Operational Phase;
Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to this SCI can be excluded.

Potential impacts to the QI habitats during the Decommissioning Phase;

Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm control buildings and reinstatement and restoration of the windfarm site. Machinery involved will include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection overlaps the boundary of the SPA at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel.
Due to the locational context and nature of the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects to the SPA can be excluded.

Overlap of construction periods: The construction stage of the Candidate Gathabawn Grid Connection will take place during the same period as the Proposed Gathabawn Windfarm.
Lifecycle stages: It is considered that the construction and decommissioning stages of the Candidate Gathabawn Grid Connection have the potential to cause effects to the SCI. Works and activities during the operational and decommissioning stages for the Gathabawn Windfarm will be limited in scale and mainly carried out at the windfarm hardcore footprint. The Candidate Gathabawn Grid Connection will require very little on-site maintenance or inspection activities during the operational stage. However, the decommissioning stage will

involve pulling internal windfarm cables and Ballylehaun-Parksgrove cables from ducting at jointing locations, loading and removal from site.

Evaluation of the Other Elements: In relation to direct impacts via habitat loss, degradation, fragmentation or reduction/loss of connectivity effects to Wetland or other suitable habitats as a result of groundworks, vegetation clearance, instream works and watercourse crossing works are required to install cable ducting across streams under the River Nore by HDD, **and in the absence of mitigation measures, effects due to HDD works could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

There is some increased potential for the Whole Gathabawn Windfarm Project works to cause direct impacts via habitat loss, degradation, fragmentation or reduction/loss of connectivity effects to Wetland or other suitable habitats as a result of groundworks and vegetation. When the Whole Gathabawn Windfarm Project is considered in-combination, construction activities associated with the Candidate Gathabawn Grid Connection, which include HDD works at the River Nore, it is considered that there is **increased potential for habitat loss, degradation, fragmentation or reduction/loss of connectivity effects on suitable Kingfisher habitat, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects with Other Projects/Activities

Other projects- Two windfarms (Siskin WF, Briskalagh WF) projects will involve HDD crossing works under the River Nore SPA. Both BESS projects at Moatpark will involve construction works in proximity to the River Nore and mature woodland along the banks of the River Nore. As such, potential disturbance to breeding Kingfisher within the River Nore SPA is possible and may result in **increased potential for habitat loss, degradation, fragmentation or reduction/loss of connectivity effects on suitable Kingfisher habitat, and in the absence of mitigation measures, these effects could be significant.** Mitigation measures to avoid or reduce the in-combination effects will be required.

Summary of Effects (in the absence of mitigation)

The potential direct impacts to Kingfisher within the SPA relate to direct habitat loss, degradation, fragmentation or reduction/loss of connectivity effects on suitable Kingfisher habitat during the construction stage of the Candidate Gathabawn Grid Connection. The risk of the potential disturbance is further increased when considering in-combination effects with other projects (Siskin WF, Briskalagh WF, both BESS projects at Moatpark).

Mitigation measures which will avoid or reduce these potential in-combination effects are described in full in Section 6.3.6 of this document.

6.3.4.7 River Nore SPA - Indirect habitat loss, reduction or loss of connectivity

SCI

[A229] Kingfisher

Description of potential Impacts Considered

Indirect Impacts to SCI: indirect loss, reduction or loss of connectivity of wetland or other suitable habitat via reductions in water quality, reduction in prey item species or spread of invasive species.

Sensitivity of SCI

Kingfishers occupy wetlands ecologically connected to the wider landscape; habitat destruction, degradation via pollution (e.g. agricultural run-off; pesticides; increased turbidity) and/or poor management of watercourses are a concern. Riparian birds are less abundant where stream acidity and aluminium concentrations increase; their territories are longer at low pH, and clutch and brood sizes are significantly smaller.

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Potential impacts to the QI habitats as a result of Construction Works:

Kingfishers were not observed during ecological surveys undertaken at the Gathabawn Windfarm. There are no natural watercourses at the Gathabawn Windfarm, and the Gathabawn Windfarm does not have direct hydrological connectivity to the SPA via surface water pathways. As such, there is no potential for indirect loss, reduction or loss of connectivity of wetland or other suitable Kingfisher habitat via reductions in water quality or reduction in prey item species within the Gathabawn Windfarm. The Gathabawn Windfarm is also located 4.6km from the SPA boundary; as such, there is no likelihood of the spread of invasive species. The potential for significant impacts to this SCI can be excluded.

Potential impacts to the QI habitats during the Operational Phase;

Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to this SCI can be excluded.

Potential impacts to the QI habitats during the Decommissioning Phase;

Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm control buildings and reinstatement and restoration of the windfarm site. Machinery involved will include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection overlaps the boundary of the SPA at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel.
Due to the separation distance (10.5km), locational context and nature of the works at the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects to the SPA can be excluded.

Overlap of construction periods: The construction stage of the Candidate Gathabawn Grid Connection will take place during the same period as the Proposed Gathabawn Windfarm.

Lifecycle stages: It is considered that the construction and decommissioning stages of the Candidate Gathabawn Grid Connection have the potential to cause effects to the SCI. Works and activities during the operational and decommissioning stages for the Gathabawn Windfarm will be limited in scale and mainly carried out at the windfarm hardcore footprint. The Candidate Gathabawn Grid Connection will require very little on-site maintenance or inspection activities during the operational stage. However, the decommissioning stage will involve pulling internal windfarm cables and Ballylehaun-Parksgrove cables from ducting at jointing locations, loading and removal from site.

Evaluation of the Other Elements: In relation to indirect loss, reduction or loss of connectivity of wetland or other suitable habitat via reductions in water quality, reduction in prey item species or spread of invasive species; works associated with the construction of the Candidate Gathabawn Grid Connection include HDD works at the River Nore SPA and instream works required to install cable ducting at three watercourse locations upstream of the SPA (Lismaine Stream at W3, Lisdowney Stream at W4 and the Ballyconra Stream at W5). Other construction activities will involve works and machinery movements and material delivery within or in close proximity to this SPA or in close proximity to suitable habitat ex-situ to the SPA**,** which could potentially facilitate the spread of invasive species**, and in the absence of mitigation measures, indirect loss, reduction or loss of connectivity of wetland or other suitable Kingfisher habitat via reductions in water quality or reduction in prey item species or spread of invasive species due to HDD works and movement of vehicles could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

There is some increased potential for the Whole Gathabawn Windfarm Project works to cause indirect loss, reduction or loss of connectivity of wetland or other suitable Kingfisher habitat via reductions in water quality or reduction in prey item species or spread of invasive species. When the Whole Gathabawn Windfarm Project is considered in-combination, construction activities associated with the Candidate Gathabawn Grid Connection include HDD at the River Nore SPA, instream works to install the ducting at three watercourse locations upstream of the SPA (Lismaine Stream at W3, Lisdowney Stream at W4 and the Ballyconra Stream at W5), machinery movements and material delivery within or in close proximity to this SPA. Therefore, it is considered that there is **increased potential for indirect loss, reduction or loss of connectivity of wetland or other suitable Kingfisher habitat via reductions in water quality or reduction in prey item species or spread of invasive species due to HDD works and movement of vehicles could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects with Other Projects/Activities

Other projects- Two windfarm projects (Siskin WF, Briskalagh WF) will involve HDD crossing works under the River Nore SPA and the movement of vehicles and material delivery. Both BESS projects at Moatpark will involve construction works in proximity to the River Nore and mature woodland along the banks of the River Nore; these works will also likely involve the movement of vehicles and material delivery. Potential ex-situ effects to breeding Kingfisher within the River Nore SPA are possible and may result in **increased potential for indirect loss, reduction or loss of connectivity of wetland or other suitable Kingfisher habitat via reductions in water quality or reduction in prey item species or spread of invasive species due to HDD works and movement of vehicles could be significant.** Mitigation measures to avoid or reduce the in-combination effects will be required.

Summary of Effects (in the absence of mitigation)

The potential ex-situ impacts to Kingfisher within the SPA relate to ex-situ disturbance or displacement during the construction stage of the Candidate Gathabawn Grid Connection. The risk of the potential disturbance is further increased when considering in-combination effects with other projects (Siskin WF, Briskalagh WF, both BESS projects at Moatpark).

Mitigation measures which will avoid or reduce these potential in-combination effects are described in full in Section 6.3.6 of this document.

6.3.5 Requirement for Mitigation Measures - River Nore SPA

The potential for adverse impacts on the integrity of the River Nore SPA cannot be ruled out in relation to

(i) Disturbance or Mortality (construction phase),
(ii) Ex-situ disturbance/displacement of SCI (construction phase),
(iii) Ex-situ Mortality or barrier effects on SCI bird species (construction phase),
(iv) Direct habitat loss, degradation, fragmentation or reduction/loss of connectivity effects to wetland or other suitable habitats as a result of groundworks, vegetation clearance (construction phase),
(v) Indirect habitat loss, reduction or loss of connectivity of wetland or other suitable habitat via reductions in water quality, reduction in prey item species or spread of invasive species (construction phase).

Mitigation measures are proposed for the River Nore SPA in order to remove, avoid or reduce the impacts identified in the appropriate assessment evaluation to a level where they will no longer affect the integrity of the SPA site.

These mitigation measures and monitoring arrangements are presented below in Section 6.3.6.

6.3.6 Mitigation Measures – River Nore SPA

Mitigation measures are proposed for the Proposed Gathabawn Windfarm *(WF)* and for the Candidate Gathabawn Grid Connection *(GC)* in order to remove, avoid or reduce the impacts identified in the appropriate assessment to a level where they will no longer affect the integrity of the River Nore SPA. The mitigation measures and monitoring arrangements will be implemented through the Environmental Management Plan for the Whole Gathabawn Windfarm Project (EMP 2026). The EMP 2026 accompanies the subject planning application. These mitigation measures and monitoring arrangements are based on accepted best practice standards and our experience of supervising and reviewing the implementation and operation of such measures.

6.3.6.1 Disturbance, Displacement, or Mortality of Kingfisher

The following measures will be implemented during the construction and operational phase, through the Environmental Management Plan and under the supervision of the Environmental Clerk of Works (construction phase) and Asset Manager (operational phase), who will be responsible for monitoring the implementation and effectiveness of the mitigation and monitoring measures.

The residual effect of the Project on the integrity of the SAC follows in Section 6.3.7.

Table 6-4: Disturbance, Displacement, Mortality Measures

ID	Description of the Measure – disturbance, displacement, mortality of Kingfisher	Effectiveness of the measure
Design	No instream works within the boundary of the SPA; cables to be installed across the River Nore using HDD techniques, which put the cables several metres under the riverbed – to avoid direct effects to SPA habitats	This design measure minimised the extent of works in close proximity to sensitive aquatic habitat suitable for Kingfisher.
Design	No trenching works within riparian areas, and drill pits set back 30m from the riverbanks – to avoid direct effects to SPA habitats;	This design measure minimised the extent of works in close proximity to sensitive aquatic habitat suitable for Kingfisher.
Design	Underground Cables associated with the Parksgrove-Moatpark UGC are located in the public road verge where possible – to reduce extent of works within the grassland fields on the western side of the river;	This design measure minimised the extent of works in close proximity to sensitive aquatic habitat suitable for Kingfisher.
Design	An oversized cable will be installed for the Parksgrove-Moatpark UGC. This higher-capacity cable can support both the Gathabawn project and a future project, thereby avoiding consecutive construction works for an additional grid connection	This design measure avoids the need for future works in close proximity to sensitive aquatic habitat suitable for Kingfisher.
	Preconstruction Surveying and Monitoring	
WM05	Pre-construction surveys for Kingfisher nests will be carried out to determine if any new Kingfisher nests have been established in the interim period between the submission of the planning application and the commencement of construction works. These pre-construction confirmatory surveys will be carried out by a suitably qualified Ornithologist along the Ballyring Upper Stream, 300m upstream and downstream of facilitating works near the road bridge in Coolcashin/Garrydague and will be undertaken between March and April (early visit) and again between May and June (late visit).	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. In addition, the presence of an ornithologist and ecologist will facilitate the Project Manager to be alerted to any emergent changes during the construction phases.

ID	Description of the Measure – disturbance, displacement, mortality of Kingfisher	Effectiveness of the measure
GM59	Should a Kingfisher nest be identified within 300m of watercourse crossing points during pre-construction surveys (*see GM05*), then no construction activities will be permitted within 300m of Kingfisher nest locations during the bird breeding season (March – August inclusive) or until nesting is confirmed as complete following supervision by a suitably qualified Ornithologist.	Pre-construction monitoring prior to any works commencing for Kingfisher nest sites will allow works and plans to be the most accurate and prevent any mortality, disturbance and displacement impacts to breeding Kingfishers ex-situ of the SPA.
WM76 GM64	Noise and emissions from plant/machinery: Plant and machinery will not be permitted to idle. Machinery used intermittently will be shut down when not in use. The best means practicable, including proper maintenance of plant, will be employed to minimise the GHG emissions and noise produced by on-site operations. All vehicles and plant will be fitted with effective exhaust silencers. Noise dampeners will be fitted where required. To protect residential amenity, if any plant/machine is required to operate before 07:00hrs or after 19:00hrs Monday to Friday, or before 08:00hrs or after 13:00hrs on a Saturday, then it will be surrounded by an acoustic enclosure or portable screen.	This measure will minimise disturbance and displacement-based effects to Kingfisher.
GM55	Noise and emissions from plant/machinery: Plant and machinery will not be permitted to idle. Machinery used intermittently will be shut down when not in use. Any plant operating within 50m of the River Nore or within 200m of a bat roost (if any) will be fitted with noise dampeners and an acoustic enclosure or portable screen placed between the source of noise and the sensitive receptor.	This measure will minimise disturbance and displacement-based effects to Kingfisher.
WM30 GM27	Fencing of works areas: The boundaries of construction works areas in agricultural lands will be fenced to prevent the encroachment of construction phase personnel, machinery or materials beyond this boundary. Livestock proof fencing will be used, with landowner access maintained through the provision of openings along the boundary fences.	This measure will prevent any expansion of construction works impacts beyond the established construction works area boundary. This is an accepted measure to prevent works expanding beyond the consented areas for machinery and human activity where the pathways and potential impacts were not considered for additional adverse effects. This measure will ensure that the only adverse effects needing mitigation are the ones considered within the relevant works area boundaries provided for the development.
WM85	Roadside boundaries will be maintained during the construction phase and following the removal of the boundary to provide a widened transport area or to provide sightlines, a post and mesh boundary fence will be erected immediately.	This measure will prevent any expansion of construction works impacts beyond the established Construction Works Area Boundary. This is an accepted measure to prevent works expanding beyond the consented areas for machinery and human activity where the pathways and potential impacts were not considered for additional adverse effects. This measure will ensure that the only adverse effects needing mitigation are the ones considered

ID	Description of the Measure – disturbance, displacement, mortality of Kingfisher	Effectiveness of the measure
		within the relevant works area boundaries provided for the development.
GM69	Roadside boundaries will be maintained during the construction phase.	This measure will prevent any expansion of construction works impacts beyond the established Construction Works Area Boundary. This is an accepted measure to prevent works expanding beyond the consented areas for machinery and human activity where the pathways and potential impacts were not considered for additional adverse effects. This measure will ensure that the only adverse effects needing mitigation are the ones considered within the relevant works area boundaries provided for the development.
GM108	The Parksgrove-Moatpark UGC works will not be carried out during the period 1st April to 31st July inclusive	This measure avoids works being carried out during critical periods of the Kingfisher lifecycle
GM109	The Promoter of the of the Gathabawn Windfarm Project will liaise with other renewable energy developers where there is potential for the timing of groundworks associated with grid connection works to overlap within a sub-catchment. The Promoter will liaise with the other developer(s) with the aim of jointly agreeing the timing of works to provide a buffer of time between works. The Project Ecologist will consult with NPWS and advise on the timing of the works to avoid or reduce cumulative impacts to habitats and species in downstream waterbodies and in the Parksgrove/Moatpark area.	This measure reduces or avoids magnitude of impacts to SCI

6.3.6.2 Sediment/Contaminant-laden Runoff Measures

The following measures will be implemented during the construction phase, through the Environmental Management Plan 2026 under the supervision of the Ecological Clerk of Works, who along with the Environmental Manger will be responsible for monitoring the implementation and effectiveness of the mitigation and monitoring measures. The EMP 2026 also includes a Sediment & Runoff/Storm Water Control Plan, Fuel Management Plan, Waste Management Plan and Dust Minimisation Plan.

Table 6-5: Sediment/Contaminant-laden Runoff Measures

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
WF Design	Avoidance of on-site sensitive hydrology features by constraints mapping (i.e. buffer zones)	This design measure minimised the extent of works in close proximity to sensitive aquatic habitat suitable for Kingfisher.
WF Design	Construction and installation of the site drainage network	This is an accepted design measure to ensure the drainage of surface water runoff from construction, operational and decommissioning works flow to areas part of the sediment catch netting and other measures design to prevent any sediment run-off offsite into WFD waterbodies of local importance or higher within the wider receiving environment.
WF Design	Implementation of the Surface Water Management Plan	The SWMP will implement mitigation principles described in the EIAR designed to ensure that work is carried out with minimal impact on the water environment.
WF Design	At D2, the existing wet drainage channel will be permanently diverted for a short distance so that it does not interact with the turbine hardstand	This drain is an existing farm drain of low - negligible flow. The installation of the turbine hardstand require this drain be rerouted around the hardstand. This will allow the drain to flow without interaction with the new permanent artificial surfaces or the dirty water drains around the turbine hardstand area.
	Preconstruction Surveying & Monitoring	
WM02 GM02	Water Quality Monitoring: Confirmatory surface water quality monitoring will be carried out prior to the commencement of construction works at the water quality monitoring locations to determine the pre-construction status of surface water quality in downstream watercourses. This monitoring will include laboratory analysis of water samples which will be carried out by an independent and appropriately certified laboratory. The monitoring of water quality parameters and collection of samples will be undertaken by the Environmental Clerk of Works, who will be appropriately trained on the required monitoring methods and the use, calibration and maintenance of all monitoring equipment used. Records will be kept of biological and chemical monitoring undertaken carried out prior to the commencement of construction works.	Pre-construction monitoring prior to any works commencing near surface water locations will allow works and plans to be the most accurate to avoid and prevent contaminant or sediment release that could contribute impacts to the designated sites downstream of the Gathabawn Windfarm Project.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
WM11 GM11	The construction Method Statements to be developed by the construction contractors will take full account of the EMP including the mitigation and monitoring measures and will be reviewed by the Project Engineer and the Environmental Manager prior to the commencement of construction works.	Following the refinement, design and implementation of mitigation measures, minimal sediment or contaminants will enter downslope watercourses, habitats will be maintained through restoration and the construction and design of new culverts will ensure free passage of fish and aquatic species. Therefore, any potential negative impacts on downstream waterbodies, aquatic habitats or species will be Negligible.
	Construction Phase Monitoring Arrangements	
WM12 GM12	The Environmental Management Team will monitor construction works for compliance with the Environmental Management Plan. The project Environmental Management Team which includes an Environmental Clerk of Works, the Project Ecologist and specialists as required such as archaeologists, invasive species specialists and hydrologists, who are independent of the site contractors. The Environmental Management Team will report to the owner's Project Manager.	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. In addition, the presence of a ECoW and ecologist will facilitate the Project Manager to be alerted to any emergent changes during the construction phases (i.e. changes in soil integrity surrounding work area, weather changes impact timing of works at watercourses and drains)
WM14 GM14	Engineer Supervision: a suitably qualified engineer will supervise all excavations and construction works.	This will ensure that all such works are undertaken in accordance with best practise and in such a way as to minimise the potential for pollution (aquatic and air quality) and minimise disturbance.
WM15	Drainage Network Inspections: The windfarm drainage network will be inspected regularly during the construction phase under the following schedule: Daily visual inspections by the Contractor; weekly inspections by the Environmental Management team; Event based inspections by the Contractor as follows: >10 mm/hr (i.e. high intensity localised rainfall event); or >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day); or, rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week). All inspections will include all elements of the drainage systems to ensure that the systems are operating correctly. Inspections will examine the functioning of the various elements of the drainage system, and if evidence of sedimentation or scouring and any changes in the drainage water including discolouration, odour, oily sheen or the presence of litter, then the required corrective maintenance or actions will be identified and will be implemented immediately the Contractor. Weekly site inspections of the drainage network will be carried out by members of the Environmental Management Team during construction phase and for a period of 6 months following construction. If monitoring identifies sediment or contaminant polluted waters, then the Environmental Clerk of Works will establish the cause of the pollution, and if caused by the Project, then the Environmental Clerk of	Regular inspections of drainage network will facilitate the monitoring of any unforeseen sediment build up and allow construction crew to amend actions to prevent further build up and ensure drainage network is flowing neatly and cleanly in line with the intended pathways.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
	Works will have a 'stop-works' authority to temporarily stop construction works at the Project site and the Contractor will implement the necessary actions and measures to resolve the cause of the pollution.	
WM16 GM16	Surface water quality monitoring of watercourses downstream of the works will be carried out at regular intervals by the Environmental Management team during the construction phase. Laboratory analysis of water samples will also be undertaken as part of the monitoring programme by an independent and appropriately certified laboratory. The surface water monitoring locations and sampling programme are defined in the Surface Water Management Plan which forms part of the Gathabawn Windfarm Project Environmental Management Plan. Surface water quality monitoring will include Total Suspended Solids [TSS] monitoring, with readings above 25mg per litre (as specified in the Salmonid Waters Regulations, SI 293 of 1988) triggering a non-compliance issue, and resultant remedial action by the construction Contractor, in line with the EMP. Records will be kept of biological and chemical monitoring undertaken before, during and after the works, and will be made available upon request to any authorised person as defined under the Local Government (Water Pollution) Acts.	Regular inspections will facilitate the monitoring of any unforeseen sediment build up and allow construction crew to amend actions to prevent further build up and ensure the surface water network is flowing neatly and cleanly in line with the intended pathways.
WM20 GM20	Liaison with Contractor: The Project Ecologist will liaise with the Contractors on a weekly basis regarding the upcoming schedule of works and will advise the Contractors of any particular ecological protection requirements at specific locations on site.	This is a best practice measure to ensure all ecological receptors and sensitivities are considered for all works proposed and to ensure all targeted mitigation measures to prevent adverse effects on QI and SCI receptors are adhered to and implemented in full.
	Construction Phase Mitigation Measures	
WM30 GM27	Fencing of works areas: The boundaries of construction works areas in agricultural lands will be fenced to prevent the encroachment of construction phase personnel, machinery or materials beyond this boundary. Livestock proof fencing will be used, with landowner access maintained through the provision of openings along the boundary fences.	This measure will prevent any expansion of construction works impacts beyond the established Construction Works Area Boundary. This is an accepted measure to prevent works expanding beyond the consented areas for machinery and human activity where the pathways and potential impacts were not considered for additional adverse effects. This measure will ensure that the only adverse effects needing mitigation are the ones considered within the relevant works area boundaries provided for the development.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
GM28	Control of Movement of Machinery/Vehicles: Construction traffic, personnel and materials will be restricted to within the construction works area fence and will avoid moving onto areas not delineated on the site drawings.	This measure will prevent any expansion of construction works impacts beyond the established Construction works Area Boundary. This is an accepted measure to prevent works expanding beyond the consented areas for machinery and human activity where the pathways and potential impacts were not considered for additional adverse effects. This measure will ensure that the only adverse effects needing mitigation are the ones considered within the relevant works area boundaries provided for the development.
WM32 GM29	Land reinstatement will not be carried out during very wet weather or when the soil is waterlogged. If any compaction has occurred along the construction works area, these areas will be ploughed with a sub-soiler to loosen the subsoil layer.	Carrying out reinstatement works during very wet weather can result in sediment run off occurring in potential significant levels. All efforts should be to conduct work in weather and conditions that limit or reduce any such run-off potential. This measure will ensure even unlikely worst-case scenario effects are of negligible to no effect on the integrity of the SACs QIs.
WM33 GM30	Excavation of Materials: The excavation of earth materials during the construction stage will be kept to a minimum. The excavation of materials will be completed in accordance with best practices for the management and treatment of such materials. (i.e. British Standards BS6031:2009 Code of Practice for Earthworks, and MAFF (2000) Good Practice for Handling Soils).	Backfilling is a recommended and accepted measure to prevent any substantial change to the receiving environment at landscape level.
WM34 GM31	Storage of Overburden: During construction works, excavated material will be removed for temporary or permanent storage at designated berms. All storage berms will be placed more than 50m away from any watercourse or wet drainage channel. Temporary silt control methods such as silt fencing or curtains will be placed around all overburden storage areas and/or installed between the berms and local watercourses or wet drainage channel, depending on the location, and the existing vegetative between the berms and watercourse / drainage features will be left in place.	This measure will remove any potential for excavated sediment to experience surface run-off should a rain event occur before backfilling of excavations takes place. Silt control and vegetative buffers are key measures to avoid the potential for any adverse effects from both likely and unlikely impacts.
WM35	Protection of Soils in Berms; All storage berms will be graded and sealed following emplacement. Topsoil and subsoil will be stockpiled separately. Where possible, the upper vegetative layer (where still present) of excavated soil will be stored with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the stored spoil within the storage areas. Re-seeding will also be carried out in these areas. Measures such as interceptor ditches around the bases of these areas, and silt curtains will also be incorporated where required to prevent runoff of suspended solids, dust and soil erosion.	This measure will minimise the potential for mobilisation of silts, sediments and/or dust through the establishment of vegetation.
GM32	Protection of Soils in Berms; All storage berms will be graded and sealed following emplacement. Topsoil and subsoil will be stockpiled separately. Re-seeding of permanent berms will be carried out as soon as practical in these areas. Construction works areas along cable routes in agricultural lands will be reseeded as son as practical after reinstatement. Measures such as silt curtains around the bases of	This measure will minimise the potential for mobilisation of silts, sediments and/or dust through the establishment of vegetation.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
	these areas and sediment traps will also be incorporated to prevent runoff of suspended solids, dust and soil erosion, if required.	
WM37	No storage of excavated material on the public road along road widening sections of the L58141 or L18062. All excavations from public roads will be removed to licensed waste facilities in accordance with the Waste Management Plan.	Public road excavations will include concrete/Tarmac type material with other contaminant material likely present. Removing is material, removes the source of impact. The covering of this material in transit will prevent any dropping/spiling of material that would be considered to have a likely harmful effect on the receiving environment due to the carcinogenic nature of these materials.
WM41 GM34	Protection of watercourses and existing drains: Additional mitigation measures will be deployed within 50m of watercourses or wet drainage features, including the placement of silt trapping arrangements along preferential surface water flowpaths, and temporary drain blocking in existing drains. Works will not take place within this 50m zone during prolonged heavy or exceptional rainfall events.	These measures are additional and precautionary to avoid even a negligible event of sediment run-off resulting from construction works near watercourses or wet drainage features.
WM42 GM35	Weather forecasts will be consulted in advance of works. If there is heavy prolonged rainfall or if an exceptional rainfall event occurs, then construction works will cease until peak flows have subsided.	This measure will prevent any works taking place near watercourses during periods which are more likely to cause significant run-off, particularly associated with excavation works or transport of excavation material to storage locations.
WM15	Drainage Network Inspections: The windfarm drainage network will be inspected regularly during the construction phase under the following schedule: Daily visual inspections by the Contractor; weekly inspections by the Environmental Management team; Event based inspections by the Contractor as follows: >10 mm/hr (i.e. high intensity localised rainfall event); or >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day); or, rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week). All inspections will include all elements of the drainage systems to ensure that the systems are operating correctly. Inspections will examine the functioning of the various elements of the drainage system, and if evidence of sedimentation or scouring and any changes in the drainage water including discolouration, odour, oily sheen or the presence of litter, then the required corrective maintenance or actions will be identified and will be implemented immediately the Contractor. Weekly site inspections of the drainage network will be carried out by members of the Environmental Management Team during construction phase and for a period of 6 months following construction. If monitoring identifies sediment or contaminant polluted waters, then the Environmental Clerk of Works will establish the cause of the pollution, and if caused by the Project, then the Environmental Clerk of Works will have a 'stop-works' authority to temporarily stop construction works at the Project site and	These measures will avoid even a negligible event of sediment run-off resulting from the use of site roads and operation of borrow pits via surface runoff by capturing and treating water before it can interact with drains or watercourses downstream of the works.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
	the Contractor will implement the necessary actions and measures to resolve the cause of the pollution.	
GM15	Inspections of the drainage network around the Parksgrove Substation will be conducted regularly during the construction phase under the following schedule: Daily visual inspections by the Contractor; weekly inspections by the Environmental Management team; Event based inspections by the Contractor as follows: >10 mm/hr (i.e. high intensity localised rainfall event); or >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day); or, rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week). Inspections will examine the functioning of the various elements of the drainage system, and if evidence of sedimentation or scouring and any changes in the drainage water including discolouration, odour, oily sheen or the presence of litter, then the required corrective maintenance or actions will be identified and will be implemented immediately the Contractor.	These measures will avoid even a negligible event of sediment run-off resulting from the use of site roads and operation of borrow pits via surface runoff by capturing and treating water before it can interact with drains or watercourses downstream of the works.
WM44	On-Site Borrow Pits: It is proposed that bedrock won from the on-site borrow pits during the construction phase will be used to construct the sub-base layer of proposed upgraded and new access roads and hardstand areas. Once installed the sub-base layer will be overlain by a capping layer of clean high-grade bedrock, such as limestone.	This measure will ensure the long term integrity of the project artificial surfaces and minimise any dust/sediment runoff throughout the life cycle of the project.
WM45 GM37	Where dewatering of trenches or excavations is required, there will be no direct discharge of treated water into any watercourse or drain or directly onto adjacent habitats. Rather, all pumped water will be discharged via a silt bag or infiltration trench or settlement pond, as appropriate, to surrounding vegetation.	These measures will avoid even a negligible event of sediment run-off resulting from the site via surface runoff by capturing and treating water before it can interact with drains or watercourses downstream of the works.
GM38	Any replacement culverts under the public road (if required), will be sized to cope with a minimum 100-year flood event. In all cases, culverts will be oversized to allow mammals to pass through the culvert. The replacement of drain crossing structures will be carried out in accordance with the Office of Public Works (OPW) Guidelines Construction, Replacement or Alteration of Bridges and Culverts (2013), and also with the Department of Transport, Tourism & Sport Guidelines for Managing Openings in Public Roads (April 2017). Crossings will be designed to meet IFI's *Guidelines on Protection of Fisheries during Construction Works in and adjacent to Waters 2016* and *OPW's Design Guidance For Fish Passage On Small Barriers (2021).*	These measures will prevent the need for any instream/dam and overpump works to install culverts at the windfarm, and will avoid any changes to the existing structure and depths of the drains and stream .
WM46	Isolation of flow: Works in wet drainage channels will not be undertaken without isolation of flow within the drain. The water will be isolated from the works by over pumping, flume (pipe) or channel diversion methods.	These measures will prevent the mobilsation of sediments as a result of any in-stream construction activities.
GM39	In-stream works – isolation of flow and electrofishing: In-stream works at W3, W4 and W5 will not be undertaken without isolation of flow within the watercourse by over-pumping through a flume (pipe). The Project Ecologist will supervise all watercourse crossing works at W1 to W6 inclusive. A pre-works	These measures will prevent the mobilsation of sediments as a result of any in-stream construction activities.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
	survey will be carried out by the Project Ecologist to identify any electrofishing requirements at the watercourses, and if required electrofishing of the isolated section will be carried out under licence prior to the commencement of excavation works.	
GM40	Instream works at W3, W4 and W5 will be followed by site-specific reinstatement measures to ensure the restoration of flow character and morphology within the affected reach. Measures will include: bank stabilisation using boulder armour or willow/brush bank protection; reinstatement of bank slope and character, creation of compound channels where necessary; reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and planting along the riparian margin to stabilise banks, add flood protection and provide riparian buffer.	These measures will ensure that existing flow characteristics of watercourses will be reinstated and hydrological regimes downstream of the proposed operations will be unaffacted.
GM43	Only precast concrete or double skinned HDPE pipes will be used for new drain crossing structures, if required, along the Ballylehaun-Ballyring UGC. Only precast concrete chambers will be used at Joint Bays.	This measure is to avoid setting of wet cement in close proximity to watercourses where the integrity of the cement culvert could be compromised prior to or during installation.
WM18 GM18	Fit for Purpose: All plant and machinery which will be used during construction will be fit for purpose and in good working order prior to mobilisation to works areas. The plant and machinery will be regularly inspected by the Contractor for leaks and maintained in good working order for the duration of the works.	This measure is a key measure to ensure any accidental spills/leaks of hydrocarbons are caught immediately. This measure is majorly effective in removing the likelihood for machinery to be a source of habitat degradation impacts.
WM19 GM19	Fuel, oil and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage.	This measure is a key measure to ensure any accidental spills/leaks of hydrocarbons are caught immediately. This measure is majorly effective in removing the likelihood for storage areas to be a source of habitat degradation impacts.
WM47	Concrete control procedures will be implemented and will include the following: • No concrete batching will take place on site, all concrete will be ready-mixed and delivered just-in-time. • The pouring of concrete will be scheduled for dry days. If a sudden rainfall event should occur, then suitable covers will be ready and available at the pour site to cover the concrete. • The pour site will be kept free of standing water. • All operators involved in pouring concrete will be trained and experienced in working with concrete. • Run-off from wind turbine foundation concrete pours will not be permitted to flow over adjacent lands or enter drainage channels. The run-off will be contained within the foundation area and pumped into a skip to settle out; settled solids will be appropriately disposed of off-site.	This measure is to avoid wet cement being flushed out to watercourses where the integrity of the cement could be compromised prior to or during installation of hardstands and other foundations or flow into watercourses with connectivity to the SAC.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
	• The Contractor will not permit the discharge of cement contaminated waters to the construction phase drainage system, onto adjacent lands or directly to any artificial drain or watercourse. • Concrete trucks will be washed out at the supplier's facilities and not on site. The only concrete washing that will occur on site is the hand washing of the chutes at the rear of the trucks. Washing of chutes will only take place at the designated area and into a Roadside Concrete Washout unit.	
WM48	Refuelling control procedures will be implemented and will include the following: • On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser carried on a double axel refuelling trailer, will be refuelled off-site, and will be towed around the site by a 4x4 vehicle to where machinery is located. The 4x4 vehicle will carry fuel absorbent material and pads in the event of any accidental spillage. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations. • In addition, spill response apparatus including spill-kits and fuel absorbent mats will be stored in the cabin of each vehicle and operators will be fully trained in the use of this equipment and in the implementation of the Emergency Response Plan, as contained in the Environmental Management Plan. • The fuel bowser will be parked on a level area, away from main traffic activity, in a designated part of the construction compounds when not in use. Taps, nozzles or valves associated with mobile fuel bowser will be fitted with a lock system. Only designated trained and competent operatives will be authorised to refuel plant on site. A Permit to Fuel system will be put in place. • There will be no refuelling of vehicles or plant permitted within 100m of a watercourse or wet drainage channel or local spring/well.	This measure is a key measure to control the use/handling of fuels and oils, and to ensure any accidental spills/leaks of hydrocarbons are caught immediately . This measure is majorly effective in removing the likelihood for refuelling or use of oils/fuels on the construction site to be a source of habitat degradation impacts.
GM46	Along the cable routes, there will be no refuelling of plant or machinery within 100m of a watercourse or wet drainage channel or local spring/well.	This measure is a key measure to ensure any accidental spills/leaks of hydrocarbons are caught immediately and prior to any works adjacent to or within 100m of a surface water pathway. This measure is majorly effective in removing the likelihood for refuelling activities to be a source of habitat degradation impacts.
WM49 GM47	Storage of Fuels, Oils and Chemicals: All fuels or oils or chemicals, required during construction, will be stored in a designated, bunded, locked storage area within the temporary compounds.	This measure reduces the risk to water quality through isolation and containment of potential contaminative materials and by ensuring any accidental spills/leaks of hydrocarbons are caught

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
	All fuel, oil and chemical storage areas will be bunded appropriately to 110% of the volume of oils/fuels each area contains for the duration of the construction phase. All bunded areas will be fitted with a storm drainage system and an appropriate oil interceptor. Ancillary equipment such as hoses, pipes will be contained within the bunded area. Fuel, oil and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage. Safety data sheets for all chemicals used will be kept on-site. An emergency response plan to deal with accidental spillages will be contained within the Environmental Management Plan.	immediately. This measure is highly effective in removing the likelihood for accidental spillage to be a source of water quality and habitat degradation impact.
WM50 GM48	Overnight parking of plant and machinery will only be permitted at an existing hard-core surface at locations which are greater than 50m from watercourse/drainage features/Cullahill Mountain SAC. Drip trays and fuel traps will be used under and around parked plant and machinery to contain any potential leaks.	This measure reduces the risk to water quality through separation distance, and by ensuring any accidental spills/leaks of hydrocarbons are caught immediately. This measure is majorly effective in removing the likelihood for machinery to be a source of habitat degradation impacts.
WM50 GM48	Overnight parking of plant and machinery will only be permitted at an existing hard-core surface at locations which are greater than 50m from watercourse/drainage features/Cullahill Mountain SAC. Drip trays and fuel traps will be used under and around parked plant and machinery to contain any potential leaks.	This measure reduces the risk to water quality through separation distance, and by ensuring any accidental spills/leaks of hydrocarbons are caught immediately. This measure is majorly effective in removing the likelihood for machinery to be a source of habitat degradation impacts.
GM49	In-stream works (W3, W4 and W5) will only be undertaken during the IFI specified period (July, August and September) and will be carried out in accordance with the *Guidelines on Protection of Fisheries during Construction Works in and adjacent to Waters* (IFI, 2016). As requested by IFI during preplanning consultations for the windfarm, a site-specific method statement for each crossing will be provided to IFI and OPW at least one month ahead of works at each crossing.	This measure is an accepted means to ensure the drains are as dry as possible at the time of works, removing any downstream likelihood for the low magnitude impact to actually occur. Removing its likelihood. and therefore removing the adverse effect from occurring as a result for the project.
GM41	HDD Control of Works: The horizontal directional drilling works will be carried out by an experienced Drilling Contractor and supervised and managed by a competent and experienced Mud Engineer who understands the technicalities and challenges of drilling works. The Mud Engineer will advise the Construction Manager on the selection of competent drillers for the HDD works; monitor the watercourse bed during drilling works and will supervise the drilling works including the drilling pressures and the implementation of any contingency measures. From a surface water quality protection perspective, the area around the launch/reception pit, bentonite batching, pumping and recycling plant will be bunded using appropriate terram geotextile and/or sandbags in order to contain any spillages. Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area. Spills of drilling fluid will be cleaned up immediately and stored in an adequately sized watertight skip before being taken off-site to a suitably licensed waste facility.	These measures are accepted best practice to prevent and manage any breach to a riverbed during direction drilling works. Given the timing of the works will be at a period when this stream is dry, these measures are unlikely to be needed but will be sufficient to mitigate any potential breach or contamination event.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
	The HDD works from preparatory stage through to reinstatement will be supervised by the Project Ecologist. In the event of a break-out occurring, the Environmental Emergency Response Procedure for Frac-Out will be implemented which includes the following contingency measures; • In the event of break-out occurring in the stream/river bed, the rig will immediately shut off the pumps and the drilling assembly will be pulled off to reduce annular pressures; • In the event of break-out on the road an excavator will be available to dig a pit to contain fluid with vacuum trucks/pumps available to transfer drill fluid from the containment point back to the recycling point; and in either scenario, drilling fluid additives designed to plug the formation will be introduced to the circulation system and let set. Environmental Emergency Response Procedures are included in the Whole Gathabawn Windfarm Project Environmental Management Plan.	
	Operational Phase Monitoring and Mitigation	
WM102 GM93	Environmental Management Plan for the Operational Phase: Following the completion of the construction and commissioning of the Project, the Environmental Management Plan will be updated, and the operation of the Gathabawn Windfarm Project will be carried out in accordance with the updated Plan. A suitably qualified Environmental Manager will be appointed by the Project Promoter, and it will be their responsibility to ensure that the EMP is implemented through liaising with the Asset Manager and by carrying out regular audits on EMP compliance. The EMP will be an important contract document for the Asset Management contractor who will be contractually obliged to comply with the EMP and the requirements of the Environmental Manager.	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately during the operation stage. In addition, the presence of an Environmental Manager will facilitate the Project Manager to be alerted to any emergent changes during the operation phase.
WM112	Control of vehicle/machinery movement: Operational phase traffic, personnel and materials will be restricted to the windfarm site roads, and hardstanding areas.	This measure will minimise mortality effects to Kingfisher.
	Decommissioning Phase Monitoring and Mitigation	
WM132 GM98	Noise and GHG emissions from plant/machinery: Plant and machinery will not be permitted to idle. Machinery used intermittently will be shut down when not in use. All vehicles and plant will be fitted with effective exhaust silencers. Noise dampeners will be fitted where required. The best means practicable, including proper maintenance of plant, will be employed to minimise noise and GHG emissions.	This measure will minimise disturbance and displacement effects to Kingfisher within or ex-situ of River Nore SPA.
WM133	Fuel Controls: Overnight parking of plant and machinery will only be permitted at the turbine locations. There will be no refuelling of vehicles or plant permitted within 100m of a watercourse or drainage feature or within 100m of the Cullahill Mountain SAC or the Gales Hill Nature Reserve. Any re-fuelling of	This measure reduces the risk to water quality through separation distance, and by ensuring any accidental spills/leaks of hydrocarbons are caught immediately. This measure is majorly

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
	machinery on site will be carried out using a mobile double skinned fuel bowser which will carry fuel absorbent material and pads in the event of any accidental spillages. In addition, spill response apparatus including 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.	effective in removing the likelihood for machinery to be a source of habitat degradation impacts.
WM135	Land reinstatement: Following the completion of decommissioning, the hardcore areas at the turbines and at widened site entrances and facilitating works locations will be covered over, using the soil in the deposition areas. The areas will be reseeded/replanted as appropriate to the location. The areas will we fenced from livestock until revegetation has occurred. Land reinstatement works will not take place during periods of prolonged heavy rain or exceptional rainfall events or when the soil is waterlogged.	The measure will be effective by restoring disturbed areas to their pre-construction land use and supporting the rapid re-establishment of vegetation. Reusing stored soil and reseeding/replanting will minimise exposed ground and the potential for soil erosion, while fencing areas from livestock and avoiding works during wet or waterlogged conditions will protect the reinstated areas and promote successful revegetation.
GM106	Reinstatement Works: Following cable pulling works, the covers will be replaced on the chambers, and ground above the chamber reinstated as appropriate to the location. If in agricultural lands, the area will be reseeded as appropriate and fenced from livestock until revegetation has occurred. Land reinstatement works will not take place during periods of prolonged heavy rain or exceptional rainfall events or when the soil is waterlogged.	The measure will be effective by restoring disturbed areas to their pre-construction land use and supporting the rapid re-establishment of vegetation. Reusing stored soil and reseeding/replanting will minimise exposed ground and the potential for soil erosion, while fencing areas from livestock and avoiding works during wet or waterlogged conditions will protect the reinstated areas and promote successful revegetation.
WM136 GM107	Revegetation: The Asset Manager and Project Ecologist will check the rate of re-vegetation of exposed soils and reinstated areas quarterly following decommissioning works (until revegetation is attained). Where revegetation is slower than expected, that area will be prepared and re-seeded in an appropriate manner.	The measure will be effective by restoring disturbed areas to their pre-construction land use and supporting the rapid re-establishment of vegetation.
GM109	The Promoter of the of the Gathabawn Windfarm Project will liaise with other renewable energy developers where there is potential for the timing of groundworks associated with grid connection works to overlap within a sub-catchment. The Promoter will liaise with the other developer(s) with the aim of jointly agreeing the timing of works to provide a buffer of time between works. The Project Ecologist will consult with NPWS and advise on the timing of the works to avoid or reduce cumulative impacts to habitats and species in downstream waterbodies and in the Parksgrove/Moatpark area.	The measure reduces the magnitude of cumulative impacts to SCI species.

6.3.6.3 Spread of Invasive Species Measures

The following measures will be implemented to reduce the risk of spreading invasive species during all phases of the Project. These measure will be implemented through the Environmental Management Plan and under the supervision of the Environmental Clerk of Works during the construction phase, and under the supervision of the Asset Manager during the operational and decommissioning phases. The Environmental Clerk of Works and Asset Manager will be responsible for monitoring the implementation and effectiveness of the mitigation and monitoring measures.

The residual effect of the Project on the integrity of the SAC follows in Section 6.3.7.

Table 6-6: Invasive Species Measures

ID	Description of the Measure - Invasive Species	Effectiveness of the measure
	Pre-Construction Surveys	
WM03 GM03	Pre-construction surveys for invasive species will be carried out to determine if any new infestations of invasive species have been established in the interim period between the submission of the planning application and the commencement of construction works. These pre-construction confirmatory surveys for invasive species will be carried out at the construction works areas plus 7m, by the Project Ecologist, to accurately determine the extent of new invasive species infestations. Mapping, showing the most up to date distribution and extent of each infestation, will be distributed to the Environmental Clerk of Works and to the Project Engineer.	These pre-construction surveys will confirm the identified locations of invasive species have not expanded or changed between the time of submission for planning and the commencement of construction works.
	Construction Phase Monitoring and Surveys	
WM12 GM12	The Environmental Management Team will monitor construction works for compliance with the Environmental Management Plan. The project Environmental Management Team which includes an Environmental Clerk of Works, the Project Ecologist and specialists as required such as archaeologists, invasive species specialists and hydrologists, who are independent of the site contractors. The Environmental Management Team will report to the owner's Project Manager.	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. In addition, the presence of a ECoW and ecologist will facilitate the Project Manager to be alerted to any emergent changes during the construction phases (i.e. changes in soil integrity surrounding work area, weather changes impact timing of works at watercourses and drains)
WM20 GM20	Liaison with Contractor: The Project Ecologist will liaise with the Contractors on a weekly basis regarding the upcoming schedule of works and will advise the Contractors of any particular ecological protection requirements at specific locations on site.	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. In addition, the presence of a ECoW and ecologist will facilitate the Project Manager to be alerted to any emergent changes during the construction phases (i.e. appearance of new invasive plant species locations)
WM22 GM21	Any excavation works in close proximity (7m) to an invasive species infestation location will be carried out under the direct supervision of an invasive species specialist ecologist.	These are best practice measures related to managing invasive species that change their locations, or related to new infestations which have established, between the time of surveying for invasive plant species and the commencement of construction works.
WM23	Invasive Species Control: Visual inspections will be carried out by the Contractor on all machinery and equipment (particularly for machinery and equipment which has come into contact with water	This is the accepted practice to ensure machinery and personnel do not inadvertently cause the transportation of invasive species either

ID	Description of the Measure - Invasive Species	Effectiveness of the measure
GM22	or soils) for evidence of attached plant or animal material, or adherent mud or debris. Any attached or adherent material will be removed before entering or leaving the site, securely stored away from traffic for removal to a contaminated waste Community Liaison Officer bin at the temporary constructions.	within the construction area sites or across the wider receiving environment.
	Construction Phase Mitigation Measures	
WM31	Control of Movement of Machinery/Vehicles: Construction traffic, personnel and materials will be restricted to the hardcore surfaces, particularly with respect to the newly constructed access roads. This means that machinery will be kept on the windfarm site roads and hardstanding areas, and, aside from advancing excavations, will avoid moving onto areas not delineated on the site drawings.	This is the accepted practice to ensure machinery and personnel do not inadvertently cause the transportation of invasive species either within the construction area sites or across the wider receiving environment
GM28	Control of Movement of Machinery/Vehicles: Construction traffic, personnel and materials will be restricted to within the construction works area fence and will avoid moving onto areas not delineated on the site drawings.	This is the accepted practice to ensure machinery and personnel do not inadvertently cause the transportation of invasive species either within the construction area sites or across the wider receiving environment
WM51 GM50	Treatment/management of invasive species infestations: Any infestations of Japanese knotweed or other high-impact invasive species within 7m of works will be covered with high density polyethylene grass carpet terram prior to any works commencing at the location. The covering of any new infestations will only be carried out under the direct supervision of a specialist invasive species ecologist, and works within 7m of the infestation will be under the direct supervision of this specialist invasive species ecologist.	This biosecurity measure is in line with best practice for construction works to prevent the expansion and/or spread of invasive plant material.
	Operational Phase Monitoring and Mitigation	
WM101	Invasive Species Survey during major maintenance: Prior to facilitating works for turbine component transportation, the works locations will be surveyed for invasive plant species. Should a new infestation be identified, then the works within 7m of the infestation will be carried out under the direct supervision of an ecologist with prior experience of invasive species.	This biosecurity measure is in line with best practice for operation works to prevent the expansion and/or spread of invasive plant material.
	Decommissioning Phase Monitoring and Mitigation	
WM127GM96	Invasive Species Survey: Before any decommissioning works commence, the works locations will be surveyed for invasive plant species infestations and should any be present within 7m of the works, then the works within 7m of the infestation will be under the direct supervision of an ecologist with prior experience of invasive species.	This biosecurity measure is in line with best practice for decommissioning works to prevent the expansion and/or spread of invasive plant material.
GM92	Invasive Species: Before any reopening of jointing chambers, works locations will be surveyed for invasive plant species infestations and should any be present within 7m of the works, then the works within 7m of the infestation will be under the direct supervision of an ecologist with prior experience of invasive species.	This biosecurity measure is in line with best practice for decommissioning works to prevent the expansion and/or spread of invasive plant material.

6.3.6.4 Monitoring of the Implementation and Effectiveness of the Mitigation Measures

Monitoring:

The construction of the Whole Gathabawn Windfarm Project will be carried out in accordance with the Environmental Management Plan 2026, which accompanies the planning application. The Environmental Management Plan 2026 includes a Sediment & Erosion/Storm Water Control Plan, a Fuel Management Plan, a Waste Management Plan, a Dust Minimisation Plan and an Invasive Species Management Plan. The implementation of the Environmental Management Plan, including all of the mitigation and monitoring measures proposed herein, will be monitored by an Environmental Clerk of Works and an Environmental Manager during the construction works.

Weekly auditing of the construction works for compliance with the Mitigation Measures will be carried out by the Environmental Clerk of Works, who will also monitor construction works in order to Identify any unforeseen adverse effects to the environment. The Environmental Clerk of Works will be appointed by the Project Promoter, be independent of the Construction Contractor, and will report directly to the Promoters Project Manager.

Once the Gathabawn Windfarm Project is constructed, the environmental management of the project will be carried out by the Gathabawn Windfarm site manager, who will be responsible for the implementation of mitigation and monitoring measures during any operational maintenance and decommissioning works.

On-going monitoring of the implementation and effectiveness of the Mitigation Measures will ensure that the above mitigation measures are implemented and working effectively which will ensure that the Gathabawn Windfarm Project will not adversely affect the integrity of a European Site.

Effectiveness:

It is considered that the measures provided in Section 6.3.5 above are appropriate and comprehensive to prevent any potential direct and indirect effects from resulting in even a negligible magnitude adverse effect on Kingfisher of the River Nore SPA.

Given the likelihood of sediment and contamination-laden run-off to occur as a result of construction works associated with the Candidate Gathabawn Grid Connection, the mitigation measures provided above are appropriate and comprehensive to prevent any such effects from resulting in even a negligible magnitude adverse effect on Kingfisher.

The spread of invasive species is a common and increasing impact source from developments across Ireland. In the absence of mitigation, this impact almost always poses low to high magnitude adverse effects on sensitive receptors. The measures provided in Section 6.3.5 above are accepted best practice to manage and prevent this impact from occurring. As such, these measures remove any potential for invasive species spread within the boundaries of the SPA or in suitable habitat ex-situ to the SPA.

Following the implementation of the mitigation measures, it can be concluded that the Proposed Gathabawn Windfarm will not result in adverse effects on the conservation objectives, QI habitat or typical species of the River Nore SPA in circumstances where no reasonable scientific doubt remains.

6.3.7 Evaluation of the Residual Effect of the proposed development on the Integrity of the River Nore SPA [004233]

Using the checklist in the table below and taking into account the mitigation measures and monitoring arrangements for the Proposed Gathabawn Windfarm and the Candidate Gathabawn Grid Connection, presented in Section 6.3.6, the Proposed Gathabawn Windfarm development is examined, both alone and in-combination with the other parts of the Whole Gathabawn Windfarm Project and with the other projects, plans and land-use activities, for adverse impacts on the integrity of the River Nore SPA.

AA Table 17: Integrity of Site checklist for the River Nore SPA (Site Code: 004233)

***Does the project or plan have the potential to*:**	**(Yes/No)**
- cause delays in progress towards achieving the conservation objectives of the site?	No
- interrupt progress towards achieving the conservation objectives of the site?	No
- disrupt those factors that help to maintain the favourable conditions of the site?	No
- interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	No
- change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	No
- interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No
- reduce the area of key habitats?	No
- reduce the population of key species?	No
- change the balance between key species?	No
- reduce diversity of the site?	No
- result in disturbance that could affect population size or density or the balance between key species?	No

In summary,

as no adverse impacts on the integrity of the River Nore SPA are predicted for the Proposed Gathabawn Windfarm, whether considered alone or in-combination with the other parts of the whole Gathabawn Windfarm Project and with other projects, plans or land-use activities, it can be objectively concluded that Proposed Gathabawn Windfarm will not result in adverse impacts on the integrity of the River Nore SPA, in circumstances where no reasonable scientific doubt remains.

6.4 River Barrow and River Nore SAC [002162]

This site comprises stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains, and it also includes the tidal elements and estuary as far downstream as Creadun Head in Waterford. The site passes through eight counties (NPWS, 2024). This SAC supports many habitats and species and is important for Irish ecology. The QI's present on the site have been discussed in more detail below.

The Site Synopsis for this SAC site is included in full in Appendix I1 of this AA Report.

The site is a Special Area of Conservation (SAC) selected for the following habitats and species:

1016 Desmoulin's Whorl Snail Vertigo moulinsiana

1029 Freshwater Pearl Mussel Margaritifera margaritifera

1092 White-clawed Crayfish Austropotamobius pallipes

1095 Sea Lamprey Petromyzon marinus

1096 Brook Lamprey Lampetra planeri

1099 River Lamprey Lampetra fluviatilis

1103 Twaite Shad Alosa fallax fallax

1106 Salmon Salmo salar

1130 Estuaries

1140 Mudflats and sandflats not covered by seawater at low tide

1170 Reefs

1310 Salicornia and other annuals colonising mud and sand

1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)

1355 Otter Lutra lutra

1410 Mediterranean salt meadows (Juncetalia maritimi)

1421 Killarney Fern Trichomanes speciosum

3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

4030 European dry heaths

6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

7220 Petrifying springs with tufa formation (Cratoneurion)*

91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles

91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*

6.4.1 Conservation Objectives, Pressures/Threats

The site-specific conservation objectives of the River Barrow and River Nore SAC aim to define favourable conservation condition for the particular habitats and species at that site, as outlined on the table below.

The Conservation Objectives, and Standard Data Form for the River Barrow and River Nore SAC [002162] are reproduced in Appendix I2, and available in full on the National Parks & Wildlife Service website at https://www.npws.ie/protected-sites, and should be read in conjunction with any other supporting documentation on the website or as referenced in the Conservation Objective Series for the SAC.

Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]	
Objective:	To maintain the favourable conservation condition of Desmoulin's whorl snail in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Attribute	Target
Distribution: occupied sites	No decline. Two known sites: Borris Bridge, Co. Carlow S711503; Boston Bridge, Kilnaseer S338774, Co. Laois. See map 7
Population size: adults	At least 5 adult snails in at least 50% of samples
Population density	Adult snails present in at least 60% of samples per site
Area of occupancy	Minimum of 1ha of suitable habitat per site
Habitat quality: vegetation	90% of samples in habitat classes I and II as defined in Moorkens & Killeen (2011)
Habitat quality: Soil moisture levels	90% of samples in moisture class 3-4 as defined in Moorkens & Killeen (2011)
Nore freshwater pearl mussel (*Margaritifera durrovensis*) [1990]	
Objective:	To restore the favourable conservation condition of the Nore freshwater pearl mussel in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Distribution:	Maintain at 15.5km. See map 7
Population size: adult mussels	Restore to 5,000 adult mussels
Population structure: recruitment	Restore to at least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length
Population structure: adult mortality	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution
Habitat extent:	Restore suitable habitat in length of river corresponding to distribution target (15.5km; see map 7) and any additional stretches necessary for salmonid spawning
Water quality: Macroinvertebrates and phytobenthos (diatoms)	Restore water quality- macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93
Substratum quality: Filamentous algae (macroalgae), macrophytes (rooted higher plants)	Restore substratum quality- filamentous algae: absent or trace (<5%); macrophytes absent or trace (<5%)
Substratum quality: sediment	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment
Substratum quality: oxygen availability	Restore to no more than 20% decline from water column to 5cm depth in substrate
Hydrological regime: flow variability	Restore appropriate hydrological regimes
Host fish:	Maintain sufficient juvenile salmonids to host glochidial larvae
Freshwater pearl mussel (*Margaritifera margaritifera*) [1029]	
The status of the freshwater pearl mussel (*Margaritifera margaritifera*) as a qualifying Annex II species for the River Barrow and River Nore SAC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this species. Please note that the Nore freshwater pearl mussel (*Margaritifera durrovensis*) remains a qualifying species for this SAC. This document contains a conservation objective for the latter species.	
White-clawed Crayfish (*Austropotamobius pallipes*) [1092]	

Objective:	To maintain the favourable conservation condition of White-clawed Crayfish in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Attribute	Target
Distribution	No reduction from baseline. See map 7
Population structure: recruitment	Juveniles and/or females with eggs in at least 50% of positive samples
Negative indicator species	No alien crayfish species
Disease	No instances of disease
Water quality	At least Q3-4 at all sites sampled by EPA
Habitat quality: heterogeneity	No decline in heterogeneity or habitat quality
Sea Lamprey (*Petromyzon marinus*) [1095]	
Objective:	To restore the favourable conservation condition of Sea Lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Distribution: extent of anadromy	Greater than 75% of main stem length of rivers accessible from estuary
Population structure of juveniles	At least three age/size groups present
Juvenile density in fine sediment	Juvenile density at least 1/m²
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds
Availability of juvenile habitat	More than 50% of sample sites positive
Brook Lamprey (*Lampetra planeri*) [1096]	
Objective:	To restore the favourable conservation condition of Brook Lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Distribution	Access to all water courses down to first order streams
Population structure of juveniles	At least three age/size groups of brook/river lamprey present
Juvenile density in fine sediment	Mean catchment juvenile density of brook/river lamprey at least 2/m²
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds
Availability of juvenile habitat	More than 50% of sample sites positive
River Lamprey (*Lampetra fluviatilis*) [1099]	
Objective:	To restore the favourable conservation condition of River Lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Distribution: extent of anadromy	Greater than 75% of main stem and major tributaries down to second order accessible from estuary
Population structure of juveniles	At least three age/size groups of river/brook lamprey present
Juvenile density in fine sediment	Mean catchment juvenile density of brook/river lamprey at least 2/m²
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds
Availability of juvenile habitat	More than 50% of sample sites positive
Twaite Shad (*Alosa fallax*) [1103]	
Objective:	To restore the favourable conservation condition of Twaite Shad in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Attribute	Target
Distribution: extent of anadromy	Greater than 75% of main stem length of rivers accessible from estuary
Population structure: age classes	More than one age class present
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning habitats
Water quality: oxygen levels	No lower than 5mg/l
Spawning habitat quality: Filamentous algae; macrophytes; sediment	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plant) growth

Atlantic Salmon (*Salmo salar*) (only in fresh water) [1106]	
Objective:	To restore the favourable conservation condition of Salmon in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Distribution: extent of anadromy	100% of river channels down to second order accessible from estuary
Adult spawning fish	Conservation limit (CL) for each system consistently exceeded
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling
Out-migrating smolt abundance	No significant decline
Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes
Water quality	At least Q4 at all sites sampled by EPA
Estuaries [1130]	
Objective:	To maintain the favourable conservation condition of Estuaries in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Habitat area	The permanent habitat area is stable or increasing, subject to natural processes. See map 2
Community distribution	The following sediment communities should be maintained in a natural condition: Muddy estuarine community complex; Sand to muddy fine sand community complex; Fine sand with *Fabulina fabula* community. See map 4
Community extent	Maintain the natural extent of the Sabellaria alveolata reef, subject to natural process. See map 4
Mudflats and sandflats not covered by seawater at low tide [1140]	
Objective:	To maintain the favourable condition of Mudflats and sandfalts not covered by seawater at low tide in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Habitat area	The permanent habitat area is stable or increasing, subject to natural processes. See map 3
Community distribution	The following sediment communities should be maintained in a natural condition: Muddy estuarine community complex, Sand to muddy fine sand community complex. See map 4
Salicornia and other annuals colonizing mud and sand [1310]	
Objective:	To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Habitat area	Area stable or increasing, subject to natural processes, including erosion and succession. For the one sub-site mapped: Ringville – 0.03ha. See map 5
Habitat distribution	No decline, subject to natural processes. See map 5
Physical structure: sediment supply	Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions
Physical structure: flooding regime	Maintain natural tidal regime
Physical structure: creeks and pans	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession
Vegetation structure: zonation	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession. See map 5
Vegetation structure: vegetation height	Maintain structural variation within sward
Vegetation structure: vegetation cover	Maintain more than 90% of area outside creeks vegetated.
Vegetation composition: typical species and sub-communities	Maintain range of sub- communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009).
Vegetation structure: negative indicator species: *Spartina anglica*	No significant expansion of *Spartina*. No new sites for this species and an annual spread of less than 1% where it is already known to occur
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	

Objective:	To restore the favourable conservation condition of Atlantic salt meadows in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Attribute	Target
Habitat area	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: Dunbrody Abbey – 1.25ha, Killowen – 2.59ha, Rochestown – 17.50ha, Ringville – 6.70ha. See map 5
Habitat distribution	No decline, subject to natural processes. See map 5
Physical structure: sediment supply	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions
Physical structure: flooding regime	Maintain natural tidal regime
Physical structure: creeks and pans	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession
Vegetation structure: zonation	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession. See map 5
Vegetation structure: vegetation height	Maintain structural variation within sward
Vegetation structure: vegetation cover	Maintain more than 90% of area outside creeks vegetated
Vegetation composition: typical species and sub-communities	Maintain range of sub- communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009)
Vegetation structure: negative indicator species: *Spartina anglica*	No significant expansion of Spartina. No new sites for this species and an annual spread of less than 1% where it is already known to occur
Otter (*Lutra lutra*) [1355]	
Objective:	To restore the favourable conservation condition of Otter in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Distribution	No significant decline
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 122.8ha above high-water mark (HWM) and 1136.0ha along riverbanks / around ponds
Extent of marine habitat	No significant decline. Area mapped and calculated as 857.7ha
Extent of freshwater (river) habitat	No significant decline. Area mapped and calculated as 616.6km
Extent of freshwater (lake) habitat	No significant decline. Area mapped and calculated as 2.6ha
Couching sites and holts	No significant decline
Fish biomass available	No significant decline
Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	
Objective:	To restore the favourable conservation condition of Mediterranean salt meadows in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Attribute	Target
Habitat area	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: Dunbrody Abbey – 0.08ha, Rochestown – 0.04ha, Ringville – 6.70ha. See map 5
Habitat distribution	No decline, subject to natural processes. See map 5
Physical structure: sediment supply	Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions
Physical structure: flooding regime	Maintain natural tidal regime
Physical structure: creeks and pans	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession
Vegetation structure: zonation	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession. See map 5
Vegetation structure: vegetation height	Maintain structural variation within sward
Vegetation structure: vegetation cover	Maintain more than 90% of area outside creeks vegetated.

Vegetation composition: typical species and sub-communities	Maintain range of sub- communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)
Vegetation structure: negative indicator species: *Spartina anglica*	No significant expansion of Spartina. No new sites for this species and an annual spread of less than 1% where it is already known to occur
Killarney Fern (*Trichomanes speciosum*) [1421]	
Objective:	To maintain the favourable conservation condition of Killarney Fern in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Distribution	No decline. Three locations are known, with three colonies of gametophyte and one sporophyte colony. See map 7
Population size	Maintain at least three colonies of gametophyte, and at least one sporophyte colony of over 35 fronds
Population structure: juvenile fronds	At least one of the locations to have a population structure comprising sporophyte, unfurling fronds, 'juvenile' sporophyte and gametophyte generations
Habitat extent	No loss of suitable habitat, such as shaded rock crevices, caves or gullies in or near to, known colonies. No loss of woodland canopy at or near to known locations
Hydrological conditions: visible water	Maintain hydrological conditions at the locations so that all colonies are in dripping or damp seeping habitats, and water is visible at all locations
Hydrological conditions: humidity	No increase. Presence of desiccated sporophyte fronds or gametophyte mats indicates conditions are unsuitable
Light levels: shading	No changes due to anthropogenic impacts
Invasive species	Absent or under control
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	
Objective:	To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Habitat distribution	No decline, subject to natural processes
Habitat area	Area stable or increasing, subject to natural processes
Hydrological regime: river flow	Maintain appropriate hydrological regimes
Hydrological regime: groundwater discharge	The groundwater flow to the habitat should be permanent and sufficient to maintain tufa formation
Substratum composition: Particle size range	The substratum should be dominated by large particles and free from fine sediments
Water chemistry: minerals	The groundwater and surface water should have sufficient concentrations of minerals to allow deposition and persistence of tufa deposits
Water quality: suspended sediment	The concentration of suspended solids in the water column should be sufficiently low to prevent excessive deposition of fine sediments
Water quality: nutrients	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition
Vegetation composition: typical species	Typical species of the relevant habitat sub-type should be present and in good condition
Floodplain connectivity	The area of active floodplain at and upstream of the habitat should be maintained
European dry heaths [4030]	
Objective:	To maintain the favourable conservation condition of European dry heaths in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Attribute	Target
Habitat distribution	No decline from current habitat distribution, subject to natural processes
Habitat area	Area stable or increasing, subject to natural processes. Habitat area is not known but estimated as less than 400ha of the area of the SAC, occurring in dispersed locations

Physical structure: free-draining, acid, low nutrient soil; rock outcrops	No significant change in soil nutrient status, subject to natural processes. No increase or decrease in area of natural rock outcrop
Vegetation structure: sub-shrub indicator species	Cover of characteristic sub- shrub indicator species at least 25%: gorse (*Ulex europaeus*) and where rocky outcrops occur bilberry (*Vaccinium myrtillus*) and woodrush (*Luzula sylvatica*). Some rock outcrops support English stonecrop (*Sedum anglicum*), sheep's bit (*Jasione montana*) and wild madder (Rubia peregrina) as well as important moss and lichen assemblages
Vegetation structure: senescent gorse	Cover of senescent gorse less than 50%
Vegetation structure: browsing	Long shoots of bilberry with signs of browsing collectively less than 33%
Vegetation structure: native trees and shrubs	Cover of scattered native trees and shrub less than 20%
Vegetation composition: positive indicator species	Number of positive indicator species at least 2 e.g., gorse and associated dry heath/ acid grassland flora
Vegetation structure: positive indicator species	Cover of positive indicator species at least 60%. This should include plant species characterisitic of dry heath in this SAC including gorse, bilberry and associated acid grassland flora
Vegetation composition: bryophyte and non-crustose lichen species	Number of bryophyte or non- crustose lichen species present at least 2
Vegetation composition: bracken (*Pteridium aquilinum*)	Cover of bracken less than 10% - however see 'Notes'
Vegetation structure: weedy negative indicator species	Cover of agricultural weed species (negative indicator species) less than 1%
Vegetation composition: non-native species	Cover of non-native species less than 1%.
Vegetation composition: rare/scarce heath species	No decline in distribution or population sizes of rare, threatened or scarce species, including Greater Broomrape (*Orobanche rapum-genistae*) and the legally protected clustered clover (*Trifolium glomeratum*)
Vegetation structure: disturbed bare ground	Cover of disturbed bare ground less than 10% (but if peat soil less than 5%)
Vegetation structure: burning	No signs of burning within sensitive areas
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	
Objective:	To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Attribute	Target
Habitat distribution	No decline, subject to natural processes
Habitat area	Area stable or increasing, subject to natural processes
Hydrological regime: Flooding depth/height of water table	Maintain appropriate hydrological regimes
Vegetation structure: sward height	30-70% of sward is between 40 and 150cm in height
Vegetation compositions: broadleaf herb: grass ratio	Broadleaf herb component of vegetation between 40 and 90%
Vegetation composition: typical species	At least 5 positive indicator species present
Vegetation composition: negative indicator species	Negative indicator species, particularly non-native invasive species, absent or under control- NB Indian balsam (*Impatiens glandulifera*), monkeyflower (*Mimulus guttatus*), Japanese knotweed (*Fallopia japonica*) and giant hogweed (*Heracleum mantegazzianum*)
*Petrifying springs with tufa formation (*Cratoneurion*) [7220]	

Objective:	To maintain the favourable conservation condition of Petrifying springs with tufa formation (*Cratoneurion*) in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Habitat area	Area stable or increasing, subject to natural processes
Habitat distribution	No decline. See map 6 for recorded location
Hydrological regime: height of water table; water flow	Maintain appropriate hydrological regimes
Water quality	Maintain oligotrophic and calcareous conditions
Vegetation composition: typical species	Maintain typical species
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	
Objective:	To restore the favourable conservation condition of Old oak woodland with Ilex and Blechnum in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Habitat area	Area stable or increasing, subject to natural processes, at least 85.08ha for sub-sites surveyed. See map 6
Habitat distribution	No decline. Surveyed locations shown on map 6
Woodland size	Area stable of increasing. Where topographically possible, "large" woods at least 25ha in size and “small” woods at least 3ha in size
Woodland structure: cover and height	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi- mature trees and shrubs; and well-developed herb layer
Woodland structure: community diversity and extent	Maintain diversity and extent of community types
Woodland structure: natural regeneration	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy
Woodland structure: dead wood	At least 30m³/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter
Woodland structure: veteran trees	No decline
Woodland structure: indicators of local distinctiveness	No decline
Vegetation composition: native tree cover	No decline. Native tree cover not less than 95%
Vegetation composition: typical species	A variety of typical native species present, depending on woodland type, including sessile oak (*Quercus petraea*) and birch (*Betula pubescens*)
Vegetation composition: negative indicator species	Negative indicator species, particularly non-native invasive species, absent or under control
*Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	
Objective:	To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:
Attribute	Target
Habitat area	Area stable or increasing, subject to natural processes, at least 181.54ha for sites surveyed. See map 6
Habitat distribution	No decline. Surveyed locations shown on map 6
Woodland size	Area stable of increasing. Where topographically possible, "large" woods at least 25ha in size and “small” woods at least 3ha in size
Woodland structure: cover and height	Diverse structure with a relatively closed canopy containing mature trees; sub canopy layer with semi- mature trees and shrubs; and well-developed herb layer
Woodland structure: community diversity and extent	Maintain diversity and extent of community types
Woodland structure: natural regeneration	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy

Hydrological regime: Flooding depth/height of water table	Appropriate hydrological regime necessary for maintenance of alluvial vegetation
Woodland structure: dead wood	At least 30m³/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)
Woodland structure: veteran trees	No decline
Woodland structure: indicators of local distinctiveness	No decline
Vegetation composition: native tree cover	No decline. Native tree cover not less than 95%
Vegetation composition: typical species	A variety of typical native species present, depending on woodland type, including ash (*Fraxinus excelsior*) alder (*Alnus glutinosa*), willows (*Salix* spp) and locally, oak (*Quercus robur*)
Vegetation composition: negative indicator species	Negative indicator species, particularly non-native invasive species, absent or under control

<u>Threats & Pressures:</u> High - Agricultural intensification High - Dykes and flooding defence in inland water systems High - Erosion High - Modifying structures of inland water courses High - Pollution to surface waters (limnic, terrestrial, marine & brackish) Medium - Changes in abiotic conditions Medium - Dredging/ removal of limnic sediments Medium - Fishing and harvesting aquatic resources Medium - Forest and Plantation management & use Medium - Forestry activities not referred to above Medium - Human-induced changes in hydraulic conditions Medium - Intensive cattle grazing Medium - Invasive non-native species	Medium - Peat extraction Medium - Reduction in migration/ migration barriers Medium - Use of fertilizers (forestry) Medium - Water abstractions from surface waters Low - Industrial or commercial areas Low - Intensive fish farming, intensification Low - Leisure fishing Low - Netting Low - Port areas Low - Removal of hedges and copses or scrub Low - Sand and gravel quarries Activities, Management Low - Forest replanting (native trees)

6.4.2 Aquatic Habitats and Species

6.4.2.1 Aquatic QI Habitats & Species

6.4.2.1.1 Freshwater Pearl Mussel (1029) and Nore Freshwater Pearl Mussel (1990)

Previously the River Nore Pearl Mussel (*Margaritifera durrovensis*) was reported separately; however, genetic research has since placed the Nore population within the *Margaritifera margaritifera* taxon (*M. m. durrovensis*) (NPWS, 2025). As a result, these species are treated together and the Conservation Objectives for the Nore Freshwater pearl mussel (1990) have been applied to the Freshwater Pearl Mussel (1029), herein.

The Freshwater Pearl Mussel (*Margaritifera margaritifera*) / Nore Freshwater Pearl Mussel (*Margaritifera durrovensis*) is a large, long-lived, bivalve mollusc found in clean, fast-flowing rivers. They are one of three Irish freshwater bivalves over 50mm. Individuals can grow to very large sizes relative to other freshwater molluscs, slowly building up thick calcareous shells in rivers with relatively soft water and low levels of calcium. Individual mussels can live for over a hundred years in Ireland.

Freshwater Pearl Mussel/Nore Freshwater Pearl Mussel requires armoured substrate structures along riverbeds. Where river flow and sediment composition are altered, this can negatively affect population structure. Algae and diatom cover must ideally be very sparse and consists of species associated with high status environments. River flow velocity has been shown to affect juvenile habitat suitability where drainage work changes result in lower speeds increasing the presence and build-up of finer sediment. This finer sediment can impede oxygen flow to juvenile pearl mussel individuals prior to them latching to juvenile salmonids in gravels, impacting recruitment which is considered the primary cause for its 90% decline across Europe in the last 50 years. The fine sediment build up can also lead to recruitment of macrophytes which require fine sediment to root, this has effects on riverbed structure, river flow and oxygen levels. These factors are considered the primary indicators for monitoring Freshwater Pearl Mussel/Nore Freshwater Pearl Mussel population structure and health in Stage 3 and Stage 4 surveys (Byrne *et al*. 2009; Moorkens & Killeen, 2009).

Conservation status: The International Union for Conservation of Nature (IUCN) conservation status for Ireland and Europe is Critically Endangered. While the range of the species in Ireland is Favourable, the population, habitat and future prospects are described as Bad (NPWS, 2025a).

Threats and pressures faced by this species include modification of hydrographic functioning, other human induced changes in hydrographic conditions, restructuring agricultural landholding, water abstractions from groundwater, diffuse pollution to surface waters due to agricultural and forestry activities and pollution to surface waters due to other sources not listed (NPWS, 2025a).

Species Distribution:

Desk Study Results: Multiple records for the critically endangered hard-water form of the Freshwater Pearl Mussel were available for the River Nore. This species has declined significantly in recent years and is now confined to areas upstream of the Erkina confluence, Durrow (NPWS & Triturus data; Sweeney, 2022). It has been concluded that pearl mussel is no longer present in the River Nore downstream of the Erkina confluence (Sweeney, 2022).

Field Study Results: Freshwater Pearl Mussel was not recorded during aquatic surveys for the Gathabawn Windfarm. Environmental DNA sampling was undertaken on a precautionary basis in July 2025 on the River Goul (site A4) and Nuenna River (site B6). In keeping with an absence of records for the respective watercourses, Freshwater Pearl Mussel were not detected in the samples from the River Goul or Nuenna River.

The Gathabawn Windfarm is located within two *Margaritifera* sensitive areas, the Nore Upper and Nore Middle catchments, both of which are designated for '*catchments of SAC populations listed in S.I. 296 of 2009*'. Freshwater Pearl Mussel favours fast-flowing and clean rivers, with coarse sand or fine gravel beds. The majority of watercourses surveyed were subject to significant siltation and eutrophication pressures, which resulted in a reduction of biological water quality. Low summer flows, very much characteristic of this region,

further affected the quality of aquatic habitats and were evidently an issue for fish populations on several watercourses in the vicinity of the Gathabawn Windfarm, and therefore provided generally unsuitable habitat for Freshwater Pearl Mussel. The Nore population of Freshwater Pearl Mussel within the River Barrow and River Nore SAC is upstream of the Gathabawn Windfarm, within the Nore catchment. Therefore, the Gathabawn Windfarm does not have direct downstream hydrological connectivity to the Nore population and, as such, there are no arising from the Gathabawn Windfarm that are likely to impact Freshwater Pearl Mussel.

Vulnerability to potential impacts: As filter feeders, Freshwater Pearl Mussel/Nore Freshwater Pearl Mussel are particularly sensitive to changes in water quality. Other impacts to stream hydrology, riverbed substrate, channel structure and riparian management and the presence, or otherwise, of fish host stocks can all contribute to the vulnerability of this species.

See AA Figure 24: Baseline Information mapping for - Desmoulins Whorl Snail, White Clawed Crayfish, Nore Freshwater Pearl Mussel & Killarney Fern.

6.4.2.1.2 White-clawed Crayfish (1092)

The White-clawed Crayfish (*Austropotamobius pallipes*) is the only crayfish currently known to occur in Irish freshwater. It is the largest freshwater arthropod found in Ireland.

The species prefers relatively cool temperatures and adequate dissolved oxygen and lime, although tolerating significant fluctuations in these parameters. Habitat heterogeneity is important; juveniles live among submerged tree roots, gravel or macrophytes, while larger Crayfish must have stones to hide under, or an earthen bank in which to burrow. The species is omnivorous, with juveniles more reliant than adults on animal foods.

Conservation Status: The IUCN conservation status of this species in Ireland has not been evaluated. However, their global IUCN conservation status is Endangered. The Overall Status of the species is Bad with a deteriorating trend, unchanged from the 2019 assessment. The Bad status is due to population decline and poor future prospects for the species due to the presence of the Crayfish Plague organism across seventeen catchments (NPWS, 2025a).

Threats and pressures faced by this species include the introduction of invasive alien species and the introduction of disease, specifically White-Clawed Crayfish faces an existential threat from twin impacts of non-indigenous Crayfish species (NICS) and Crayfish Plague which is a water-borne disease specific to freshwater Crayfish caused by the oomycete *Aphanomyces astaci*. NICS impact the White-clawed Crayfish through direct predation and competition but also act as carriers of Crayfish Plague (NPWS, 2025a). An outbreak of the highly infectious Crayfish Plague (*Aphanomyces astaci*) - a pathogen which causes 100% mortality in White-clawed Crayfish populations - was confirmed on the River Nore in Kilkenny in 2019 and may have impacted populations throughout the Nore catchment. No Crayfish plague was recorded during aquatic surveys in 2025.

Species Distribution:

Desk Study Results: A low number of records for Annex II White-clawed Crayfish were available in the wider survey area, with more contemporary records for the River Goul and River Nore (2025-2023 data). Crayfish remains have previously been identified in Otter spraint on the lower reaches of the Coolnacrutta Stream (current survey site A2) (Triturus 2022 data).

Field Study Results: White-clawed Crayfish surveys were undertaken at the aquatic survey sites in July 2025. No White-clawed Crayfish were recorded via hand-searching or sweep netting of instream refugia at any of the aquatic survey sites in July 2025. Environmental DNA sampling detected White-clawed Crayfish eDNA at the River Goul (site A4) and Nuenna River (site B6) with 5/12 and 3/12 positive qPCR records at these survey sites, respectively. No Crayfish plague (an obligate pathogen of Crayfish) was detected in the samples.

White-clawed Crayfish utilises a broad spectrum of habitats extending from smallest streams and drains to large rivers and medium-sized lakes wherever there is sufficient lime. The White-clawed Crayfish is generally

associated with good-quality waters, but this is not necessarily the case in Ireland, where it can occur in water of lower quality (NPWS, 2025a). The majority of watercourses surveyed were subject to significant siltation and eutrophication pressures, which resulted in a reduction of biological water quality. Low summer flows were very much characteristic of this region. These results are in keeping with the low records for the species in the survey area and wider sub-catchments.

Vulnerability to potential impacts: Sediment run-off can affect this species, however its primary sensitivities are to Crayfish plague and increased temperature ranges impacting breeding success.

See AA Figure 24: Baseline Information mapping for - Desmoulins Whorl Snail, White Clawed Crayfish, Nore Freshwater Pearl Mussel & Killarney Fern.

6.4.2.1.3 Sea Lamprey (1095)

The life cycle of the Sea Lamprey (*Petromyzon marinus*) contains both a marine phase and a freshwater phase. Adult Sea Lamprey living as external parasites on host fish or marine mammals at sea grow in length from 60 to 100cm before migrating in spring into freshwater to excavate redds or spawning nests in gravelled areas of large rivers. Upriver migration occurs at a time of falling water levels and substantial spawning activity has been recorded in gravelled areas downstream of large weirs in the major Irish rivers. Substantial areas of gravel suitable for spawning have been recorded in SAC main stem rivers but low utilisation of these areas by spawning Sea Lamprey has been recorded, both up- and downstream of barriers to migration (NPWS, 2025a).

This species requires healthy beds for spawning and egg laying, this is composed of redds that require high oxygen flow with steady current flow, fine sediment eddies along river banks for burrowing to protect from predators before migrating downstream into more coastal and intertidal waters as they mature (Kelly & King, 2001).

Conservation Status, Threats & Pressures: Their IUCN conservation status for Ireland is Near Threatened. The Overall Status of this species is assessed as Bad, as in the last two assessments, but there is a change in trend from stable to deteriorating (NPWS, 2025a).

Threats and pressures faced by this species include barriers to upstream migration (e.g. weirs), which limit access to spawning beds and juvenile habitat; changes in precipitation due to climate change; and impacts from fishing on prey species availability (NPWS, 2025a).

Species Distribution:

Desk Study Results: The River Nore in the vicinity of Ballyragget is known to support *Lampetra* sp. Historical Sea Lamprey (*Petromyzon marinus*) records are available for the River Nore at Ballyragget (1968 and 1972). The Nuenna River is known to support low densities of *Lampetra* sp.

Field Study Results: Lampetra sp. ammocoetes were recorded from a total of four sites on the Coolnacrutta Stream (A2), River Goul (A4), Lismaine Stream (B3) and Gorteenahilla River (B4), typically in low to medium densities. The River Goul at site A4, located within the River Barrow and River Nore SAC, supported Lamprey (density of 2 per m^2). Sites B3 and B4 supported higher ammocoete densities given the abundance of suitable soft sediment accumulations not typically encountered elsewhere. The Gorteenahilla River supported the highest density of Lamprey (7 per m^2) at site B4, located 1.1km southwest from the Gathabawn Windfarm construction works area.

Lamprey habitat was restricted in the survey area given the higher energy conditions at many sites which discourage the settlement of organic-rich fines required for larval burial (Aronsuu & Virkkala, 2014; Goodwin *et al.*, 2008; Gardiner, 2003), plus siltation, eutrophication and hydromorphological pressures. Given that *Lampetra* spp. require fine, clean gravels for spawning (Dawson *et al.*, 2015; Rooney *et al.*, 2013; Lasne *et al.*, 2010; Kelly & King, 2001), siltation significantly impacted spawning opportunities in the survey area, with bed calcification and eutrophication also additional pressures. Channel gradients and instream barriers (both

natural and anthropogenic) further restricted Lamprey populations given their poor ability to navigate even low head obstacles and higher flow velocities.

Vulnerability to potential impacts: Sea Lamprey larval stage is sensitive to sediment build up affecting spawning redds and burrowing habitat prior to metamorphosis and harming the recruitment rate of larvae making it to adults.

See AA Figure 24: Baseline Information mapping for - Desmoulins Whorl Snail, White Clawed Crayfish, Nore Freshwater Pearl Mussel & Killarney Fern.

6.4.2.1.4 Brook Lamprey (1096)

The Brook Lamprey (*Lampetra planeri*) is the smallest of the three Lampreys recorded in Ireland, typically reaching no more than 15-18cm in length. Unlike the Sea Lamprey and the River Lamprey, the Brook Lamprey is non-parasitic and non-migratory as an adult, living its entire life in freshwater. Adults spawn in spring, excavating shallow nests in relatively small-sized gravels in areas of reduced flow. After hatching, the larvae ('ammocoetes') drift or swim downstream to areas of riverbed or margins with fine silt deposits. They burrow into this substrate and live as filter feeders over a period of years before transforming into young adult fish. The young adults overwinter before migrating short distances upstream to gravelled areas where they spawn. The adult fish die after spawning (NPWS, 2025a).

This species requires healthy beds for spawning and egg laying, this is composed of redds that require high oxygen flow with steady current flow, fine sediment eddies along river banks for burrowing to protect from predators. As such, this species requires healthy areas of vegetation for adults to shelter from predators

Conservation Status, Threats and Pressures: The species has an IUCN status of Least Concern for Ireland. Lamprey surveys in Ireland have necessarily focused on ammocoete abundances and, to a lesser extent upon observations of adult spawning events. Distribution records can only be definitively assigned to one species or the other where adult records exist. For Brook Lamprey in Ireland there are extensive areas of suitable habitat and no significant pressures impacting this species. The Overall Status is therefore assessed as Favourable (NPWS, 2025a).

Species Distribution:
Desk Study Results: The River Nore in the vicinity of Ballyragget is known to support *Lampetra* sp. The Nuenna River is known to support low densities of *Lampetra* sp.

Field Study Results: Lampetra sp. ammocoetes were recorded from a total of four sites on the Coolnacrutta Stream (A2), River Goul (A4), Lismaine Stream (B3) and Gorteenahilla River (B4), typically in low to medium densities. The River Goul at site A4, located within the River Barrow and River Nore SAC, supported Lamprey (density of 2 per m^2). Sites B3 and B4 supported higher ammocoete densities given the abundance of suitable soft sediment accumulations not typically encountered elsewhere. The Gorteenahilla River supported the highest density of Lamprey (7 per m^2) at site B4, located 1.1km southwest from the Gathabawn Windfarm construction works area.

Vulnerability to potential impacts: Brook Lamprey larval stage is sensitive to sediment build-up affecting spawning redds and burrowing habitat prior to metamorphosis and harming the recruitment rate of larvae making it to adults.

See AA Figure 24: Baseline Information mapping for - Desmoulins Whorl Snail, White Clawed Crayfish, Nore Freshwater Pearl Mussel & Killarney Fern.

6.4.2.1.5 River Lamprey (1099)

The River Lamprey (*Lampetra fluviatilis*) breeds in freshwater rivers and streams. Adults spawn in spring, excavating shallow nests in riverine sections comprising fine gravels and small stones. After hatching, the larvae or 'ammocoetes' drift or swim downstream to areas of riverbed or margins with fine silt deposits. They burrow into this bed material where they live as filter feeders over a period of years before transforming into

young adult fish and migrating downriver to estuarine and marine habitats. As adults they are parasitic, attaching to and feeding on larger fish in coastal waters. They can grow up to 25-30cm at maturity, at which stage they return to freshwater habitats to spawn. The adult fish die after spawning (NPWS, 2025a).

This species requires healthy beds for spawning and egg laying, this is composed of redds that require high oxygen flow with steady current flow, fine sediment eddies along river banks for burrowing to protect from predators before migrating downstream into more coastal and intertidal waters as they mature.

Conservation status, Threats and Pressures: River lamprey IUCN conservation status for Ireland is Least Concern. The inability to distinguish between River Lamprey and Brook Lamprey larvae, and the challenges associated with sampling for adult River Lamprey, means that an evaluation of their actual range and population size cannot be undertaken. The Overall Status assessment for River Lamprey has changed from Unknown to Inadequate (NPWS, 2025a).

Species Distribution:

Desk Study Results: The River Nore in the vicinity of Ballyragget is known to support *Lampetra* sp. The Nuenna River is known to support low densities of *Lampetra* sp.

Field Study Results: Lampetra sp. ammocoetes were recorded from a total of four sites on the Coolnacrutta Stream (A2), River Goul (A4), Lismaine Stream (B3) and Gorteenahilla River (B4), typically in low to medium densities. The River Goul at site A4, located within the River Barrow and River Nore SAC, supported Lamprey (density of 2 per m^2). Sites B3 and B4 supported higher ammocoete densities given the abundance of suitable soft sediment accumulations not typically encountered elsewhere. The Gorteenahilla River supported the highest density of Lamprey (7 per m^2) at site B4, located 1.1km southwest from the Gathabawn Windfarm construction works area.

Lamprey habitat was restricted in the survey area given the higher energy conditions at many sites which discourage the settlement of organic-rich fines required for larval burial (Aronsuu & Virkkala, 2014; Goodwin *et al.*, 2008; Gardiner, 2003), plus siltation, eutrophication and hydromorphological pressures. Given that *Lampetra* spp. require fine, clean gravels for spawning (Dawson *et al.*, 2015; Rooney *et al.*, 2013; Lasne *et al.*, 2010; Kelly & King, 2001), siltation significantly impacted spawning opportunities in the survey area, with bed calcification and eutrophication also additional pressures. Channel gradients and instream barriers (both natural and anthropogenic) further restricted Lamprey populations given their poor ability to navigate even low head obstacles and higher flow velocities.

Vulnerability to potential impacts: River Lamprey larval stage is sensitive to sediment build up affecting spawning reds and burrowing habitat prior to metamorphosis and harming the recruitment rate of larvae making it to adults.

See AA Figure 24: Baseline Information mapping for - Desmoulins Whorl Snail, White Clawed Crayfish, Nore Freshwater Pearl Mussel & Killarney Fern.

6.4.2.1.6 Twaite Shad (1103)

The Twaite Shad (*Alosa fallax*) spends most of its life in estuaries and coastal waters but returns upriver to spawn in late May/early June. The fertilised eggs hatch after a short period and juveniles can reach up to 100mm at the end of the first year. Limited knowledge indicates that Irish twaite shad may live in estuarine waters for at least two full years prior to going to sea. Twaite Shad can migrate long distances into freshwater but, in Ireland, they spawn in transitional waters at the upper limits of tidal influence (NPWS, 2025a).

This species spends most of its time offshore, only returning to estuarine habitats or to freshwater depositing rivers to mate. 'Medium-energy systems with erosive channels seem to be favoured, and shad do not generally utilise rivers that are heavily modified or less than 10m wide.' They spawn usually above shallow gravel substrates near deeper pools. Spawning takes place in flowing water over stones and gravel, among which the eggs sink. Once the eggs hatch, the young Twaite Shad move downstream using the current to the upper

estuary where it is quieter, which allows them to feed and grow (Maitland PS & Hatton-Ellis TW,2003; King and Roche, 2008).

Conservation Status, Threats and Pressures: Twaite Shad IUCN conservation status is described as Vulnerable in Ireland. The Overall Status remains Bad, and the overall trend is now deteriorating, a change from the stable trend reported in 2019 (NPWS, 2025a).

Species Distribution: In Ireland, there are four spawning populations which occur in the Barrow, Nore, Suir and Munster Blackwater rivers, all of which are SACs for this species (NPWS, 2025a).

Desk Study Results: The species was also **not recorded** within desk study records.
Field Study Results: The species was also **not observed** during aquatic surveys undertaken in July 2025 (EIAR Appendix 13.8).

Vulnerability to potential impacts: Numbers of Twaite Shad have declined across its range, with the main causes attributed to dam construction, pollution, overexploitation and habitat destruction. The combined influence of deteriorating water quality, the challenges of climate change and the hydrological and physico-chemical impacts of weirs have implications for the conservation status of this species.

6.4.2.1.7 Atlantic Salmon (1106)

The Atlantic Salmon (*Salmo salar*) is indigenous to the North Atlantic, extending in an arc from northern Portugal in the east to the north-eastern United States in the west. The Irish population generally comprises fish that spend usually two years as sub-adults in freshwater before going to sea as smolts. The majority of fish spend one winter at sea before returning to their natal rivers, mainly during the summer, as grilse. Smaller numbers spend two winters at sea, returning mainly in spring, hence “spring” Salmon. A small proportion of the adult population returns to the sea postspawning and can return to spawn again (NPWS, 2025a).

Atlantic Salmon require coarse gravel beds for spawning. Spawning occurs in freshwater rivers and streams, in shallow fast-flowing areas with riffles, and moderate depths (Jonsson & Jonsson, 2011). Access to these habitats is crucial to Atlantic Salmon's life cycle, but it may be impacted by damming or poor water quality. Juvenile Salmon require habitats with adequate shelter such as submerged aquatic vegetation, boulders or debris, and stable water currents (Hutchings, 2003). This kind of habitat provides food resources in the form of insect larvae, worms, and small crustaceans for the Salmon, and shelter from predators.

Conservation status, threats and pressures: They have an IUCN conservation status of Vulnerable in Ireland and Europe. There is considered to be sufficient habitat in Ireland to support a viable salmon population. Freshwater quality in Ireland continues to remain a concern, but ongoing pressures linked with habitat quality are not considered to be compromising the viability of the species. The Overall Status is assessed as Bad and deteriorating, a decline from Inadequate and stable in the last assessment (NPWS, 2025a). A substantial number of habitat threats and pressures impact Salmon, including aquaculture, declining quality of water and habitat, and physical barriers to migration, including from hydroelectric schemes. Although the protection for this species is in freshwater, there are also marine pressures that are influencing the population viability (NPWS, 2025a).
Species Distribution: Atlantic Salmon is an anadromous species indigenous to the North Atlantic. In freshwater, it is found in an arc from northern Portugal in the east, to Connecticut River, New England, United States in the west.
Desk Study Results: The River Goul, River Nore, Coolnacrutta Stream, Gorteenahilla River and the Lisdowney Stream are known to support Atlantic Salmon.
Field Study Results: Salmonid populations were widespread in the survey area, although were absent from the upper reaches of several watercourses such as the Coolnacrutta and Lismaine Streams (which supported salmonids further downstream). Atlantic Salmon were recorded from seven sites during aquatic surveys in July 2025 – on the Coolnacrutta Stream (A2), River Goul (A3, A4), Lismaine Stream (B3), Gorteenahilla River (B4) and Nuenna River (B5, B6). None of these points have direct hydrological connectivity with the Gathabawn

Windfarm site, however it is noted that turbine delivery route facilitating works at FW9 at located 5m from the Ballyring Upper Stream, while facilitating works at FW8 are ~50m from the Foyle South stream which drains into the Gorteenahilla Stream. Surveys at or near FW8 (C1 on the Gorteenamuck Stream is upstream of FW8; B4 on the Gorteenahilla River is downstream of FW8) found good numbers of Atlantic Salmon (16), Brown Trout (7) and lamprey (14) at B4; C1 had no species recorded (it was dry and considered to have no fisheries value). Surveys at FW9 (C3 on the Ballyring Upper Stream) recorded no salmonid species and was considered to be of low fisheries value.

In relation to the Candidate Gathabawn Grid Connection, three survey sites are downstream of the Ballylehaun-Ballyring Underground Cabling (Gorteenahilla River (B4) and Nuenna River (B5, B6)). Atlantic Salmon were recorded from all three of these watercourses.

The watercourses surveyed in the vicinity of the Gathabawn Windfarm were typically historically modified lowland depositing channels (FW2; Fossitt, 2000) and more natural upland eroding channels. Siltation of spawning habitat was especially noticeable throughout the survey area, with Hydromorphological impacts reducing habitat heterogeneity and the quality of available nursery areas.

Vulnerability to potential impacts: Atlantic salmon require clean and oxygenated gravel beds for spawning, as well as suitable habitats with shelter and food sources for juvenile salmon. Should the proposed development lead to sedimentation, pollution, or riverbed alteration, these habitats could be subject to degradation which subsequently would cause salmon mortality and population decline. Additionally, sedimentation can smother eggs and reduce the availability of food for young salmon, resulting in high juvenile mortality. Sedimentation can also clog the gills of adult and juvenile salmon which would also have detrimental effects on salmon populations. Run-off from the project may reduce water quality and pollute the freshwater habitat which could cause eutrophication.

See AA Figure 24: Baseline Information mapping for - Desmoulins Whorl Snail, White Clawed Crayfish, Nore Freshwater Pearl Mussel & Killarney Fern.

6.4.2.1.8 Estuaries (1130)

Estuaries are the downstream part of a river valley, subject to the tide and extending from the limit of brackish waters. They are coastal inlets where there is generally a significant freshwater influence. Estuaries are an extremely diverse and dynamic habitat and play a major role in maintaining the health of coastal ecosystems (NPWS, 2025a). Estuarine dynamics are influenced by freshwater inputs (from the River Barrow and River Nore) and tidal movements.

Conservation status, threats and pressures: Threats and pressures impacting the habitat include increased nutrient enrichment from a range of sources, and disturbance due to fishing activities. The Overall Status of the habitat has been assessed as Bad, but this change from Inadequate in 2019 is due to improved knowledge rather than genuine change, and the trend is assessed as stable (NPWS, 2025a).

Habitat Distribution:

Desk Study Results: Estuaries (1130) is a QI habitat in the River Barrow and River Nore SAC. The habitat is mapped in the supporting Conservation Objectives document (NPWS, 2025) and is located approx. 51.5km hydrologically downstream from the Candidate Gathabawn Grid Connection. It does not have hydrological connectivity to the Gathabawn Windfarm.

Field Study Results: Estuarine habitat was **not recorded** within the Gathabawn Windfarm during habitat surveys.

Vulnerability to potential impacts: These habitats are susceptible to direct losses as a result of developments, marine pollution from agricultural, domestic and industrial sources, and marine aquaculture. The introduction and spread of invasive species also has the potential to impact on this habitat through colonisation and changing flow patterns.

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AA Figure 24 - Baseline Information mapping for - Desmoulins Whorl Snail, White Clawed Crayfish, Nore Freshwater Pearl Mussel & Killarney Fern

Additional Information added to the map:

- Proposed Gathabawn Windfarm Red Line Boundary
- Candidate Gathabawn Grid Connection
- Aquatic Survey Locations
- Watercourses

Sources:
Environmental Protection Agency
National Parks & Wildlife Service (Conservation Objectives)

Legend

- 1016 Desmoulin's Whorl Snail - *Vertigo moulinsiana*
- 1092 White-Clawed Crayfish - *Austropotamobius pallipes*
- 1421 Killarney Fern - *Trichomanes speciosum*
- River Barrow and River Nore SAC 002162
- OSi Discovery Series County Boundary

NPWS An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra National Parks and Wildlife Service

SITE CODE: 002162
SAC; Version 3.04;
CO. CARLOW, CO. KILDARE, CO. KILKENNY, CO. LAOIS, CO. OFFALY, CO. TIPPERARY, CO. WATERFORD, CO. WEXFORD

MAP 7: RIVER BARROW AND RIVER NORE SAC CONSERVATION OBJECTIVES DESMOULIN'S WHORL SNAIL, WHITE-CLAWED CRAY FISH & KILLARNEY FERN

0 5 10 km

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).
Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. EN 0059208)

N

Map Version 2
Date: May 2025

Map to be read in conjunction with the NPWS Conservation Objectives Document.

See AA Figure 25: Baseline Information mapping for QI habitats – Estuaries.

6.4.2.1.9 Mudflats and sandflats not covered by seawater at low tide (1140)

Mudflats and sandflats not covered by seawater at low tide are comprised of the international section of the coastline where sands and muds dominate. They are dynamic ecosystems, dependent on the balance of natural accretion and erosion. The only vascular plant species associated with this habitat is *Zostera noltei*.

Mudflats are composed of fine particles like clay and silt, while sandflats are made of coarser sand particles. The sediment texture can vary based on tidal conditions, freshwater inflow, and sediment deposition from upstream rivers like the Barrow and Nore. This habitat is a tough and sensitive environment to the species that live in it due to the constantly changing conditions. At low tide, they are exposed, and at high tide, they are submerged.

Conservation status, threats and pressures: The range of this habitat type is 23,800km² nationally and is stable both in the short-term and long-term (NPWS, 2019). The area covered by the habitat type within the range in the biogeographical/marine region concerned is 646km² and is experiencing a stable trend in the short-term and long-term (NPWS, 2019). Threats and pressures associated with this marine habitat include residential or recreational activities and structures generating marine pollution; agricultural activities generating marine pollution; and marine aquaculture generating marine pollution (NPWS, 2019).

Habitat Distribution:

Desk Study Results: The habitat is mapped in the supporting Conservations Objectives document (NPWS, 2011a) and is located approx. 70km hydrologically downstream from the proposed Gathabawn Windfarm. Expanses of sandflat occur from Creadon Head to Passage East on the western shore and from Black Point to Duncannon Fort on the eastern shore (NPWS, 2011b). Mudflat is present as a narrow band on the western shore and on the eastern shore broad areas occur at Shelbourne Bay and Fishertown Flats, thereafter it continues north as a narrow band (NPWS, 2011b).

Field Study Results: Mudflats and sandflats not covered by seawater at low tide was **not recorded** within the Gathabawn Windfarm Project site during habitat surveys.

Vulnerability to potential impacts: These habitats are susceptible to direct losses as a result of developments, marine pollution from agricultural, domestic and industrial sources, marine aquaculture. The introduction and spread of invasive species also has the potential to impact on this habitat by colonising the habitat and changing flow pattern.

See AA Figure 26: Baseline Information mapping for QI habitats - Mudflats and sandflats not covered by seawater at low tide.

6.4.2.1.10 *Salicornia* and other annuals colonizing mud and sand (1310)

Salicornia and other annuals colonizing mud and sand is a pioneer saltmarsh community that may occur on muddy sediment seaward of established saltmarsh, or form patches within other saltmarsh communities where the elevation is suitable and there is regular tidal influence (NPWS, 2019).

Salicornia are adapted to high salinity and are typically pioneer species that colonize disturbed or newly exposed areas of mudflats and sandflats. These habitats form at the upper tidal zone where the sediments are exposed at low tide and have a relatively low sediment deposition during high tide (EC, 2013).

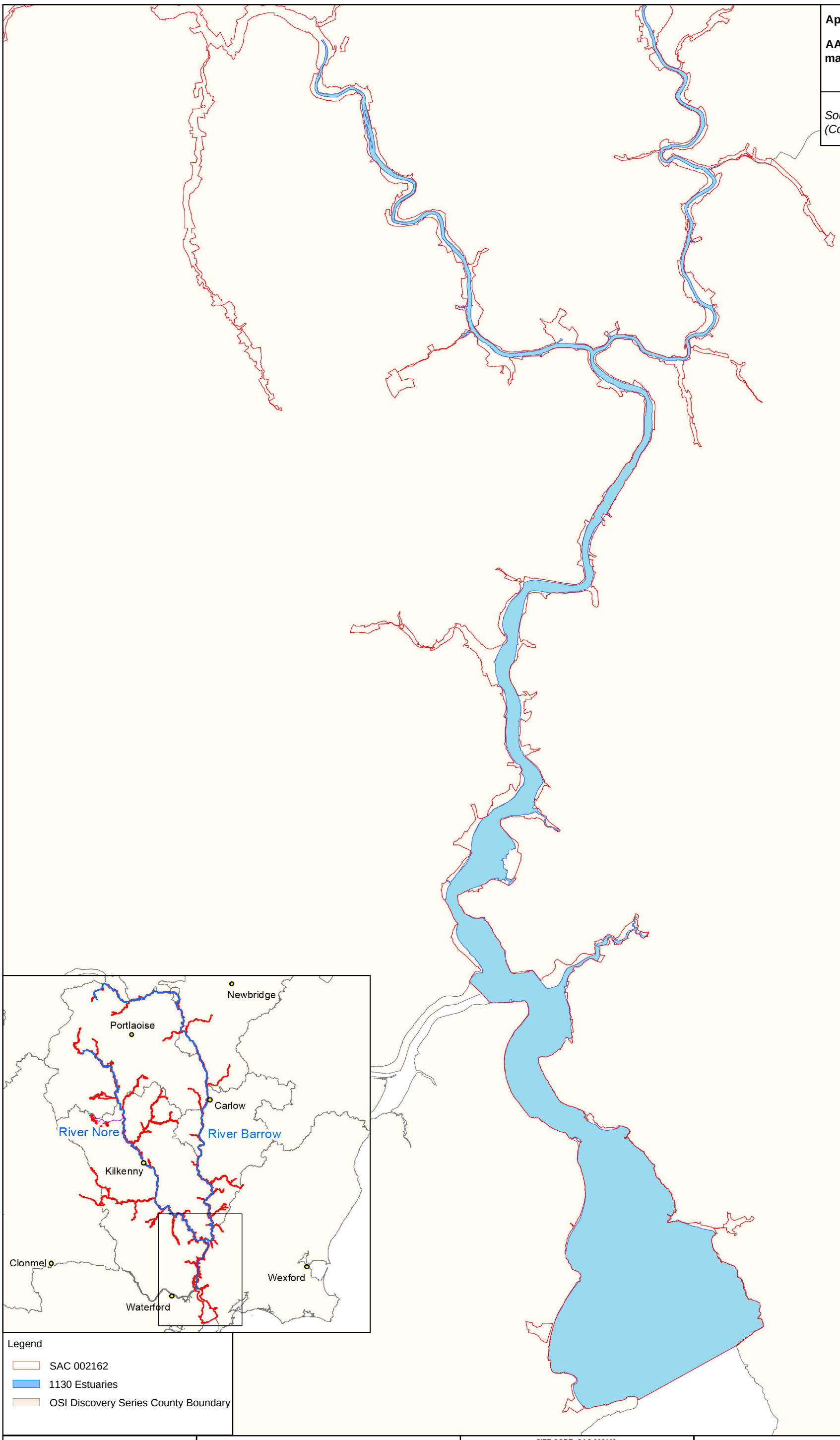
Conservation status, threats and pressures: The range of this habitat is 15,200km² nationally and is stable in both the short-term and long-term trends (NPWS, 2019). The area covered by the habitat type within the range in the biogeographical/marine region concerned is 1.16km² (at a minimum) and is experiencing a stable trend in the short-term and long-term (NPWS, 2019). Threats and pressures associated with this habitat type include the spread of invasive alien species and intensive.

Habitat Distribution:

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AA Figure 25 - Baseline Information mapping for QI habitats - Estuaries

Sources: National Parks & Wildlife Service (Conservation Objectives)



An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht

MAP 2:
RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES ESTUARIES

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002162
CO. CARLOW; version 1.03, CO. KILDARE; version 1.04, CO. KILKENNY; version 1.1, CO. LAOIS; version 1.07, CO. OFFALY; version 1.01, CO. TIPPERARY; version 1.01, CO. WATERFORD; version 1.01, CO. WEXFORD; version 1.01

0 1 2 3 4 5 km

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Boundaries of designated areas are subject to revision.
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Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. EN 0059208)

N

Map Version 1
Date: April 2011

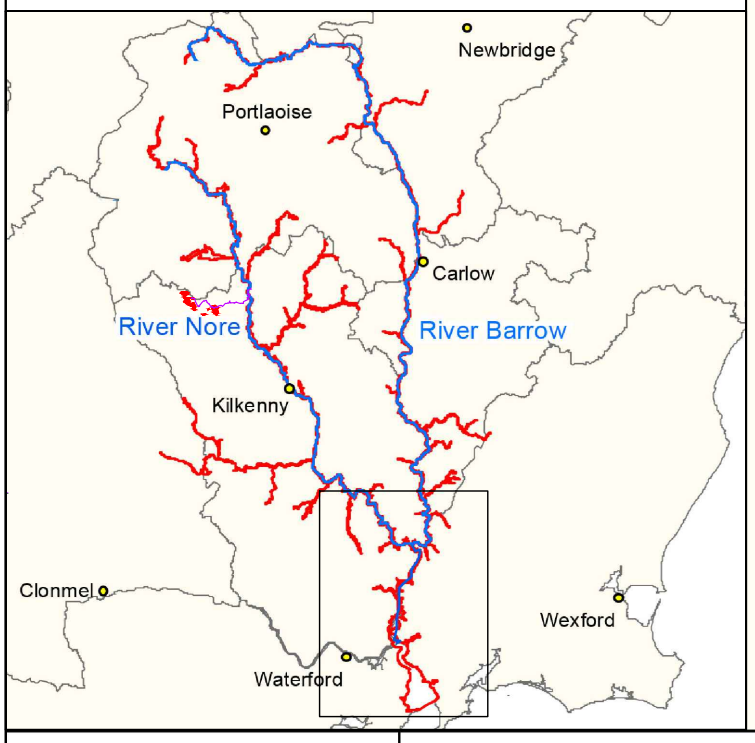
Appropriate Assessment Report

AA Figure 26 - Baseline Information mapping for QI habitats - Mudflats and sandflats not covered by seawater at low tide

Sources: National Parks & Wildlife Service (Conservation Objectives)

Legend

- SAC 002162
- 1140 Mudflats and sandflats not covered by sea water at low tide
- OSI Discovery Series County Boundary



An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht

MAP 3:
RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES TIDAL MUDFLATS AND SANDFLATS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002162
CO. CARLOW; version 1.03, CO. KILDARE; version 1.04, CO. KILKENNY; version 1.1, CO. LAOIS; version 1.07, CO. OFFALY; version 1.01, CO. TIPPERARY; version 1.01, CO. WATERFORD; version 1.01, CO. WEXFORD; version 1.01

0 1 2 3 km

The mapped boundaries are of an indicative and general nature only.
Boundaries of designated areas are subject to revision.
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta.
Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. EN 0059208)

N

Map Version 1
Date: April 2011

Desk Study Results: The habitat is mapped in the supporting Conservations Objectives document (NPWS, 2011a) and is located approx. 76km hydrologically downstream from the Proposed Gathabawn Windfarm Project.

Field Study Results: Salicornia and other annuals colonizing mud and sand was **not recorded** within the Proposed Gathabawn Windfarm Project site during habitat surveys.

Vulnerability to potential impacts: These habitats are susceptible to direct losses as a result of developments, marine pollution from agricultural, domestic and industrial sources, marine aquaculture. The introduction and spread of invasive species also has the potential to impact this habitat by colonising the habitat and changing flow patterns.

See AA Figure 27: Baseline Information mapping for QI habitats – Saltmarsh Habitats.

6.4.2.1.11 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) (1330)

Atlantic salt meadows generally occupy the widest part of the saltmarsh gradient. They contain a distinctive topography with an intricate network of creeks and salt pans occurring on the medium to large-sized saltmarshes. Atlantic salt meadows contain several distinctive zones that are related to elevation and submergence frequency (NPWS, 2019).

These habitats comprise grasses that are hardy and can withstand fluctuating salinities. Many variables are important for this type of habitat to thrive. This includes a brackish and saline habitat, tidal processes that maintain soil moisture and bring nutrients to the area (O'Connor, 2011).

Conservation Status, threats and pressures: The range of this habitat is 25,900km² and is stable in both the short-term and long-term trends (NPWS, 2019). However, the area covered by the habitat type within the range in the biogeographical/marine region concerned is 27.19km² and is experiencing a decreasing trend in the short-term and long-term (NPWS, 2019). Threats and pressures associated with this coastal habitat type include the spread of invasive alien species; intensive grazing or overgrazing by livestock; sports, tourism and leisure activities; modification of hydrological flow or physical alternation of water bodies for agriculture; and modification of coastline, estuary and coastal conditions for development (NPWS, 2019).

Habitat Distribution:

Desk Study Results: The habitat is mapped in the supporting Conservations Objectives document (NPWS, 2011a) and is located approx. 75km hydrologically downstream from the Proposed Gathabawn Windfarm Project.

Field Study Results: Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) were **not recorded** within the Proposed Gathabawn Windfarm Project site during habitat surveys.

Vulnerability to potential impacts: These habitats are susceptible to direct losses as a result of developments, marine pollution from agricultural, domestic and industrial sources, marine aquaculture. The introduction and spread of invasive species also has the potential to impact this habitat by colonising the habitat and changing flow patterns.

See AA Figure 27: Baseline Information mapping for QI habitats – Saltmarsh Habitats.

6.4.2.1.12 Mediterranean salt meadows (*Juncetalia maritimi*) (1410)

Mediterranean salt meadows occupy the upper zone of saltmarshes and usually occur adjacent to the boundary with terrestrial habitats. They are widespread on the Irish coastline; however, they are not as extensive as Atlantic salt meadows (NPWS, 2019). This habitat is more sensitive to changes in salinity than Atlantic salt meadows as well as fluctuating water levels hindering vegetation specialised to brackish type habitats (Sertić Perić et al., 2024).

Conservation status, threats and pressures: The range of this coastal habitat is stable in both the short-term and long-term trends (NPWS, 2019). However, the area covered by the habitat type within the range in the

biogeographical/marine region concerned is experiencing a decreasing trend in the short-term and long-term (NPWS, 2019). Threats and pressures associated with this habitat include intensive grazing or overgrazing by livestock; modification of hydrological flow or physical alternation of water bodies for agriculture; and agricultural activities not referred to above (NPWS, 2019).

Habitat Distribution:

Desk Study Results: The habitat is mapped in the supporting Conservations Objectives document (NPWS, 2011a) and is located approx. 76km hydrologically downstream from the Proposed Gathabawn Windfarm Project.

Field Study Results: Mediterranean salt meadows (*Juncetalia maritimi*) (1410) were **not recorded** within the Proposed Gathabawn Windfarm Project site during habitat surveys.

Vulnerability to potential impacts: These habitats are susceptible to direct losses as a result of developments, marine pollution from agricultural, domestic and industrial sources, marine aquaculture. The introduction and spread of invasive species also has the potential to impact this habitat by colonising the habitat and changing flow patterns.

See AA Figure 27: Baseline Information mapping for QI habitats – Saltmarsh Habitats.

6.4.2.1.13 Water courses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (3260)

This annexed habitat has a broad definition, covering from upland, flashy, oligotrophic, bryophyte- and algal-dominated rivers, to tidal reaches dominated by higher plants. In Ireland, the highest riverine conservation interest is associated with lowland depositing and tidal rivers and unmodified, fast-flowing, low-nutrient rivers (NPWS, 2019).

This habitat is dependent on oligotrophic conditions, constant water flow which provided high oxygenation. *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation requires stable water conditions that allows them to remain submerged and well oxygenated.

Conservation status, threats and pressures: The range of this habitat is 82,200km² and is stable in the short-term trend (NPWS, 2019). The area covered by the habitat type within the range in the biogeographical region concerned is 234km² and is experiencing a stable trend in the short-term (NPWS, 2019). Threats and pressures associated with this habitat type include agricultural activities, forestry activities and discharge of urban waste generating diffuse pollution to surface or ground waters; agricultural activities generating point source pollution to surface or ground waters; modification of hydrological flow; physical alteration of water bodies; and abstraction from groundwater, surface water or mixed water (NPWS, 2019).

Habitat Distribution:

Desk Study Results: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (3260) is a QI habitat of the River Barrow and River Nore SAC. The full distribution and extent of this habitat and its sub-types in the River Barrow and River Nore SAC is unknown (NPWS, 2011a).
Field Study Results: This habitat was **not recorded** within the Proposed Gathabawn Windfarm Project site during habitat surveys or aquatic surveys.

Vulnerability to potential impacts: This habitat is susceptible to changes in water quality (pollution and siltation), changes to hydrological flows reducing and/or changing vegetations ability to colonise an/or maintain itself and physical changes to the watercourses, including changes to substate.

6.4.2.1.14 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430)

Three distinct communities can be associated with this habitat type in Ireland. In the lowlands, the habitat occurs as a community of watercourses, particularly unmanaged edges of slow-moving rivers and the margins of lakes. In the uplands, the habitat occurs as a community of ungrazed or lightly grazed cliff ledges. In the

lowlands, the habitat also possibly occurs as a nitrophilous tall herb community of woodland borders, referred to as the saum community (NPWs, 2019).

These habitats are highly sensitive to hydrological changes and require high levels of soil moisture and stable water tables to sustain the growth of the species. The habitat chemistry is sensitive to changes in nutrient levels and therefore, low levels of pollution is important for this habitat community.

Conservation Status, threats and pressures: The range of this habitat is 19,100km² and is decreasing in the short-term and long-term trends (NPWS, 2019). The area covered by the habitat type within the range in the biogeographical region concerned is 1.004km² at a minimum and is experiencing a decreasing trend in the short-term and long-term (NPWS, 2019). Threats and pressures associated with this habitat include intensive grazing or overgrazing by livestock; drainage for use as agricultural land; and the spread of invasive alien species (NPWS, 2019).

Habitat Distribution:

Desk Study Results: The full distribution and extent of this habitat in the River Barrow and River Nore SAC is unknown, although it is considered to occur in association with some riverside woodlands, unmanaged river islands and in narrow bands along the floodplain of slow-flowing stretches of river (NPWs, 2011a).

Field Study Results: This habitat was **not recorded** within the Proposed Gathabawn Windfarm Project site during habitat surveys or aquatic surveys.

Vulnerability to potential impacts: These habitats are susceptible to direct losses as a result of developments, or riparian management. They are also highly sensitive to hydrological and nutrient changes through pollution. Agricultural pressures through intensive overgrazing also has the potential to affect changes to this habitat. The introduction and spread of invasive species has the potential to impact this habitat by colonising the habitat and changing the plant species composition.

6.4.2.1.15 Petrifying springs with tufa formation (7220)*

Petrifying springs are lime-rich water sources which deposit tufa (or travertine). The emerging spring water is rich in carbon dioxide and dissolved calcium carbonate. On contact with the atmosphere, carbon dioxide is outgassed, and calcium carbonate is deposited as tufa. The resulting ecological conditions, with high pH and constant inundation by water and deposition of precipitated calcium carbonate, constitute a challenging environment for plants and animals to colonise, and the communities associated with petrifying springs are therefore highly specialised (NPWS, 2019).

Conservation Status, threats and pressures: The range of this habitat is 18,900km² and is stable in the short-term trend (NPWS, 2019). The area covered by the habitat type within the range in the biogeographical region concerned is between 0.1379km² and 0.1549km² and is experiencing a stable trend in the short-term (NPWS, 2019). Threats and pressures associated with this habitat include abandonment of grassland management; extensive grazing or undergrazing by livestock; roads, paths, railroads and related infrastructure; drainage; mixed source pollution to surface and ground waters; and sports, tourism and leisure activities (NPWS, 2019).

Habitat Distribution:

Desk Study Results: Known locations of this habitat type in the River Barrow and River Nore SAC are mapped in the related Conservation Objectives document (NPWS, 2011a) and are located approx. 38km hydrologically downstream from the Proposed Gathabawn Windfarm Project site. However, the full extant and distribution of this habitat within this Natura 2000 site is unknown; further areas are likely to occur within the site (NPWS, 2011a).

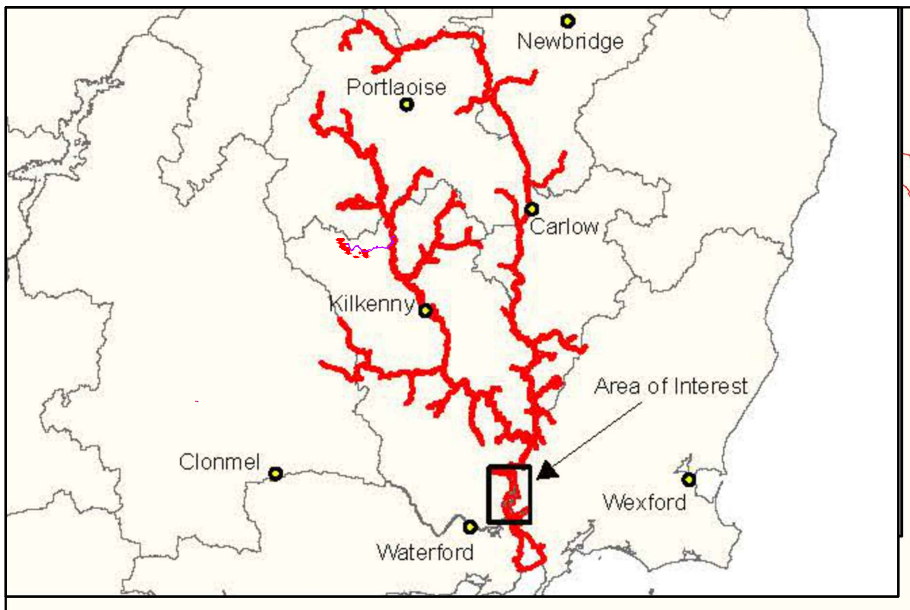
Field Study Results: This habitat was **not recorded** within the Proposed Gathabawn Windfarm Project site during habitat surveys or aquatic surveys.

Vulnerability to t potential impacts: These habitats are susceptible to direct losses as a result of developments, or riparian management. They are also highly sensitive to hydrological and nutrient changes through pollution.

Appropriate Assessment Report

AA Figure 27 - Baseline Information mapping for QI habitats - Saltmarsh Habitats

Sources: National Parks & Wildlife Service (Conservation Objectives)



SMP0049

SMP0050

SMP0051

SMP0048

Legend

- SAC 002162
- OSI Discovery Series County Boundary

Saltmarsh Habitats

- 1310 *Salicornia* and other annuals colonising mud and sand
- 1330 Atlantic salt meadows (Glauco -Puccinellietalia maritimae)
- 1410 Mediterranean salt meadows (Juncetalia maritimi)
- Potential 1330 Atlantic salt meadows (Glauco -Puccinellietalia maritimae)

An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht

MAP 5:
RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES SALTMARSH HABITATS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002162
CO. CARLOW; version 1.03, CO. KILDARE; version 1.04, CO. KILKENNY; version 1.1, CO. LAOIS; version 1.07, CO. OFFALY; version 1.01, CO. TIPPERARY; version 1.01, CO. WATERFORD; version 1.01, CO. WEXFORD; version 1.01

0 0.25 0.5 0.75 1 km

The mapped boundaries are of an indicative and general nature only.
Boundaries of designated areas are subject to revision.
Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).
Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta.
Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. EN 0059208)

N

Map Version 1
Date: April 2011

Agricultural pressures through undergrazing or overgrazing also has the potential to affect changes to this habitat. The introduction and spread of invasive species has the potential to impact this habitat.

See AA Figure 28: Baseline Information mapping for QI habitats - Old Oak Woodlands, Alluvial Forests & Petrifying Springs.

6.4.2.1.16 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) (91E0)*

Alluvial woodland is a priority Annex I habitat. A number of variants of this habitat exist – the most common found in Ireland include forests of *Fraxinus excelsior* and *Alnus glutinosa* of temperate and Boreal Europe lowland and hill watercourses. All types occur on heavy soils which are periodically inundated by the annual rise of river levels, but which are otherwise well-drained and aerated during low water (NPWS, 2019).

Alluvial forests require wet, periodically flooded conditions with moderate to low nutrient levels. These conditions are produced along the riverbanks and flood plains of the River Barrow and River Nore SAC.

Conservation Status, threats and pressures: The range of this habitat is 61,000km² and is stable in the short-term and long-term trends (NPWS, 2019). However, the area covered by the habitat type within the range in the biogeographical region concerned is between 19.64km² at a minimum and is experiencing decreasing trends in the short-term and long-term (NPWS, 2019). Threats and pressures associated with this habitat include the spread of invasive alien species; clear-cutting; and plant and animal diseases, pathogens and pests (NPWS, 2019).

Habitat Distribution:

Desk Study Results: Known locations of this habitat type in the River Barrow and River Nore SAC are mapped in the related Conservation Objectives document (NPWS, 2011a). The closest mapped site of this habitat is located approx. 7.4km hydrologically upstream from the Proposed Gathabawn Windfarm Project site, with a further mapped location 10km upstream. The closest mapped site of this habitat (hydrologically downstream) is located approx. 21km from the Proposed Gathabawn Windfarm Project site. However, the full extant and distribution of the habitat within this Natura 2000 site is unknown; further areas may be present within the SAC site (NPWS, 2011a).

Field Study Results: This habitat was **not recorded** within the Proposed Gathabawn Windfarm Project site during habitat surveys or aquatic surveys.

Vulnerability to potential impacts: These habitats are susceptible to the spread of invasive alien species, clear-cut felling and plant and animal diseases, pathogens and pests.

See AA Figure 28: Baseline Information mapping for QI habitats - Old Oak Woodlands, Alluvial Forests & Petrifying Springs.

6.4.2.2 Terrestrial Habitats & Plant Species

6.4.2.2.1 European dry heaths (4030)

European dry heaths comprise vegetation dominated by ericaceous dwarf shrubs and usually occurs on well-drained, nutrient-poor and acidic mineral soils or shallow peats (typically <50cm deep) on sloping ground. *Calluna vulgaris* is usually the main species but *Erica cinerea, Ulex gallii* and *Vaccinium myrtillus* may also be important components (NPWS, 2019).

Conservation Status, threats and pressures: The range of this habitat is 66,600km² and is stable in the short-term trend (NPWS, 2019). However, the area covered by the habitat type within the range in the biogeographical region concerned is 1,230.01km² (at a minimum) and is experiencing a decreasing trend in the short-term and long-term (NPWS, 2019). Threats and pressures associated with this terrestrial habitat include intensive grazing or overgrazing by livestock; burning for agriculture; conversion to forest; and wind, wave and tidal power, including infrastructure (NPWS, 2019).

Habitat Distribution:

Desk Study Results: The full distribution and extent of this habitat in the River Barrow and River Nore SAC is unknown (NPWS, 2011a). However, it is indicated as occurring on the steep, free-draining river valley sides especially the Barrow and tributaries on the foothills of the Blackstairs Mountains (NPWS, 2011a). The Blackstairs Mountains are located more than 40km to the southeast of the Proposed Gathabawn Windfarm Project site.

Field Study Results: This habitat was **not recorded** within the Proposed Gathabawn Windfarm Project site during habitat surveys.

Vulnerability to potential impacts: This habitat is susceptible to the spread of invasive species, intensive grazing or overgrazing by livestock, burning for agriculture, forestry plantation and windfarm developments.

6.4.2.2.2 Old sessile oak woods with Ilex and Blechnum in the British Isles (91A0)

Old sessile oak woods is defined in the interpretation manual of EU habitats as "acidophilous *Quercus petraea* woods, with low-branched trees, with many ferns, mosses, lichens and evergreen bushes." Three indicative species are listed: *Quercus petraea, Ilex aquifolium* and *Blechnum* ssp. However, in Ireland, the interpretation of this habitat type is wider – it also includes woods with *Quercus x rosacea* and *Quercus robur* (NPWS, 2019).

Conservation status, threats and pressures: The range of this habitat is 40,300km² and is stable in the short-term and the long-term trends (NPWS, 2019). However, the area covered by the habitat type within the range in the biogeographical region concerned is 60.08km² (at a minimum) and is experiencing a decreasing trend in the short-term and long-term (NPWS, 2019). Threats and pressures associated with this habitat type include the spread of invasive alien species; intensive grazing or overgrazing by livestock; and clear-cutting (NPWS, 2019).

Habitat Distribution:

Desk Study Results: Within this SAC, 13 sites of Old sessile oak woods were surveyed and mapped in the related conservation interests' documents (NPWS, 2011a). The closest site containing the habitat is located approx. 38km hydrologically downstream from the Proposed Gathabawn Windfarm Project site. However, further unsurveyed areas may be present within the Natura 2000 site (NPWS, 2011a).

Field Study Results: This habitat was **not recorded** within the Proposed Gathabawn Windfarm Project site during habitat surveys.

Vulnerability to potential impacts: This habitat is susceptible to the spread of invasive species, intensive grazing or overgrazing by livestock and forestry plantation.

See AA Figure 28: Baseline Information mapping for QI habitats - Old Oak Woodlands, Alluvial Forests & Petrifying Springs.

6.4.2.2.3 Killarney Fern (1421)

The perennial Killarney Fern (*Trichomanes speciosum*) sporophyte is a medium to small fern with translucent membranous fronds that are light green when young and a deep-dark green when they mature. Fronds often hang from vertical rock surfaces but are also known to occur on damp woodland floors. Frond length is reported to range from 20 - 45 cm (Ní Dhúill *et al.*, 2015). Killarney Fern have a very restricted ecological niche.

Conservation status, threats and pressures: The surface area range of the Killarney Fern is 7000km² which has been described as a Favourable reference range (NPWS, 2013). The population size is recorded at 177 colonies, with the largest population in Ireland occurring in Co. Waterford (NPWS, 2013). Threats and pressures associated with the Killarney Fern include grazing, outdoor sports and leisure activities and recreational activities; fire and fire suppression; and invasive alien species (NPWS, 2013).

Habitat Distribution:

Desk Study Results: The location of Killarney Fern within the SAC is mapped in the related Conservation Objectives and is located approx. 50km from the Proposed Gathabawn Windfarm Project site. Killarney Fern sightings were not recorded within the NBDC Grid Squares within which the proposed Gathabawn Windfarm is located.

Field Study Results: Killarney Fern was **not recorded** during habitat surveys within the Proposed Gathabawn Windfarm Project site.

Vulnerability to potential impacts: This species is susceptible to direct losses as a result of developments, or riparian management. It is also sensitive to agricultural pressures through grazing and recreational pressures and the spread of invasive species.

See AA Figure 24: Baseline Information mapping for - Desmoulins Whorl Snail, White Clawed Crayfish, Nore Freshwater Pearl Mussel & Killarney Fern.

6.4.2.3 Otter (1355)

The territories of Otters can stretch for many kilometres; the total length of the home range depends on the availability of food. The smallest territories are thought to occur at coastal sites, where territories may be as small as 2km. The longest territories occur in upland streams where an individual may have to range more than 20km to find sufficient food. Territorial marking typically occurs by means of sprainting or anal secretions. These marks are left mostly at features such as bridge footings, boulders, grass tussocks and stream confluences.

An individual Otter may utilise a number of resting sites within its territory; these can be hidden refuges above ground (couches), or under-ground chambers (holts). Holts tends to be natural crevices, associated with the roots of trees growing along river and lake banks. These natural recesses provide the Otter with a holt that has multiple entrances from which the Otter can escape if disturbed. Couches occur frequently in dense vegetation and may be associated with frequently used runs and slides into the water. The rearing of cubs occurs within 'natal holts', which are not marked by spraint. Although capable of breeding at any time of the year, a peak in breeding occurs during the summer and early autumn.

Otters that live in rivers and lakes tend to be completely nocturnal, described as being crepuscular – activity peaks at dusk and dawn. Otters are principally piscivorous (fish eating), relying predominantly on salmonids (salmon and trout), but also eel and small fish species such as stickleback. However, Otters are not limited to fish and feed opportunistically on a range of prey when available: frogs are frequently eaten by Otters, and the remains of invertebrates (crayfish), birds and small mammals have also been found in spraints (Reid *et al*. 2013).

Conservation status, threats and pressures: Ireland remains a stronghold for the European Otter – the most recent distribution data show that the Otter is widespread throughout Ireland in a wide variety of habitat types (NPWS, 2019). It is considered stable across Ireland based on the most recent Article 17 Reporting (NPWS, 2019c). The overall status of Otter is considered to be favourable – population, range, habitat and future prospects are all considered favourable (BiodiversityIreland.ie, 2021). The main threats to the Otter include pollution – particularly organic pollution resulting in fish kills; and accidental deaths (e.g., collision with road traffic) (NPWS, 2019a). Disturbance to riverbank habitat also negatively impacts Otters.

Species Distribution:

Desk Study Results: Contemporary Annex II Otter records were widespread throughout the respective grid squares, with records available for the Coolnacrutta Stream, River Goul, Gorteenahilla River, Nuenna River, Lisdowney Stream and River Nore (2005-2023 data). Otter are recorded 9 times in the NBDC OS grid squares S36 and S37 (most recently in 2018 in S37), and 10 times in S46 and S47 (most recently in 2015 in S47).

Field Study Results: An Otter latrine site was recorded immediately downstream of the bridge on the Nuenna River at site B6, while a regular Otter spraint site was recorded underneath the masonry arch bridge crossing and immediately downstream of the bridge on the Lisdowney Stream at site C4. In addition, an Otter spraint site was recorded immediately upstream of the bridge on the Coolnacrutta Stream at site A2 (c.800m from

FW1 at Ballylehaun). Turbine delivery route facilitating works at FW9 at located 5m from the Ballyring Upper Stream, while facilitating works at FW8 are ~50m from the Foyle South stream which drains into the Gorteenahilla Stream. Surveys at these stream locations found Otter spraint under the bridges at FW8, with no evidence of Otter at FW9, although habitats would be suitable for Otter to forage along with watercourse.

Two Otter spraints (ITM: 644282.43, 673384.19; ITM 644440.86, 672912.35) were recorded on the River Nore as incidental sightings during a Watercourse Survey in May 2025. There is an Otter Holt/Couch recorded near these spraint locations. These records were recorded c.1.3km north of the Candidate Gathabawn Grid Connection crossing of the River Nore.

High foraging suitability was recorded on the Nuenna River (B5 and B6), which provided high cover and abundant food resources. Good suitability for Otter was also noted on the River Nore (C6).

Generally, all watercourses containing water will be of foraging value to Otter. Evidence on the River Nore, Nuenna River, Lisdowney Stream, Coolnacrutta River and Gorteenahilla River indicate that Otter are widespread within the wider network of watercourses within the project area.

Vulnerability to potential impacts:

The main threats to the Otter include pollution – particularly organic pollution resulting in fish kills and accidental deaths (e.g., collision with road traffic). Disturbance and loss of riverbank habitat also negatively impacts Otters and fencing can prevent individuals commuting between waterbodies.

See AA Figure 11: Aquatic Habitat, Kingfisher Watercourse Survey & Otter Survey Locations.

6.4.2.4 Desmoulin's Whorl Snail (1016)

Desmoulin's Whorl Snail (*Vertigo moulinsiana*) is the largest of all the Vertigo species, growing to between 2.2 and 2.7mm in height. All whorl snails favour damp or wet habitats, where they live mostly in moss, leaves and decaying vegetation. They feed on bacterial films and decaying vegetation. *V. moulinsiana* lives on living and dead stems and leaves of tall wetland plants.

It has a requirement for tall, structured vegetation containing tall riparian grasses and sedges, particularly reed sweet-grass (*Glyceria maxima*), common reed (*Phragmites australis*), greater pond-sedge (*Carex riparia*) and great fen-sedge (*Cladium mariscus*).

Conservation status, threats and pressures: Desmoulin's Whorl Snail is protected by the Habitats Directive [92/42/EEC] Annex II. Their overall status in Ireland is described as Inadequate and deteriorating – their range, population, habitat and future prospects are described as Inadequate (NPWS, 2019). The species' IUCN conservation status is assessed as Endangered in Ireland and Vulnerable in Europe (NBDC, 2021). Threats and pressures faced by this species include natural succession resulting in species composition change and drying out of the habitat, dredging / removal of limnic sediments and management of aquatic and bank vegetation for drainage purposes (NPWS, 2019).

Species Distribution:

Desk Study Results: Two known sites: (a) Borris Bridge, Co. Carlow S711503, more than 40km south-east of the Gathabawn Windfarm Project, present on River Barrow therefore hydrologically isolated; (b) Boston Bridge, Kilnaseer S338774, Co. Laois, c. 16km upstream of, and therefore hydrologically unaffected by the Gathabawn Windfarm Project. Six records for the species were recorded in grid square S47 and dated 03/09/1998.

Field Study Results: Desmoulin's Whorl Snail was **not observed** during aquatic surveys undertaken in the Proposed Gathabawn Windfarm Project.

Vulnerability to potential impacts: This species is vulnerable to changes in management regimes resulting in changes to habitat structure and humidity levels. This species is also susceptible to direct losses as a result of developments, or other pressures and the spread of invasive species.

See AA Figure 24 : Baseline Information mapping for - Desmoulins Whorl Snail, White Clawed Crayfish, Nore Freshwater Pearl Mussel & Killarney Fern.

6.4.3 Proposed Gathabawn Windfarm

The location of the Proposed Gathabawn Windfarm in relation to the River Barrow and River Nore SAC is provided in this Section. Details of the design of the windfarm in the context of avoiding impacts to the SAC are outlined, and the key works and activities which are relevant to the evaluation of effects are identified across the various life-cycle stages of the development.

See AA Figure 20: Locational Context of Gathabawn Windfarm Project and Surrounding Landuse in relation to River Barrow and River Nore SAC.

6.4.3.1 Locational Context

The Proposed Gathabawn Windfarm development is not located within or in close proximity to any part of the River Barrow and River Nore SAC. However, the Candidate Gathabawn Grid Connection overlaps the boundary of the SAC at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within adjacent agricultural lands which are within the boundary of the SAC. The Candidate Gathabawn Grid Connection also includes cable crossing of tributary streams which occur along the Ballylehaun-Ballyring UGC and Ballyring to Parksgrove UGC. See AA Figure 20: Locational Context map (over).

6.4.3.2 Design Features of the development

The following constraints were implemented during the design of the windfarm development:

- No instream works within the boundary of the SAC, cables to be installed across the River Nore using HDD techniques which put the cables several metres under the river bed. This will avoid direct effects to the main Nore channel and any associated riparian habitats;
- Drill pits set back 30m from the riverbanks – to reduce effects to the main Nore channel and any associated riparian habitats;;
- Underground Cables associated with the Parksgrove-Moatpark UGC are located in the public road verge where possible – to reduce extent of works within the grassland fields and SAC boundary on the western side of the river;
- An oversized cable will be installed for the Parksgrove-Moatpark UGC. This higher-capacity cable can support both the Gathabawn project and a future project, thereby avoiding consecutive construction works for an additional grid connection.

Appropriate Assessment Report

AA Figure 20 - Locational Context of Gathabawn Windfarm Project and Surrounding Landuse in relation to River Barrow and River Nore SAC

Legend:

- Underground Cabling
- Parksgrove Substation
- Drill Pits
- Joint Bay
- Existing EirGrid Ballyragget Substation
- Long Term Storage Berm
- Briskalagh WF Grid Connection (Consented)
- Seskin WF Grid Connection (Under Appeal, ACP)
- Construction Works Area Boundary
- River Barrow and River Nore SAC
- N77 Public Road Identification Number

Gathabawn Drill Pits (Crossing the River Nore)

Existing Eirgrid Ballyragget Substation

Seskin WF Grid Connection (Under Appeal, ACP)

River Barrow and River Nore SAC

Briskalagh WF Grid Connection (Consented)

Parksgrove - Moatpark UGC

Gathabawn Drill Pits (Crossing the N77)

Parksgrove Substation

Temporary Construction Compound

Access Road

Long Term Storage Berm

Ballyring - Parksgrove UGC

Cemetery

N432

N77

Páirc an Mhóta
Moatpark

River Nore
An Fheoir

N

6.4.3.3 Impact Potential Across the Project Life Cycle

In addition to the descriptions of the project provided in Section 3 of the AA Report, an overview those project activities which are in close proximity to the SAC are identified below, to establish the specific source-pathway mechanisms for the evaluation of potential impacts on the Qualifying Interests (QIs) of the SAC.

Construction Phase: The main potential for effects arises during the construction phase:

- Although the Proposed Gathabawn Windfarm is remote from the SAC site, with no natural watercourses at the Ballylehaun or Ballyring Areas, temporary turbine delivery facilitating works at Garrydague will be close (within 5m) to the Ballyring Upper Stream, a tributary stream of the Nuenna River;
- Works to install cables for the Candidate Gathabawn Grid Connection will involve works at tributary streams - under an existing culvert at the Gorteenamuck Stream (W1), HDD works at the Gorteenahilla Stream (W2), instream works at the Lismaine Stream (W3), Lisdowney Stream (w4) and Ballyconra Stream (W5); HDD crossing of the River Nore (W6);
- The Proposed Gathabawn Windfarm site is located in the Goul_SC_010 which drains into the River Nore via the Goul River and then via the Erkina River joining the Nore at Durrow, and the Nore_SC_070 sub-catchment which drains mainly into the Nuenna River, whose confluence with the River Nore is downstream of Freshford town. A small area of the windfarm in the Ballyring Area drains into the River Nore directly via the Lismaine Stream. Excavations, groundworks, emplacement of cementitious materials and use of machinery run on hydrocarbons are all sources of potential water quality impacts;
- The Candidate Gathabawn Grid Connection is also located in the Goul_SC_010 and Nore_SC_070, in addition to the Nore_SC_060, with similar type, albeit smaller scale, of works within the catchment;
- Grid works, along the Parksgrove-Moatpark UGC, will involve trenching works along the N77 verge, then across grassland fields on either side of the River Nore, with drilling pits located 30m from the river bank;
- Delivery of materials to the windfarm site and grid connection works areas will be via the national and regional road network through Ballyragget and Durrow which are both located along the SAC. Deliveries will involve the movement of HGVs run on hydrocarbons, which will emit GHG and noise, and present a collision mortality risk to some species.
- Noise and visual intrusion as a result of the presence of personnel, machinery and construction works, particularly in close proximity the Ballyring Upper Stream (at FW9), and to the River Nore and its tributary streams along UGC routes and in proximity to the Parksgrove Substation.

Operational Phase: Operational works for the Gathabawn Windfarm Project in proximity to the SAC or to its connecting tributary streams is limited to monthly inspections and testing at the Parksgrove Substation, with infrequent maintenance works required at this location. Annual or bi-annual inspection of cable routes with testing at jointing chamber locations. This works will involve the removal of the manhole cover and testing of cables inside the chamber. No excavation works are expected to be required along the cable trenches. The Parksgrove Substation and Parksgrove-Moatpark UGC are expected to be permanent infrastructure, transferring into State ownership following their construction. The Ballylehaun-Ballyring UGC and Ballyring-Ballylehaun UGC may be decommissioned with the Gathabawn Windfarm, this would involve small discrete excavations at jointing chambers along the UGC routes to pull the cables from the cable ducts, followed by reinstatement of the chamber lid and reinstatement of the landcover. The closest jointing chamber to a natural watercourse is the Lismaine stream (36m), and 100m from all other watercourses, including the River Nore.

6.4.4 Potential Impact Screened-In for Detailed Evaluation – River Barrow and River Nore SAC

The findings of the screening exercise carried out for the River Barrow and River Nore SAC (Section 5.2.2) identified connectivity with the following potential impact:

SAC Impact A: Direct impact to QI habitat - Direct loss, fragmentation or degradation of QI habitats, direct loss or reduction in connectivity of QI habitats or plant species

SAC Impact B: Indirect Impact to QI habitat or plant species – Loss or degradation of terrestrial or aquatic habitats or species, or loss of connectivity of habitats, within or ex-situ SAC sites (via reductions in water quality, dust emissions or the spread of invasive species).

SAC Impact C: Indirect Impacts to QI fauna species loss, reduction, fragmentation of loss of connectivity of suitable habitat or reduction in prey item species (via reductions in water quality, dust emissions, changes in flow, or spread of invasive species)

SAC Impact D: Direct or Indirect Impacts to QI species via mortality, disturbance or displacement.

6.4.4.1 Breakdown of Specific Pathways under SAC Impacts A to D

The SAC Impacts A - D comprises several distinct environmental pathways that could indirectly affect the Qualifying Interest habitats and species. To ensure a robust assessment, these specific pathways are characterised individually below to establish their scale and mechanisms. However, they are fundamentally considered as interconnected components of a single impact type, and their collective, cumulative effects on the conservation objectives of the SAC are fully evaluated in Section 6.4.4.2 to Section 6.4.4.10 below.

AA Table 18: Breakdown of Specific Pathways under SAC Impacts A to D

Impact	Evaluation can be found in:
Direct impact to European dry heaths, old sessile oak woods, killarney fern	Section 6.4.4.3
Direct impact to tidal, coastal and riparian QI habitats	Section 6.4.4.4
Indirect impact to European dry heaths, Old sessile oak woods, Killarney fern	Section 6.4.4.5
Indirect impacts to tidal, coastal and riparian QI habitats	Section 6.4.4.6
Indirect impacts to QI Aquatic species	Section 6.4.4.7
Indirect impact to QI species – Otter, Desmoulin's Whorl Snail	Section 6.4.4.8
Mortality, disturbance or displacement - Aquatic Species	Section 6.4.4.9
Mortality, disturbance or displacement of Otter, Desmoulin's Whorl Snail	Section 6.4.4.10

6.4.4.2 Consideration of In-Combination Effects

The evaluations take into account the in-combination effect with the following other projects and activities:

- Grid connections for the Briskalagh WF (consented) and Seskin WF (in-planning) both involve crossing the River Nore by HDD and connecting into the existing Eirgrid Ballyragget Substation. These projects could potentially all be built during the same period as the Gathabawn Windfarm Project.
- Works for the wind farms within the same sub-catchments and in the sub-catchments of the Upper Nore, would involve excavations, groundworks, use of cementitious material, hydrocarbons and noise and visual intrusion from personnel, machinery and delivery vehicles. Wind farms which are consented, currently in planning, or currently pre-planning, and could therefore potentially construct during the same period (worst case scenario), include: Briskalagh Wind Farm (consented) (part) and the Seskin Wind Farm (in planning).

- Sub-catchments associated with the Whole Gathabawn Windfarm Project (Goul_SC_010, Nore_SC_070, Nore_SC_060 and Nore_SC_080) also include the Seskin Wind Farm (under appeal, ACP), Ballynalacken Wind Farm Project (consented), Moatpark BESS 1, Moatpark BESS 2 (associated with Seskin WF, Ballynalacken WF, and Briskalagh WF), and grid connections (associated with Seskin WF and Briskalagh WF).
- Two BESS projects have been consented in Moatpark, involving excavations, groundworks, presence of personnel and working machinery; while unlikely, these projects could potentially build during the same period as the Gathabawn Windfarm Project.
- Agricultural land use and management practices.
- Ballyragget River Walk plan.

All stages of the project lifecycle, in addition to other plans, projects and activities are considered. Where it is determined that the potential for significant effects to the Conservation Objectives cannot be excluded, the requirement for mitigation measures is identified in view of reducing, avoiding, or eliminating adverse impacts.

The Conservation Objectives for the SAC, in addition to the specific impact pathways identified for the evaluation of *SAC Impacts A to D*, are considered sufficient to inform a considered and reasoned examination and analysis of effects of the Proposed Gathabawn Windfarm (either alone or in-combination) on the conservation status of the QI habitats and species, and thus on the overall integrity of the River Barrow and River Nore SAC.

6.4.4.3 Direct impact to European dry heaths, old sessile oak woods, killarney fern

QI Habitat

[4030] European dry heaths
[91A0] Old sessile oak woods with Ilex and Blechnum in the British Isles
[1421] Killarney Fern

Description of potential Impacts Considered

Direct impact to QI habitat - Direct loss, fragmentation or degradation of QI habitats, direct loss or reduction in connectivity of QI habitats or plant species

Sensitivity of QI Habitat

European dry heaths are vegetation dominated by ericaceous dwarf shrubs, typically occurring on well-drained, nutrient-poor, acidic mineral soils or on shallow peats and peaty podzols. Ling is generally the main species, but Bell Heather, Western Gorse and Bilberry may also be important components. This habitat is sensitive to burning and overgrazing. Climate change is acknowledged as a potential threat to dry heaths, with predicted increases in the frequency of temperature and rainfall extremes and more frequent or prolonged drought periods (NPWS, 2025a). The Conservation Objectives document contains targets specific to this habitat, including the potential threat of increased Bracken (*Pteridium aquilinum*), cover of non-native agricultural weed species and non-native species (target: > 1%) (NPWS, 2025)

Old sessile oak woods with Ilex and Blechnum in the British Isles (91A0) is defined as Quercus petraea woods, with low-branched trees, with many ferns, mosses, lichens and evergreen bushes, with three indicative species: *Quercus petraea*, *Ilex aquifolium* and *Blechnum* spp. (NPWS, 2025). This QI habitat occurs throughout the River Barrow and Nore SAC, with at least 85.08ha of habitat recorded. This habitat is sensitive to the following invasive species in this woodland type: Beech (*Fagus sylvatica*), Rhododendron (*Rhododendron ponticum*), Cherry Laurel (*Prunus laurocerasus*), and overgrazing by deer (NPWS, 2025a). As per the Conservation Objectives document, the target for this QI is the absence or control of these negative indicator species (NPWS, 2025).

The Killarney Fern is a large-sized, evergreen, perennial filmy fern in the family *Hymenophyllaceae*. It is restricted to damp, shady and humid habitats and is extremely sensitive to desiccation. The pressures identified are generally local issues, and none are considered to be impacting the long-term viability of the species or its habitat (NPWS, 2025a). The Conservation Objectives document contains targets specific to this species, including the absence or control of invasive species, maintaining hydrological conditions, and no loss of suitable habitat, including woodland canopies (NPWS, 2025).

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Potential impacts to the QI habitats as a result of Construction Works:

The Gathabawn Windfarm does not overlap the boundary of the River Barrow and River Nore SAC; it is located 4.6km from the SAC boundary. The sources for direct loss, fragmentation or degradation effects will be restricted to the construction works areas of the Gathbawn Windfarm; the potential for significant impacts to these QIs can be excluded.

Potential impacts to the QI habitats during the Operational Phase;
Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to these QIs can be excluded.

Potential impacts to the QI habitats during the Decommissioning Phase;

Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm

control buildings and reinstatement and restoration of the windfarm site. Machinery involved will include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection overlaps the boundary of the SAC at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel.
Due to the separation distance (9.3km) to the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects to the SAC can be excluded.

Overlap of construction periods: It is considered that the construction and decommissioning stages of the Candidate Gathabawn Grid Connection have the potential to cause effects to the QIs. Works and activities during the operational and decommissioning stages for the Gathabawn Windfarm will be limited in scale and mainly carried out at the windfarm hardcore footprint. The Candidate Gathabawn Grid Connection will require very little on-site maintenance or inspection activities during the operational stage. However, the decommissioning stage will involve pulling internal windfarm cables and Ballylehaun-Parksgrove cables from ducting at jointing locations, loading and removal from site.
Evaluation of the Other Elements: In relation to direct loss, fragmentation or degradation effects, given the terrestrial nature of these QIs and the significant distance over land and hydrological distance downstream of the mapped areas of these QIs, potential for significant in-combination impacts of the Whole Gathabawn Windfarm Project can be excluded.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

When the Whole Gathabawn Windfarm Project is considered in-combination, construction activities associated with the Candidate Gathabawn Grid Connection, given the terrestrial nature of these QIs and the significant distance over land and hydrological distance downstream of the mapped areas of these QIs, potential for significant in-combination impacts of the Whole Gathabawn Windfarm Project can be excluded.

Evaluation of Potential In-Combination Effects with Other Projects/Activities

Other projects- Two windfarm projects (Siskin WF, Briskalagh WF) will involve HDD crossing works under the River Nore SPA. Both BESS projects at Moatpark will involve construction works in proximity to the River Nore and mature woodland along the banks of the River Nore. However, given the terrestrial nature of these QIs and the significant distance over land and hydrological distance downstream of the mapped areas of these QIs, potential for significant in-combination impacts of the Whole Gathabawn Windfarm Project can be excluded.

Summary of Effects (in the absence of mitigation)

It is concluded that significant direct impacts to the SAC via direct loss, fragmentation or degradation of QI habitats, direct loss or reduction in connectivity of QI habitats or plant species during the construction, operational and decommissioning stages of the Whole Gathabawn Windfarm and in-combination with other projects can be excluded.

6.4.4.4 Direct impact to tidal, coastal and riparian QI habitats

QI Habitat
[1130] Estuaries [1140] Mudflats and sandflats not covered by seawater at low tide [1310] Salicornia and other annuals colonizing mud and sand [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1410] Mediterranean salt meadows (*Juncetalia maritimi*) [3260] Water courses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [6430] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [7220*] Petrifying springs with tufa formation [91E0*] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)
Description of potential Impacts Considered
Direct impact to QI habitat - Direct loss, fragmentation or degradation of QI habitats, direct loss or reduction in connectivity of QI habitats or plant species
Sensitivity of QI Habitat
Estuaries are coastal inlets where there is generally a significant freshwater influence but the salinity can be highly temporally variable. Pressures impacting the habitat include increased nutrient enrichment from a range of sources, and disturbance due to fishing activities (NPWS, 2025a). Mudflats and sandflats comprise the intertidal section of the coastline where sands and muds dominate. They are dynamic ecosystems, dependent on the balance of natural accretion and erosion. The main pressure on Tidal mudflats and sandflats is nutrient enrichment of enclosed bays with poor mixing, due mainly to diffuse pollution as a result of agricultural and forestry activities and wastewater discharges (NPWS, 2025a). Salicornia and other annuals colonising mud and sand is a pioneer saltmarsh community that may occur on muddy sediment seaward of established saltmarsh, or form patches within other saltmarsh communities where the elevation is suitable and there is regular tidal inundation. Sensitivities include invasion by cord-grasses (*Spartin*a spp.) affecting the habitat at present (NPWS, 2025a). Atlantic salt meadows generally occupy the widest part of the saltmarsh gradient. They also contain a distinctive topography with an intricate network of creeks and salt pans occurring on medium- and large-sized saltmarshes. Sensitivities include pressures from agriculture (including ecologically unsuitable grazing regimes and land reclamation) and continued invasion by cord-grasses (NPWS, 2025a). Mediterranean salt meadows occupy the upper zone of saltmarshes and usually occur adjacent to the boundary with terrestrial habitats. They are widespread on the Irish coastline; however, they are not as extensive as Atlantic salt meadows. Sensitivities mainly include pressures associated with invasive species such as Common Cord-grass (*Spartina anglica*), and agriculture (e.g., overgrazing, undergrazing and land reclamation) (NPWS, 2025a). Water courses of plain to montane levels have a broad definition, ranging from upland, flashy, oligotrophic, bryophyte- and algal-dominated rivers, to tidal reaches dominated by higher plants. In Ireland, the highest riverine conservation interest is associated with lowland depositing and tidal rivers and unmodified, fast-flowing, low-nutrient rivers. The main problems for river habitats in Ireland are damage through

hydrological and morphological change, eutrophication and other water pollution. Agriculture and municipal and industrial discharges are the most significant sources of nutrient and organic pollution (NPWS, 2025a).

Hydrophilous tall-herb fringe communities are characterised by a high proportion of tall herb species in hydrophilous or nitrophilous conditions. The habitat occurs in two situations - upland, typically on base-rich ledges, and lowland, along the unmanaged margins of slow-moving rivers, lakes and other wetlands. The main pressures on the lowland habitat are invasive alien species, such as Himalayan Balsam (*Impatiens glandulifera*) and Giant Hogweed (*Heracleum mantegazzianum*), drainage, and impacts along riverbanks and canals to maintain paths for walking or access for fishing. In the uplands, overgrazing is an issue (NPWS, 2025a).

Petrifying springs are a specialised habitat that forms where calcareous waters deposit tufa, a porous rock made of calcium carbonate. The tufa formation may be small deposits around the bases of plants within the spring, or very large mounds and cascades. The key pressures on the habitat relate to water quality, changes to hydrology, and abandonment (NPWS, 2025a).

Two classes of the habitat alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) exist in Ireland, both occurring on heavy soils that are periodically inundated by the rise of water levels. The more common type is that of the riparian forests of Ash and Alder (*Alno-Padion*) of temperate and Boreal Europe lowland and hill watercourses. The other type is the gallery forests of tall willows (*Salicion albae*) that occur alongside lowland river channels and occasionally on river islands, where the tree roots are almost continuously submerged. The main pressures are invasive plant species, notably Himalayan Balsam, overgrazing by deer, the fungal disease Ash dieback, and hydrological pressures such as drainage and modification of hydrological flow (NPWS, 2025a).

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Due to the hydrological separation distance and the intrinsic nature and structure of these QI habitats and the location of these habitats within a transitional waterbody (Nore Estuary [IE_SE_100_0400]), it is evaluated that there is no likelihood of significant impacts to habitat areas or to the extent, structure or distribution of their communities for the following QIs: Estuaries (1130); Mudflats and sandflats not covered by seawater at low tide (1140); Salicornia and other annuals colonizing mud and sand (1310); Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330), Mediterranean salt meadows (*Juncetalia maritimi*) (1410) and Reefs (1170).

Potential impacts to the QI habitats as a result of Construction Works:

The Gathabawn Windfarm does not overlap the boundary of the River Barrow and River Nore SAC; it is located 4.6km from the SAC boundary. The sources for direct loss, fragmentation or degradation effects will be restricted to the construction works areas of the Gathbawn Windfarm; the potential for significant impacts to these QIs can be excluded.

Potential impacts to the QI habitats during the Operational Phase;

Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to these QIs can be excluded

Potential impacts to the QI habitats during the Decommissioning Phase;

Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm

control buildings and reinstatement and restoration of the windfarm site. Machinery involved will include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection overlaps the boundary of the SAC at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel. Due to the separation distance (9.3km) and locational context of the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects to the SAC can be excluded.

Overlap of construction periods: The construction stage of the Candidate Gathabawn Grid Connection will take place during the same period as the Proposed Gathabawn Windfarm.
Lifecycle stages: It is considered that the construction and decommissioning stages of the Candidate Gathabawn Grid Connection have the potential to cause effects to the QIs. Works and activities during the operational and decommissioning stages for the Gathabawn Windfarm will be limited in scale and mainly carried out at the windfarm hardcore footprint. The Candidate Gathabawn Grid Connection will require very little on-site maintenance or inspection activities during the operational stage. However, the decommissioning stage will involve pulling internal windfarm cables and Ballylehaun-Parksgrove cables from ducting at jointing locations, loading and removal from site.

Evaluation of the Other Elements: In relation to direct impacts via direct loss, fragmentation or degradation of aquatic QI habitats, construction works associated with the Candidate Gathabawn Grid Connection include HDD at the River Barrow and River Nore SAC, and instream works to install the ducting at three watercourse locations upstream of the SAC (Lismaine Stream at W3, Lisdowney Stream at W4 and the Ballyconra Stream at W5), **and in the absence of mitigation measures, effects due to these works could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

There is some increased potential for the Whole Gathabawn Windfarm Project works to cause direct loss, fragmentation or degradation of aquatic QI habitats. When the Whole Gathabawn Windfarm Project is considered in-combination, construction activities associated with the Candidate Gathabawn Grid Connection, which include HDD works at the River Barrow and River Nore SAC and instream works upstream of the SAC, it is considered that there is **increased potential for direct loss, fragmentation or degradation, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects with Other Projects/Activities

Other projects- Two windfarms projects (Siskin WF, Briskalagh WF) will involve HDD crossing works under the River Barrow and River Nore SAC. Both BESS projects at Moatpark will involve construction works in proximity to the River Nore and mature woodland along the banks of the River Nore. As such, potential direct loss, fragmentation or degradation of aquatic QI habitats within the River Barrow and River Nore SAC is possible and may result in **increased potential for direct loss, fragmentation or degradation, and in the absence of mitigation measures, these effects could be significant.** Mitigation measures to avoid or reduce the in-combination effects will be required.

Summary of Effects (in the absence of mitigation)

The potential direct impacts to aquatic QI habitats within the SAC relate to direct loss, fragmentation or degradation effects during the construction stage of the Candidate Gathabawn Grid Connection. The risk of these impacts is further increased when considering in-combination effects with other projects (Siskin WF, Briskalagh WF, both BESS projects at Moatpark). **Mitigation measures which will avoid or reduce these potential in-combination effects are described in full in Section 6.4.6 of this document.**

6.4.4.5 Indirect impact to European dry heaths, Old sessile oak woods, Killarney fern

QI Habitat

[4030] European dry heaths
[91A0] Old sessile oak woods with Ilex and Blechnum in the British Isles
[1421] Killarney Fern

Description of potential Impacts Considered

Indirect Impact to QI habitat or plant species – Loss or degradation of terrestrial or aquatic habitats or species, or loss of connectivity of habitats, within or ex-situ SAC sites (via reductions in water quality, dust emissions or the spread of invasive species).

Sensitivity of QI Habitat

European dry heaths are vegetation dominated by ericaceous dwarf shrubs, typically occurring on well-drained, nutrient-poor, acidic mineral soils or on shallow peats and peaty podzols. Ling is generally the main species, but Bell Heather, Western Gorse and Bilberry may also be important components. This habitat is sensitive to burning and overgrazing. Climate change is acknowledged as a potential threat to dry heaths, with predicted increases in the frequency of temperature and rainfall extremes and more frequent or prolonged drought periods (NPWS, 2025a). The Conservation Objectives document contains targets specific to this habitat, including the potential threat of increased Bracken, cover of non-native agricultural weed species and non-native species (target: > 1%) (NPWS, 2025)

Old sessile oak woods with Ilex and Blechnum in the British Isles (91A0) is defined as Quercus petraea woods, with low-branched trees, with many ferns, mosses, lichens and evergreen bushes, with three indicative species: *Quercus petraea*, *Ilex aquifolium* and *Blechnum* spp. (NPWS, 2025). This QI habitat occurs throughout the River Barrow and Nore SAC, with at least 85.08ha of habitat recorded. This habitat is sensitive to the following invasive species in this woodland type: Beech, Rhododendron, Cherry Laurel, and overgrazing by deer (NPWS, 2025a). As per the Conservation Objectives document, the target for this QI is the absence or control of these negative indicator species (NPWS, 2025).

The Killarney Fern is a large-sized, evergreen, perennial filmy fern in the family *Hymenophyllaceae*. It is restricted to damp, shady and humid habitats and is extremely sensitive to desiccation. The pressures identified are generally local issues, and none are considered to be impacting the long-term viability of the species or its habitat (NPWS, 2025a). The Conservation Objectives document contains targets specific to this species, including the absence or control of invasive species, maintaining hydrological conditions, and no loss of suitable habitat, including woodland canopies (NPWS, 2025).

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Potential impacts to the QI habitats as a result of Construction Works:

In relation to reduction in water quality, the Gathabawn Windfarm does not overlap the boundary of the River Barrow and River Nore SAC; it is located 4.6km from the SAC boundary. Furthermore, as per the Conservation Objectives, these QIs are not sensitive to changes in water quality, and therefore the potential for significant impacts to these QIs via reductions in water quality can be excluded.

In relation to dust emissions, although the SAC is located 4.6km from the Gathabawn Windfarm, given the large-scale nature of the construction works, dust emissions can arise from the transportation of aggregate, movement of delivery vehicles and the movement of excavated materials and from bare soils at excavated areas and overburden storage areas. There is **potential for dust emissions, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

In relation to the spread of invasive species, within the 10km squares S36 and S37, four High Impact Invasive Species plants are recorded: Rhododendron, Giant Hogweed, Japanese Knotweed, and Bohemian Knotweed, it is considered that there is a presence of invasive species within the study area, due to the scale of construction activities and groundworks at the windfarm site, movement of overburden, importation of materials and the volume of machinery and deliveries entering the site during the construction phase, that there is **potential for the dispersal of invasive species, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Potential impacts to the QI habitats during the Operational Phase;
Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to these QIs can be excluded.

Potential impacts to the QI habitats during the Decommissioning Phase;
Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm control buildings and reinstatement and restoration of the windfarm site. Machinery involved will include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection overlaps the boundary of the SAC at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel.
Due to the separation distance (9.3km) and locational context to the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects to the SAC can be excluded.

Overlap of construction periods: The construction stage of the Candidate Gathabawn Grid Connection will take place during the same period as the Proposed Gathabawn Windfarm.
Lifecycle stages: It is considered that the construction and decommissioning stages of the Candidate Gathabawn Grid Connection have the potential to cause effects to the QIs. Works and activities during the operational and decommissioning stages for the Gathabawn Windfarm will be limited in scale and mainly carried out at the windfarm hardcore footprint. The Candidate Gathabawn Grid Connection will require very little on-site maintenance or inspection activities during the operational stage. However, the decommissioning stage will involve pulling internal windfarm cables and Ballylehaun-Parksgrove cables from ducting at jointing locations, loading and removal from site.
Evaluation of the Other Elements: In relation to reductions in water quality, it is considered that due to the terrestrial nature of the QI and the fact that these QIs are not sensitive to changes in water quality, as per the Conservation Objectives document, the potential for significant impacts to these QIs can be excluded.
In relation to indirect loss or degradation of terrestrial habitats or species, or loss of connectivity of habitats, within or ex-situ SAC sites (via dust emissions or the spread of invasive species), construction works associated with the Candidate Gathabawn Grid Connection will involve movement of overburden and materials, and the volume of machinery and deliveries entering the project works locations. It is considered that **there is increased potential for the dispersal of dust emissions and spread of invasive species, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

There is some increased potential for the Whole Gathabawn Windfarm Project works to release sediment or contaminants or nutrients to downstream watercourses. However, as per the Conservation Objectives – these QIs are not sensitive to changes in water quality, and therefore the potential for significant impacts via reductions in water quality can be excluded.

There is some increased potential for whole project works to release dust emissions and spread of invasive species, as per the Conservation Objectives – this QI habitat is sensitive to habitat loss. In relation to the spread of invasive species and dust emissions, when the Whole Gathabawn Windfarm Project is considered in-combination, construction activities and groundworks, movement of overburden and materials, and the volume of machinery and deliveries entering the project works locations increase, and therefore it is considered that there is **increased potential for the dispersal of dust emissions and invasive species, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects with Other Projects/Activities

Other projects- Two windfarm projects (Siskin WF, Briskalagh WF) will involve HDD crossing works under the River Nore SPA and the movement of vehicles and material delivery. Both BESS projects at Moatpark will involve construction works in proximity to the River Nore and mature woodland along the banks of the River Nore; these works will also likely involve the movement of vehicles and material delivery.

The likelihood of in-combination dust emissions and spread of invasive species affecting these QIs increases as the scale of the assessment increases. Therefore, **there is potential for adverse in-combination effects with other projects or activities within the catchment**. Mitigation measures will be required.

Summary of Effects (in the absence of mitigation)

These QI habitats are located throughout the River Barrow and River Nore SAC. These habitats are not sensitive to water quality effects, and due to the absence of watercourses within the Gathabawn Windfarm and the lack of sensitivity of these QIs to reductions in water quality, the potential for significant impacts of the Whole Gathabawn Windfarm and in-combination with other projects can be excluded.

The potential impacts to these QIs relate to potential dust emissions and the spread of invasive species during the construction stage of the Gathabawn Windfarm, both alone and in combination with the following other elements of the Whole Gathabawn Windfarm project – Candidate Gathabawn Grid Connection as well as other projects (Siskin WF, Briskalagh WF, both BESS projects at Moatpark). **Mitigation measures which will avoid or reduce these potential in-combination effects are described in full in Section 6.4.6 of this document.**

6.4.4.6 Indirect impacts to tidal, coastal and riparian QI habitats

QI Habitat
[1130] Estuaries [1140] Mudflats and sandflats not covered by seawater at low tide [1310] Salicornia and other annuals colonizing mud and sand [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1410] Mediterranean salt meadows (*Juncetalia maritimi*) [3260] Water courses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [6430] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [7220*] Petrifying springs with tufa formation [91E0*] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [1170] Reefs
Description of potential Impacts Considered
Indirect Impact to QI habitat or plant species – Loss or degradation of terrestrial or aquatic habitats or species, or loss of connectivity of habitats, within or ex-situ SAC sites (via reductions in water quality, dust emissions or the spread of invasive species).
Sensitivity of QI Habitat
Estuaries are coastal inlets where there is generally a significant freshwater influence but the salinity can be highly temporally variable. Pressures impacting the habitat include increased nutrient enrichment from a range of sources, and disturbance due to fishing activities (NPWS, 2025a). Mudflats and sandflats comprise the intertidal section of the coastline where sands and muds dominate. They are dynamic ecosystems, dependent on the balance of natural accretion and erosion. The main pressure on Tidal mudflats and sandflats is nutrient enrichment of enclosed bays with poor mixing, due mainly to diffuse pollution as a result of agricultural and forestry activities and wastewater discharges (NPWS, 2025a). Salicornia and other annuals colonising mud and sand is a pioneer saltmarsh community that may occur on muddy sediment seaward of established saltmarsh, or form patches within other saltmarsh communities where the elevation is suitable and there is regular tidal inundation. Sensitivities include invasion by cord-grasses (*Spartin*a spp.) affecting the habitat at present (NPWS, 2025a). Atlantic salt meadows generally occupy the widest part of the saltmarsh gradient. They also contain a distinctive topography with an intricate network of creeks and salt pans occurring on medium- and large-sized saltmarshes. Sensitivities include pressures from agriculture (including ecologically unsuitable grazing regimes and land reclamation) and continued invasion by cord-grasses (NPWS, 2025a). Mediterranean salt meadows occupy the upper zone of saltmarshes and usually occur adjacent to the boundary with terrestrial habitats. They are widespread on the Irish coastline; however, they are not as extensive as Atlantic salt meadows. Sensitivities mainly include pressures associated with invasive species such as Common Cord-grass (*Spartina anglica*), and agriculture (e.g., overgrazing, undergrazing and land reclamation) (NPWS, 2025a). Water courses of plain to montane levels have a broad definition, ranging from upland, flashy, oligotrophic, bryophyte- and algal-dominated rivers, to tidal reaches dominated by higher plants. In Ireland, the highest riverine conservation interest is associated with lowland depositing and tidal rivers and unmodified, fast-

flowing, low-nutrient rivers. The main problems for river habitats in Ireland are damage through hydrological and morphological change, eutrophication and other water pollution. Agriculture and municipal and industrial discharges are the most significant sources of nutrient and organic pollution (NPWS, 2025a).

Hydrophilous tall-herb fringe communities are characterised by a high proportion of tall herb species in hydrophilous or nitrophilous conditions. The habitat occurs in two situations - upland, typically on base-rich ledges, and lowland, along the unmanaged margins of slow-moving rivers, lakes and other wetlands. The main pressures on the lowland habitat are invasive alien species, such as Himalayan Balsam (*Impatiens glandulifera*) and Giant Hogweed, drainage, and impacts along riverbanks and canals to maintain paths for walking or access for fishing. In the uplands, overgrazing is an issue (NPWS, 2025a).

Petrifying springs are a specialised habitat that forms where calcareous waters deposit tufa, a porous rock made of calcium carbonate. The tufa formation may be small deposits around the bases of plants within the spring, or very large mounds and cascades. The key pressures on the habitat relate to water quality, changes to hydrology, and abandonment (NPWS, 2025a).

Two classes of the habitat alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) exist in Ireland, both occurring on heavy soils that are periodically inundated by the rise of water levels. The more common type is that of the riparian forests of Ash and Alder (*Alno-Padion*) of temperate and Boreal Europe lowland and hill watercourses. The other type is the gallery forests of tall willows (*Salicion albae*) that occur alongside lowland river channels and occasionally on river islands, where the tree roots are almost continuously submerged. The main pressures are invasive plant species, notably Himalayan Balsam, overgrazing by deer, the fungal disease Ash dieback, and hydrological pressures such as drainage and modification of hydrological flow (NPWS, 2025a).

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Due to the hydrological separation distance and the intrinsic nature and structure of these QI habitats and the location of these habitats within a transitional waterbody (Nore Estuary [IE_SE_100_0400]), it is evaluated that there is no likelihood of significant impacts to habitat areas or to the extent, structure or distribution of their communities for the following QIs: Estuaries (1130); Mudflats and sandflats not covered by seawater at low tide (1140); Salicornia and other annuals colonizing mud and sand (1310); Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330), Mediterranean salt meadows (*Juncetalia maritimi*) (1410) and Reefs (1170).

Potential impacts to the QI habitats as a result of Construction Works:

In relation to reduction in water quality, the Gathabawn Windfarm does not overlap the boundary of the River Barrow and River Nore SAC; it is located 4.6km from the SAC boundary. The potential for significant impacts to these QIs via reductions in water quality can be excluded.

In relation to dust emissions, although the SAC is located 4.6km from the Gathabawn Windfarm, given the large-scale nature of the construction works, dust emissions can arise from the transportation of aggregate, movement of delivery vehicles and the movement of excavated materials and from bare soils at excavated areas and overburden storage areas. There is **potential for dust emissions, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

In relation to the spread of invasive species, within the 10km squares S36 and S37, four High Impact Invasive Species plants are recorded: Rhododendron, Giant Hogweed, Japanese Knotweed, and Bohemian Knotweed; it is considered that there is a presence of invasive species within the study area. The aquatic QI habitat Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430), is noted to be sensitive to non-native species within the Conservation Objectives document, particularly:

Himalayan Balsam, Monkeyflower (*Mimulus guttatus*), Japanese knotweed and Giant Hogweed. Due to the scale of construction activities and groundworks at the windfarm site, movement of overburden, importation of materials and the volume of machinery and deliveries entering the site during the construction phase, that there is **potential for the dispersal of invasive species, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Potential impacts to the QI habitats during the Operational Phase;

Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to these QIs can be excluded.

Potential impacts to the QI habitats during the Decommissioning Phase;

Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm control buildings and reinstatement and restoration of the windfarm site. Machinery involved will include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection overlaps the boundary of the SAC at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel. Due to the separation distance (9.3km) to the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects to the SAC can be excluded.

Overlap of construction periods: The construction stage of the Candidate Gathabawn Grid Connection will take place during the same period as the Proposed Gathabawn Windfarm.
Lifecycle stages: It is considered that the construction and decommissioning stages of the Candidate Gathabawn Grid Connection have the potential to cause effects to the QIs. Works and activities during the operational and decommissioning stages for the Gathabawn Windfarm will be limited in scale and mainly carried out at the windfarm hardcore footprint. The Candidate Gathabawn Grid Connection will require very little on-site maintenance or inspection activities during the operational stage. However, the decommissioning stage will involve pulling internal windfarm cables and Ballylehaun-Parksgrove cables from ducting at jointing locations, loading and removal from site.

Evaluation of the Other Elements: In relation to indirect impacts via direct loss or degradation of aquatic QI habitats within or ex-situ of the SAC, construction works associated with the Candidate Gathabawn Grid Connection include HDD at the River Barrow and River Nore SAC, and instream works to install the ducting at three watercourse locations upstream of the SAC (Lismaine Stream at W3, Lisdowney Stream at W4 and the Ballyconra Stream at W5). The following aquatic QIs are surface water dependant and as such are sensitive to changes in water quality: Water courses of plain to montane levels (3260), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430), Petrifying springs (7220*) and Alluvial forests (91E0*). Other works include movement of overburden, importation of materials and the volume of machinery and deliveries entering the site during the construction phase which has the potential to be a source for dust emissions and spread of invasive species. It is considered that **there is potential for the reduction in water quality, dispersal of dust emissions and the spread of invasive species, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

There is some increased potential for the Whole Gathabawn Windfarm Project works to cause indirect loss, fragmentation or degradation of aquatic QI habitats within or ex-situ SAC sites (via reductions in water quality, dust emissions or the spread of invasive species). When the Whole Gathabawn Windfarm Project is considered in-combination, construction activities associated with the Candidate Gathabawn Grid Connection, which include HDD works at the River Barrow and River Nore SAC and instream works upstream of the SAC, as well as movement of overburden, importation of materials and the volume of machinery and deliveries entering the site during the construction phase, it is considered that there is **increased potential for indirect loss, fragmentation or degradation of these QIs via reductions in water quality, dust emissions and spread of invasive species, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects with Other Projects/Activities

Other projects- Two windfarm projects (Siskin WF, Briskalagh WF) will involve HDD crossing works under the River Barrow and River Nore SAC. Both BESS projects at Moatpark will involve construction works in proximity to the River Nore and mature woodland along the banks of the River Nore. As such, there is increased potential for **indirect loss, fragmentation or degradation of these QIs via reductions in water quality, dust emissions and spread of invasive species, and in the absence of mitigation measures, these effects could be significant.** Mitigation measures to avoid or reduce the in-combination effects will be required.

Summary of Effects (in the absence of mitigation)

The potential indirect impacts to aquatic QI habitats within or ex-situ of the SAC relate to habitat loss or degradation (via reductions in water quality, dust emissions or the spread of invasive species) during the construction stage of the Candidate Gathabawn Grid Connection. The risk of these impacts is further increased when considering in-combination effects with other projects (Siskin WF, Briskalagh WF, both BESS projects at Moatpark).

These QI habitats (Water courses of plain to montane levels (3260), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430), Petrifying springs (7220*) and Alluvial forests (91E0*)) are located throughout the River Barrow and River Nore SAC and the full distribution and extent of these habitats, and its sub-types in the River Barrow and River Nore SAC is unknown. These habitats are sensitive to water quality effects, and due to the proposed works associated with the construction of the Candidate Gathabawn Grid Connection and other projects, the potential for significant impacts of the Whole Gathabawn Windfarm and in-combination are considered to be significant.

Potential impacts to these QIs include the potential for dust emissions and the spread of invasive species during the construction stage of the Gathabawn Windfarm, both alone and in combination with the following other elements of the Whole Gathabawn Windfarm project – Candidate Gathabawn Grid Connection as well as other projects (Siskin WF, Briskalagh WF, both BESS projects at Moatpark).

Mitigation measures which will avoid or reduce these potential in-combination effects are described in full in Section 6.4.6 of this document.

6.4.4.7 Indirect impacts to QI Aquatic species

QI Species
[1029] Freshwater Pearl Mussel [1092] White-clawed Crayfish [1095] Sea Lamprey [1096] Brook Lamprey [1099] River Lamprey [1103] Twaite Shad [1106] Atlantic Salmon
Description of potential Impacts Considered
Indirect Impacts to QI fauna species loss, reduction, fragmentation of loss of connectivity of suitable habitat or reduction in prey item species (via reductions in water quality, dust emissions, changes in flow, or spread of invasive species)
Sensitivity of QI Species

The Freshwater Pearl Mussel is a large, long-lived, bivalve mollusc found in clean, fast-flowing rivers. Individuals can grow to very large sizes relative to other freshwater molluscs, slowly building up thick calcareous shells in rivers with relatively soft water and low levels of calcium. The pressures impacting on the species come from a wide variety of sources (e.g. forestry, farming, pollution from urban wastewater, and development activities), often quite removed from the habitat of the species. The species also suffers direct impacts from in-stream works such as channelisation, bridge repairs/construction and recreational fishery structures (NPWS, 2025a).

White-clawed Crayfish is the largest freshwater arthropod found in Ireland. The White-clawed Crayfish is generally associated with good-quality waters, but this is not necessarily the case in Ireland, where it can occur in water of lower quality. White-clawed Crayfish faces an existential threat from the twin impacts of non-indigenous crayfish species (NICS) and Crayfish Plague, which is a water-borne disease specific to freshwater crayfish caused by the oomycete *Aphanomyces astaci* (NPWS, 2025a).

The life cycle of the Sea Lamprey contains a freshwater phase followed by a marine phase. Adult Sea Lamprey at sea are external parasites on host fish or marine mammals and grow in length from 60 to 100 cm before migrating in spring into freshwater to excavate redds or spawning nests in gravelled areas of large rivers. Upriver migration occurs at a time of generally falling water levels and substantial spawning activity has been recorded in gravelled areas downstream of large weirs in the major Irish SAC rivers. Pressures on Sea Lamprey include barriers to upstream migration (e.g. weirs), which limit access to spawning beds and juvenile habitat; changes in precipitation due to climate change; and impacts from fishing on prey species availability (NPWS, 2025a).

Brook Lamprey is the smallest of the three lampreys recorded in Ireland, typically reaching no more than 15-18 cm in length. While several pressures have been identified, these pressures are often indirect, usually acting in combination, and deemed to have low influence (NPWS, 2025a).

The River Lamprey breeds in freshwater rivers and streams. Adults spawn in spring, excavating shallow nests in riverine sections comprising fine gravels and small stones. Habitat quality was considered as deteriorating due to a range of prevailing pressures and future threats including barriers to migration, increases in river discharge due to several factors including climate change, nutrient pollution due to anthropogenic activities, and impacts at sea such as commercial fishing that may impact on prey or host species (NPWS, 2025a). Twaite Shad spends most of its life in estuaries and coastal waters, but it returns to freshwater to spawn during April to July. In Ireland, there are four spawning populations which occur in the Barrow, Nore, Suir

and Munster Blackwater rivers, all of which are SACs for this species. Twaite Shad can migrate long distances into freshwaters but, in Ireland, they spawn in transitional waters at the upper limits of tidal influence. Numbers of Twaite Shad have declined across its range, with the main causes attributed to dam construction, pollution, overexploitation and habitat destruction. The combined influence of deteriorating water quality, the challenges of climate change and the hydrological and physico-chemical impacts of weirs have implications for the conservation status of this species (NPWS, 2025a).

Atlantic Salmon is an anadromous species indigenous to the North Atlantic. A substantial number of habitat threats and pressures impact Salmon, including aquaculture, declining quality of water and habitat, and physical barriers to migration, including from hydroelectric schemes. Although the protection for this species is in freshwater, there are also marine pressures that are influencing the population viability (NPWS, 2025a).

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Potential impacts to the QI habitats as a result of Construction Works:

In relation to reductions in water quality, although there is no direct hydrological connectivity to the SAC via surface water pathways and the intervening distance (4.6km) to the SAC boundary, it is considered that due to the scale of excavations and storage/movement of overburden at the windfarm site, the use of machinery running on hydrocarbons, and the use of concrete for foundation construction, there is potential for windfarm construction works to release sediment or contaminants to downstream watercourses; there is also potential for nutrients such as phosphorus to occur in site runoff, and **in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

In relation to flow regimes, the construction of an integrated drainage system at the windfarm will ensure that no changes to downstream flow regimes or flooding patterns will occur as a result of the Gathabawn Windfarm, and therefore the potential for significant impacts to this QI habitat can be excluded.

In relation to dust emissions, although the SAC is located 4.6km from the Gathabawn Windfarm, given the large-scale nature of the construction works, dust emissions can arise from the transportation of aggregate, movement of delivery vehicles and the movement of excavated materials and from bare soils at excavated areas and overburden storage areas. There is **potential for dust emissions, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

In relation to the spread of invasive species, within the 10km squares S36 and S37, four High Impact Invasive Species plants are recorded: Rhododendron, Giant Hogweed, Japanese Knotweed, and Bohemian Knotweed, it is considered that there is a presence of invasive species within the study area, due to the scale of construction activities and groundworks at the windfarm site, movement of overburden, importation of materials and the volume of machinery and deliveries entering the site during the construction phase, that there is **potential for the dispersal of invasive species, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Potential impacts to the QI habitats during the Operational Phase;

Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to these QIs can be excluded

Potential impacts to the QI habitats during the Decommissioning Phase;

Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm control buildings and reinstatement and restoration of the windfarm site. Machinery involved will include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection overlaps the boundary of the SAC at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel.
Due to the separation distance (9.3km) and locational context of the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects to the SAC can be excluded.

Overlap of construction periods: The construction stage of the Candidate Gathabawn Grid Connection will take place during the same period as the Proposed Gathabawn Windfarm.
Lifecycle stages: It is considered that the construction and decommissioning stages of the Candidate Gathabawn Grid Connection have the potential to cause effects to the QIs. Works and activities during the operational and decommissioning stages for the Gathabawn Windfarm will be limited in scale and mainly carried out at the windfarm hardcore footprint. The Candidate Gathabawn Grid Connection will require very little on-site maintenance or inspection activities during the operational stage. However, the decommissioning stage will involve pulling internal windfarm cables and Ballylehaun-Parksgrove cables from ducting at jointing locations, loading and removal from site.

Evaluation of the Other Elements: In relation to indirect impacts to QI fauna species loss, reduction, fragmentation of loss of connectivity of suitable habitat or reduction in prey item species, construction works associated with the Candidate Gathabawn Grid Connection include HDD at the River Barrow and River Nore SAC, and instream works to install the ducting at three watercourse locations upstream of the SAC (Lismaine Stream at W3, Lisdowney Stream at W4 and the Ballyconra Stream at W5); **in the absence of mitigation measures, effects due to these works could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

There is some increased potential for Whole Gathabawn Windfarm works to result in the reduction of water quality via release of sediment and/or contaminants and/or nutrients to downstream watercourses, and although the risk primarily relates to the Candidate Gathabawn Grid Connection, there is increased **potential for whole project works to cumulatively release larger volumes of sediment or contaminants or nutrients and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.
In relation to flow regimes, due to the nature of the Candidate Gathabawn Grid Connection works (HDD, instream works), this element could potentially alter flow regimes within upstream watercourses of the River Barrow and River Nore SAC, and within the SAC itself, there is increased **potential for whole project works to cumulatively alter flow regimes, and in the absence of mitigation measures, these effects could be significant**

In relation to dust emissions, given the large-scale nature of the construction works within the Gathabawn Windfarm in-combination with the construction works at the Candidate Gathabawn Grid Connection which

crosses the SAC, there is **increased potential for dust emissions, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

In relation to the spread of invasive species, when the Whole Gathabawn Windfarm is considered in-combination, construction activities and groundworks, movement of overburden and materials, and the volume of machinery and deliveries entering the project works locations increases, and therefore it is considered that there is **increased potential for the dispersal of invasive species, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects with Other Projects/Activities

Other projects- Two windfarms projects (Siskin WF, Briskalagh WF) will involve HDD crossing works under the River Barrow and River Nore SAC. Both BESS projects at Moatpark will involve construction works in proximity to the River Nore and mature woodland along the banks of the River Nore.

The likelihood of in-combination reductions in water quality, dust emissions, changes in flow or the spread of invasive species affecting QI species (Freshwater Pearl Mussel, White-clawed Crayfish, Atlantic Salmon, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad), including those species that have the potential to act as host species for Freshwater Pearl Mussel, increases as the scale of the assessment increases within the catchment impact suitable spawning redds and streams for juvenile stages to develop healthily. Therefore, **there is potential for adverse in-combination effects with other projects or activities within the catchment**. Mitigation measures will be required.

Summary of Effects (in the absence of mitigation)

The potential impacts to QI species Freshwater Pearl Mussel, White-clawed Crayfish, Atlantic Salmon, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, including those species that have the potential to act as host species for Freshwater Pearl Mussel, for both adult and juvenile fish stages relate to the potential in-combination reduction in water quality, dust emissions and the potential for the spread of invasive species during the construction stage of the Gathabawn Windfarm, and the other elements – Candidate Gathabawn Grid Connection, which increases potential for changes in flow, has the potential to affect these QI species which is located throughout the River Barrow and River Nore SAC. The risk of the potential reduction in water quality or the potential spread of invasive species is further increased when considering in-combination effects with other projects and landuse activities within the catchment.

Mitigation measures which will avoid or reduce these potential in-combination effects are described in full in Section 6.4.6 of this document.

6.4.4.8 Direct impact to QI species – Otter, Desmoulin's Whorl Snail

QI Species

[1355] Otter

[1016] Desmoulin's Whorl Snail

Description of potential Impacts Considered

Indirect Impacts to QI fauna species loss, reduction, fragmentation of loss of connectivity of suitable habitat or reduction in prey item species (via reductions in water quality, dust emissions, changes in flow, or spread of invasive species)

Sensitivity of QI Species

Otters have two basic requirements: aquatic prey and safe refuges where they can rest. In Ireland, Otter populations are found along rivers, lakes and coasts, where fish and other prey are abundant, and where the bank-side habitat offers plenty of cover. A total of 44 SACs have been designated for the Otter, comprising extensive stretches of river channels and coastline (including off-shore islands) as well as lakes and blanket bog systems. The main threats to the Otter include water pollution, habitat disturbance and accidental deaths (road traffic). The otter remains widespread across Ireland, and its population appears to be relatively stable. There are some concerns about declining water quality nationally as well as ongoing pressures on riparian habitats through drainage works and riparian scrub/woodland clearance, but it is not clear how these changes might impact on Otter (NPWS, 2025a).

Desmoulin's Whorl Snail favours damp or wet habitats, where they live mostly in moss, leaves and decaying vegetation. They feed on bacterial films and decaying vegetation. Desmoulin's Whorl Snail lives on living and dead stems and leaves of tall wetland plants. It has a requirement for tall, structured vegetation containing tall riparian grasses and sedges. The main pressures are associated with natural succession resulting in changes in species composition and drying out of the habitat, including drying out as a result of drainage (NPWS, 2025a). Potential impacts to this species are screened out due to the remoteness of the known population from the Whole Gathabawn Windfarm, the terrestrial nature of this species and lack of noted sensitivity to reductions in water quality as per the Conservation Objectives document.

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Potential impacts to the QI habitats as a result of Construction Works:

In relation to reductions in water quality, although there is no direct hydrological connectivity to the SAC via surface water pathways and the intervening distance (4.6km) to the SAC boundary, given the recorded secondary evidence of Otter (spraints) within the surrounding watercourses of the Gathabawn Windfarm, it is considered that due to the scale of excavations and storage/movement of overburden at the windfarm site, the use of machinery running on hydrocarbons, and the use of concrete for foundation construction, there is potential for windfarm construction works to release sediment or contaminants to downstream watercourses; there is also potential for nutrients such as phosphorus to occur in site runoff, and **in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

In relation to flow regimes, the construction of an integrated drainage system at the windfarm will ensure that no changes to downstream flow regimes or flooding patterns will occur as a result of the Gathabawn Windfarm. Otters are not sensitive to changes in flow according to the Conservation Objectives document. The potential for significant impacts to this QI habitat can be excluded.

In relation to dust emissions, although the SAC is located 4.6km from the Gathabawn Windfarm, given the large-scale nature of the construction works, dust emissions can arise from the transportation of aggregate, movement of delivery vehicles and the movement of excavated materials and from bare soils at excavated areas and overburden storage areas. There is **potential for dust emissions, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

In relation to the spread of invasive species (which could in turn affect suitable habitat or prey item species), within the 10km squares S36 and S37, four High Impact Invasive Species plants are recorded: Rhododendron, Giant Hogweed, Japanese Knotweed, and Bohemian Knotweed, it is considered that there is a presence of invasive species within the study area, due to the scale of construction activities and groundworks at the windfarm site, movement of overburden, importation of materials and the volume of machinery and deliveries entering the site during the construction phase, that there is **potential for the dispersal of invasive species (which could in turn affect suitable habitat or prey item species), and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Potential impacts to the QI habitats during the Operational Phase;

Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to these QIs can be excluded

Potential impacts to the QI habitats during the Decommissioning Phase;

Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm control buildings and reinstatement and restoration of the windfarm site. Machinery involved will include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection overlaps the boundary of the SAC at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel.
Due to the separation distance and locational to the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects to the SAC can be excluded.

Overlap of construction periods: The construction stage of the Candidate Gathabawn Grid Connection will take place during the same period as the Proposed Gathabawn Windfarm.
Lifecycle stages: It is considered that the construction and decommissioning stages of the Candidate Gathabawn Grid Connection have the potential to cause effects to Otter. Works and activities during the operational and decommissioning stages for the Gathabawn Windfarm will be limited in scale and mainly carried out at the windfarm hardcore footprint. The Candidate Gathabawn Grid Connection will require very little on-site maintenance or inspection activities during the operational stage. However, the decommissioning stage will involve pulling internal windfarm cables and Ballylehaun-Parksgrove cables from ducting at jointing locations, loading and removal from site.

Evaluation of the Other Elements: In relation to indirect impacts to QI fauna species loss, reduction, fragmentation of loss of connectivity of suitable habitat or reduction in prey item species, construction works associated with the Candidate Gathabawn Grid Connection include HDD at the River Barrow and River Nore SAC, and instream works to install the ducting at three watercourse locations upstream of the SAC (Lismaine Stream at W3, Lisdowney Stream at W4 and the Ballyconra Stream at W5). Otter spraint sites were recorded

immediately downstream of the bridge on the Lisdowney Stream; two other spraints were recorded on the River Nore as incidental sightings during a Watercourse Survey in May 2025; an Otter Holt/Couch was also recorded near these spraint locations. These records were recorded c.1.3km north of the Candidate Gathabawn Grid Connection crossing of the River Nore. As such, **in the absence of mitigation measures, effects due to these works could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

There is some increased potential for Whole Gathabawn Windfarm works to result in the reduction of water quality via release of sediment and/or contaminants and/or nutrients to downstream watercourses, and although the risk primarily relates to the Candidate Gathabawn Grid Connection, there is increased **potential for whole project works to cumulatively release larger volumes of sediment or contaminants or nutrients and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.
In relation to flow regimes, the construction of an integrated drainage system at the windfarm will ensure that no changes to downstream flow regimes or flooding patterns will occur as a result of the Gathabawn Windfarm. Otters are not sensitive to changes in flow according to the Conservation Objectives document. The potential for significant in-combination impacts to this QI habitat can be excluded.

In relation to dust emissions, given the large-scale nature of the construction works within the Gathabawn Windfarm in-combination with the construction works at the Candidate Gathabawn Grid Connection which crosses the SAC, there is **increased potential for dust emissions, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

In relation to the spread of invasive species (which could in turn affect suitable habitat or prey item species), when the Whole Gathabawn Windfarm is considered in-combination, construction activities and groundworks, movement of overburden and materials, and the volume of machinery and deliveries entering the project works locations increase, and therefore it is considered that there is **increased potential for the dispersal of invasive species, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects with Other Projects/Activities

Other projects- Two windfarm projects (Siskin WF, Briskalagh WF) will involve HDD crossing works under the River Barrow and River Nore SAC. Both BESS projects at Moatpark will involve construction works in proximity to the River Nore and mature woodland along the banks of the River Nore.
The likelihood of in-combination reductions in water quality, dust emissions or the spread of invasive species affecting QI species (Otter) increases as the scale of the assessment increases within the catchment impact suitable spawning redds and streams for juvenile stages to develop healthily. Therefore, **there is potential for adverse in-combination effects with other projects or activities within the catchment**. Mitigation measures will be required.

Summary of Effects (in the absence of mitigation)

The potential impacts to Otter relate to the potential in-combination reduction in water quality, dust emissions and the potential for the spread of invasive species during the construction stage of the Gathabawn Windfarm, and the construction, operation and decommissioning stages of the other element – Candidate Gathabawn Grid Connection, has the potential to affect this QI species which is located throughout the River Barrow and River Nore SAC. The risk of the potential reduction in water quality or the potential spread of invasive species is further increased when considering in-combination effects with other projects and landuse activities within the catchment.
Mitigation measures which will avoid or reduce these potential in-combination effects are described in full in Section 6.4.6 of this document.

6.4.4.9 Mortality, disturbance or displacement - Aquatic Species

QI Species

[1029] Freshwater Pearl Mussel
[1092] White-clawed Crayfish
[1095] Sea Lamprey
[1096] Brook Lamprey
[1099] River Lamprey
[1103] Twaite Shad
[1106] Atlantic Salmon

Description of potential Impacts Considered

Direct or Indirect Impacts to QI species via mortality, disturbance or displacement.

Sensitivity of QI Species

The Freshwater Pearl Mussel is a large, long-lived, bivalve mollusc found in clean, fast-flowing rivers. Individuals can grow to very large sizes relative to other freshwater molluscs, slowly building up thick calcareous shells in rivers with relatively soft water and low levels of calcium. The pressures impacting on the species come from a wide variety of sources (e.g. forestry, farming, pollution from urban wastewater, and development activities), often quite removed from the habitat of the species. The species also suffers direct impacts from in-stream works such as channelisation, bridge repairs/construction and recreational fishery structures (NPWS, 2025a).

White-clawed Crayfish is the largest freshwater arthropod found in Ireland. The White-clawed Crayfish is generally associated with good-quality waters, but this is not necessarily the case in Ireland, where it can occur in water of lower quality. White-clawed Crayfish faces an existential threat from the twin impacts of non-indigenous crayfish species (NICS) and Crayfish Plague, which is a water-borne disease specific to freshwater crayfish caused by the oomycete *Aphanomyces astaci* (NPWS, 2025a).

The life cycle of the Sea Lamprey contains a freshwater phase followed by a marine phase. Adult Sea Lamprey at sea are external parasites on host fish or marine mammals and grow in length from 60 to 100 cm before migrating in spring into freshwater to excavate redds or spawning nests in gravelled areas of large rivers. Upriver migration occurs at a time of generally falling water levels and substantial spawning activity has been recorded in gravelled areas downstream of large weirs in the major Irish SAC rivers. Pressures on Sea Lamprey include barriers to upstream migration (e.g. weirs), which limit access to spawning beds and juvenile habitat; changes in precipitation due to climate change; and impacts from fishing on prey species availability (NPWS, 2025a).

Brook Lamprey is the smallest of the three lampreys recorded in Ireland, typically reaching no more than 15-18 cm in length. While several pressures have been identified, these pressures are often indirect, usually acting in combination, and deemed to have low influence (NPWS, 2025a).

The River Lamprey breeds in freshwater rivers and streams. Adults spawn in spring, excavating shallow nests in riverine sections comprising fine gravels and small stones. Habitat quality was considered as deteriorating due to a range of prevailing pressures and future threats including barriers to migration, increases in river discharge due to several factors including climate change, nutrient pollution due to anthropogenic activities, and impacts at sea such as commercial fishing that may impact on prey or host species (NPWS, 2025a).

Twaite Shad spends most of its life in estuaries and coastal waters, but it returns to freshwater to spawn during April to July. In Ireland, there are four spawning populations which occur in the Barrow, Nore, Suir and Munster Blackwater rivers, all of which are SACs for this species. Twaite Shad can migrate long distances into freshwaters but, in Ireland, they spawn in transitional waters at the upper limits of tidal influence. Numbers of Twaite Shad have declined across its range, with the main causes attributed to dam construction, pollution, overexploitation and habitat destruction. The combined influence of deteriorating water quality, the challenges of climate change and the hydrological and physico-chemical impacts of weirs have implications for the conservation status of this species (NPWS, 2025a).

Atlantic Salmon is an anadromous species indigenous to the North Atlantic. A substantial number of habitat threats and pressures impact Salmon, including aquaculture, declining quality of water and habitat, and physical barriers to migration, including from hydroelectric schemes. Although the protection for this species is in freshwater, there are also marine pressures that are influencing the population viability (NPWS, 2025a).

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Potential impacts to the QI habitats as a result of Construction Works:

In relation to mortality, although there is no direct hydrological connectivity to the SAC via surface water pathways and the intervening distance (4.6km) to the SAC boundary, it is considered that due to the scale of excavations and storage/movement of overburden at the windfarm site, the use of machinery running on hydrocarbons, and the use of concrete for foundation construction, there is potential for windfarm construction works to release sediment or contaminants to downstream watercourses; there is also potential for nutrients such as phosphorus to occur in site runoff, leading to sedimentation, pollution, or riverbed alteration which can cause mortality, disturbance or displacement to QI species**, in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Due to the scale of construction activities and groundworks at the windfarm site, movement of overburden, importation of materials and the volume of machinery and deliveries entering the site during the construction phase, resulting in the spread/release of invasive species which may cause a reduction in the extent and quality of habitat for the QI species, making it inaccessible, resulting in disturbance or displacement effects, **in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Potential impacts to the QI habitats during the Operational Phase;

Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to these QIs can be excluded

Potential impacts to the QI habitats during the Decommissioning Phase;

Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm control buildings and reinstatement and restoration of the windfarm site. Machinery involved will include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection overlaps the boundary of the SAC at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel.
Due to the separation distance (9.3km) and locational context to the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects to the SAC can be excluded.

Overlap of construction periods: The construction stage of the Candidate Gathabawn Grid Connection will take place during the same period as the Proposed Gathabawn Windfarm.
Lifecycle stages: It is considered that the construction and decommissioning stages of the Candidate Gathabawn Grid Connection have the potential to cause effects to the QIs. Works and activities during the operational and decommissioning stages for the Gathabawn Windfarm will be limited in scale and mainly carried out at the windfarm hardcore footprint. The Candidate Gathabawn Grid Connection will require very little on-site maintenance or inspection activities during the operational stage. However, the decommissioning stage will involve pulling internal windfarm cables and Ballylehaun-Parksgrove cables from ducting at jointing locations, loading and removal from site.

Evaluation of the Other Elements: In relation to direct or indirect impacts to QI fauna species via mortality, disturbance or displacement, construction works associated with the Candidate Gathabawn Grid Connection include HDD at the River Barrow and River Nore SAC, and instream works to install the ducting at three watercourse locations upstream of the SAC (Lismaine Stream at W3, Lisdowney Stream at W4 and the Ballyconra Stream at W5); **in the absence of mitigation measures, effects due to these works could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

There is some increased potential for Whole Gathabawn Windfarm works to result in the mortality, disturbance or displacement of QI species via sedimentation or contamination of downstream suitable habitat, and although the risk primarily relates to the Candidate Gathabawn Grid Connection, there is increased **potential for whole project works to cumulatively cause mortality, disturbance and displacement to these QIs, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.
In relation to the spread of invasive species, when the Whole Gathabawn Windfarm is considered in-combination, construction activities and groundworks, movement of overburden and materials, and the volume of machinery and deliveries entering the project works locations increase can cause a reduction in the extent and quality of habitat for the QI species, resulting in disturbance or displacement effects. It is considered that there is **increased potential for disturbance or displacement effects, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects with Other Projects/Activities

Other projects- Two windfarm projects (Siskin WF, Briskalagh WF) will involve HDD crossing works under the River Barrow and River Nore SAC. Both BESS projects at Moatpark will involve construction works in proximity to the River Nore and mature woodland along the banks of the River Nore.
The likelihood of in-combination mortality, disturbance or displacement effects affecting QI species (Freshwater Pearl Mussel, White-clawed Crayfish, Atlantic Salmon, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad), including those species that have the potential to act as host species for Freshwater Pearl Mussel, increases as the scale of the assessment increases within the catchment, impacting suitable spawning redds and streams for juvenile stages to develop healthily. Therefore, **there is potential for adverse in-combination effects with other projects or activities within the catchment**. Mitigation measures will be required.

Summary of Effects (in the absence of mitigation)

The potential impacts to QI species Freshwater Pearl Mussel, White-clawed Crayfish, Atlantic Salmon, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, including those species that have the potential to act as host species for Freshwater Pearl Mussel, for both adult and juvenile fish stages relate to the potential in-combination reduction in water quality and the potential for the spread of invasive species, causing mortality, disturbance and displacement effects during the construction stage of the Gathabawn Windfarm, and the other elements – Candidate Gathabawn Grid Connection, has the potential to affect these QI species which is located throughout the River Barrow and River Nore SAC. The risk of mortality, disturbance and displacement is further increased when considering in-combination effects with other projects and landuse activities within the catchment. **Mitigation measures which will avoid or reduce these potential in-combination effects are described in full in Section 6.4.6 of this document.**

6.4.4.10 Mortality, disturbance or displacement of Otter, Desmoulin's Whorl Snail

QI Species

[1355] Otter
[1016] Desmoulin's Whorl Snail

Description of potential Impacts Considered

Direct or Indirect Impacts to QI species via mortality, disturbance or displacement.

Sensitivity of QI Species

Otters have two basic requirements: aquatic prey and safe refuges where they can rest. In Ireland, Otter populations are found along rivers, lakes and coasts, where fish and other prey are abundant, and where the bank-side habitat offers plenty of cover. A total of 44 SACs have been designated for the Otter, comprising extensive stretches of river channels and coastline (including off-shore islands) as well as lakes and blanket bog systems. The main threats to the Otter include water pollution, habitat disturbance and accidental deaths (road traffic). The otter remains widespread across Ireland, and its population appears to be relatively stable. There are some concerns about declining water quality nationally as well as ongoing pressures on riparian habitats through drainage works and riparian scrub/woodland clearance, but it is not clear how these changes might impact on Otter (NPWS, 2025a).

Desmoulin's Whorl Snail favours damp or wet habitats, where they live mostly in moss, leaves and decaying vegetation. They feed on bacterial films and decaying vegetation. Desmoulin's Whorl Snail lives on living and dead stems and leaves of tall wetland plants. It has a requirement for tall, structured vegetation containing tall riparian grasses and sedges. The main pressures are associated with natural succession resulting in changes in species composition and drying out of the habitat, including drying out as a result of drainage (NPWS, 2025a). Potential impacts to this species are screened out due to the remoteness of the known population from the Whole Gathabawn Windfarm.

Evaluation of Potential Impacts in the Absence of Mitigation

Evaluation of the Potential Impacts - Proposed Gathabawn Windfarm (alone)

Potential impacts to the QI habitats as a result of Construction Works:

In relation to mortality, there are no natural watercourses located within the Gathabawn Windfarm, as evidenced by the lack of Otter sightings within the windfarm. As such, potential for significant impacts to Otter via mortality can be excluded

In relation to disturbance and displacement, although there is no direct hydrological connectivity to the SAC via surface water pathways and the intervening distance (4.6km) to the SAC boundary, it is considered that due to the scale of excavations and storage/movement of overburden at the windfarm site, the use of machinery running on hydrocarbons, the use of concrete for foundation construction, and associated noise levels with construction works, there is potential for windfarm construction works to release sediment or contaminants to downstream watercourses, leading to sedimentation and contamination of suitable Otter habitat as well as increased noise levels above the ecological baseline, **causing disturbance or displacement to Otter, in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

In relation to the spread of invasive species (which could in turn affect suitable habitat or prey item species), within the 10km squares S36 and S37, four High Impact Invasive Species plants are recorded: Rhododendron, Giant Hogweed, Japanese Knotweed, and Bohemian Knotweed. It is considered that there is a presence of invasive species within the study area; this in turn can affect suitable Otter habitat or prey item species, causing disturbance and displacement effects. Due to the scale of construction activities and groundworks at the windfarm site, movement of overburden, importation of materials and the volume of machinery and deliveries entering the site during the construction phase, there is **potential for disturbance**

and displacement effects, and in the absence of mitigation measures, these effects could be significant. Mitigation measures to avoid or reduce the in-combination effects will be required.

Potential impacts to the QI habitats during the Operational Phase;

Operational works will generally involve routine maintenance works on the windfarm components (e.g. wind turbines, control buildings, site roads and drainage networks). Major operational works such as component replacements will take place from the hardcore windfarm footprint, and therefore the potential for significant impacts to these QIs can be excluded

Potential impacts to the QI habitats during the Decommissioning Phase;

Decommissioning works will principally involve the decommissioning and dismantling of electrical plant and apparatus, removal of underground cables, dismantling the turbines, removing equipment from the windfarm control buildings and reinstatement and restoration of the windfarm site. Machinery involved will include cranes for turbine removal, large and small excavators, HGVs and personnel. Decommissioning is expected to take approximately 3 - 4 months to complete. Given the temporary nature (3-4 months) of the works and that these works will take place within the hardcore windfarm footprint and within the bounds of the operational stage fences, it is considered that there is no potential for adverse effects arising from the decommissioning of Gathabawn Windfarm.

Evaluation of Potential Impacts - Other Elements of Whole Gathabawn Windfarm project

Location Context: The Candidate Gathabawn Grid Connection overlaps the boundary of the SAC at the crossing point of the Parksgrove-Moatpark UGC (where the cables will be installed under the River using horizontal directional drilling (HDD) technique, and works will occur within 50m of the river channel. Due to the separation distance (9.3km) to the Off-Site Haul Route Activities at Portlaoise M7/N77 interchange, the potential for effects to the SAC can be excluded.

Overlap of construction periods: The construction stage of the Candidate Gathabawn Grid Connection will take place during the same period as the Proposed Gathabawn Windfarm.
Lifecycle stages: It is considered that the construction and decommissioning stages of the Candidate Gathabawn Grid Connection have the potential to cause effects to Otter. Works and activities during the operational and decommissioning stages for the Gathabawn Windfarm will be limited in scale and mainly carried out at the windfarm hardcore footprint. The Candidate Gathabawn Grid Connection will require very little on-site maintenance or inspection activities during the operational stage. However, the decommissioning stage will involve pulling internal windfarm cables and Ballylehaun-Parksgrove cables from ducting at jointing locations, loading and removal from site.

Evaluation of the Other Elements: In relation to direct or indirect impacts to QI fauna species via mortality, disturbance or displacement, construction works associated with the Candidate Gathabawn Grid Connection include HDD at the River Barrow and River Nore SAC, and instream works to install the ducting at three watercourse locations upstream of the SAC (Lismaine Stream at W3, Lisdowney Stream at W4 and the Ballyconra Stream at W5). Otter spraint sites were recorded immediately downstream of the bridge on the Lisdowney Stream; two other spraints were recorded on the River Nore as incidental sightings during a Watercourse Survey in May 2025; an Otter Holt/Couch was also recorded near these spraint locations. These records were recorded c.1.3km north of the Candidate Gathabawn Grid Connection crossing of the River Nore. As such, **in the absence of mitigation measures, mortality, disturbance and displacement effects to Otter could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects - Whole Gathabawn Windfarm Project

Evaluation of In-combination Construction Stage Effects:

There is some increased potential for Whole Gathabawn Windfarm works to result in mortality, disturbance or displacement of Otter via movement of vehicles for works associated with the Candidate Gathabawn Grid Connection, sedimentation or contamination of downstream suitable habitat, and although the risk primarily relates to the Candidate Gathabawn Grid Connection, there is increased **potential for whole**

project works to cumulatively cause mortality, disturbance and displacement to Otter, and in the absence of mitigation measures, these effects could be significant. Mitigation measures to avoid or reduce the in-combination effects will be required.

In relation to the spread of invasive species, when the Whole Gathabawn Windfarm is considered in-combination, construction activities and groundworks, movement of overburden and materials, and the volume of machinery and deliveries entering the project works locations increase can cause a reduction in the extent and quality of habitat for the QI species, resulting in disturbance or displacement effects. Although the risk primarily relates to the Candidate Gathabawn Grid Connection, there is increased **potential for whole project works to cumulatively cause disturbance and displacement to Otter, and in the absence of mitigation measures, these effects could be significant**. Mitigation measures to avoid or reduce the in-combination effects will be required.

Evaluation of Potential In-Combination Effects with Other Projects/Activities

Other projects- Two windfarm projects (Siskin WF, Briskalagh WF) will involve HDD crossing works under the River Barrow and River Nore SAC. Both BESS projects at Moatpark will involve construction works in proximity to the River Nore and mature woodland along the banks of the River Nore.

The likelihood of in-combination mortality, disturbance or displacement effects affecting Otter increases as the scale of the assessment increases within the catchment. Therefore, **there is potential for adverse in-combination effects with other projects or activities within the catchment**. Mitigation measures will be required.

Summary of Effects (in the absence of mitigation)

The potential impacts to Otter relate to the potential in-combination mortality, disturbance and displacement effects during the construction stage of the Gathabawn Windfarm, and the other element – Candidate Gathabawn Grid Connection, has the potential to affect Otter which is located throughout the River Barrow and River Nore SAC. The risk of mortality, disturbance and displacement is further increased when considering in-combination effects with other projects and landuse activities within the catchment.

Mitigation measures which will avoid or reduce these potential in-combination effects are described in full in Section 6.4.6 of this document.

6.4.5 Requirement for Mitigation Measures - River Barrow and River Nore SAC

The potential for adverse impacts on the integrity of the River Barrow and River Nore SAC cannot be ruled out in relation to

(i) Direct loss, fragmentation or degradation of QI habitats, direct loss or reduction in connectivity of QI habitats or plant species (construction phase),

(ii) Loss or degradation of terrestrial or aquatic habitats or species, or loss of connectivity of habitats, within or ex-situ SAC sites (via reductions in water quality, dust emissions or the spread of invasive species) (construction phase),

(iii) Indirect Impacts to QI fauna species loss, reduction, fragmentation of loss of connectivity of suitable habitat or reduction in prey item species (via reductions in water quality, dust emissions, changes in flow, or spread of invasive species) (construction phase),

Direct or Indirect Impacts to QI species via mortality, disturbance or displacement (construction phase).

Mitigation measures are proposed for the River Barrow and River Nore SAC in order to remove, avoid or reduce the impacts identified in the appropriate assessment evaluation to a level where they will no longer affect the integrity of the SAC site.

These mitigation measures and monitoring arrangements are presented below in Section 6.4.6.

6.4.6 Mitigation Measures – River Barrow and River Nore SAC

Mitigation measures are proposed for the Proposed Gathabawn Windfarm *(WF)* and for the Candidate Gathabawn Grid Connection *(GC)* in order to remove, avoid or reduce the impacts identified in the appropriate assessment to a level where they will no longer affect the integrity of the River Barrow and River Nore SAC. The mitigation measures and monitoring arrangements will be implemented through the Environmental Management Plan for the Whole Gathabawn Windfarm Project (EMP 2026). The EMP 2026 accompanies the subject planning application. These mitigation measures and monitoring arrangements are based on accepted best practice standards and our experience of supervising and reviewing the implementation and operation of such measures.

6.4.6.1 Disturbance, Displacement, or Mortality of Otter

The following measures will be implemented during the construction and operational phase, through the Environmental Management Plan and under the supervision of the Environmental Clerk of Works (construction phase) and Asset Manager (operational phase), who will be responsible for monitoring the implementation and effectiveness of the mitigation and monitoring measures.

The residual effect of the Project on the integrity of the SAC follows in Section 6.3.7.

Table 6-7: Disturbance, Displacement, Mortality Measures

ID	Description of the Measure – disturbance, displacement, mortality of Otter	Effectiveness of the measure
Design	No instream works within the boundary of the SAC, cables to be installed across the River Nore using HDD techniques; which put the cables several metres under the river bed	This measure will minimise disturbance and displacement-based effects to Otter, as well as reducing any risk of mortality as there are no in-stream works. It will also avoid impacts to any habitats on which the Otter may be dependent within the river and riparian area.
Design	No trenching works within riparian areas, and drill pits set back 30m from the riverbanks	This measure will minimise disturbance and displacement-based effects to Otter. It will also avoid impacts to any habitats on which the Otter may be dependent within the river and riparian area.
Design	Underground Cables associated with the Parksgrove-Moatpark UGC are located in the public road verge where possible – to reduce extent of works within the grassland fields on the western side of the river;	This measure will minimise disturbance -based effects to Otter as the proposed works are away from any existing Otter habitats and are unlikely to increase disturbance impacts over existing baseline levels.
Design	An oversized cable will be installed for the Parksgrove-Moatpark UGC. This higher-capacity cable can support both the Gathabawn project and a future project, thereby avoiding consecutive construction works for an additional grid connection	This design measure avoids the need for future works in close proximity to sensitive aquatic habitat suitable for Otter.
	Preconstruction Surveying and Monitoring	
WM04	Pre-construction surveys for Otter holts will be carried out by an experienced Ecologist to determine if any new Otter holts have been established in the interim period between the submission of the planning application and the	This measure is the key compliance measure to ensure all mitigation measures are employed properly and

ID	Description of the Measure – disturbance, displacement, mortality of Otter	Effectiveness of the measure
	commencement of construction works. These pre-construction confirmatory surveys for Otter holts and activity (particularly holts at which breeding females or cubs are present) will be carried along the Ballyring Upper Stream, 150m upstream and downstream of facilitating works near the road bridge at Garrydague.	appropriately. In addition, the presence of an ecologist will facilitate the Project Manager to be alerted to any emergent changes during the construction phases (e.g. presence of Otter holts) so that appropriate measures can be undertaken.
GM04	Pre-construction surveys for Otter holts will be carried out out by an experienced Ecologist to determine if any new Otter holts have been established in the interim period between the submission of the planning application and the commencement of construction works. These pre-construction confirmatory surveys for Otter holts and activity (particularly holts at which breeding females or cubs are present) will be carried out 150m upstream and downstream of watercourse crossing locations.	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. In addition, the presence of an ecologist will facilitate the Project Manager to be alerted to any emergent changes during the construction phases (e.g. appearance of new Otter holts) so that appropriate measures can be undertaken.
WM53 GM51	Should an Otter holt be identified during pre-construction surveys, then all construction works within 150m of the active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer/outside of 1 hours after sunrise or before sunset during winter. If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken while cubs are present in the holt and NPWS will be notified immediately. No wheeled or tracked vehicles (of any kind) will be used within 20m of active but non-breeding otter Holts – except under license, and light work, such as digging by hand or scrub clearance will not take place within 15m of such holts, except under license. The prohibited working area associated with otter holts will, where appropriate, be fenced with temporary fencing prior to any invasive works and declared as 'out of bounds'. Appropriate awareness of the purpose of the enclosure will be conveyed through toolbox talks with site personnel and sufficient signage will be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt and subject to conformance audits.	Pre-construction monitoring prior to any works commencing for Otter holts will allow works and plans to be the most accurate and prevent any mortality, disturbance and displacement impacts to Otter ex-situ of the SPA.
WM76 GM64	Noise and emissions from plant/machinery: Plant and machinery will not be permitted to idle. Machinery used intermittently will be shut down when not in use. The best means practicable, including proper maintenance of plant, will be employed to minimise the GHG emissions and noise produced by on-site operations. All vehicles and plant will be fitted with effective exhaust silencers. Noise dampeners will be fitted where required. To protect residential amenity, if any plant/machine is required to operate before 07:00hrs or after 19:00hrs Monday to Friday, or before 08:00hrs or after 13:00hrs on a Saturday, then it will be surrounded by an acoustic enclosure or portable screen.	This measure will minimise disturbance and displacement-based effects to Otter.
GM55	Noise and emissions from plant/machinery: Plant and machinery will not be permitted to idle. Machinery used intermittently will be shut down when not in use. Any plant operating within 50m of the River Nore or within 200m of	This measure will minimise disturbance and displacement-based effects to Otter.

ID	Description of the Measure – disturbance, displacement, mortality of Otter	Effectiveness of the measure
	a bat roost (if any) will be fitted with noise dampeners and an acoustic enclosure or portable screen placed between the source of noise and the sensitive receptor.	
WM30 GM27	Fencing of works areas: The boundaries of construction works areas in agricultural lands will be fenced to prevent the encroachment of construction phase personnel, machinery or materials beyond this boundary. Livestock proof fencing will be used, with landowner access maintained through the provision of openings along the boundary fences.	This measure will prevent any expansion of construction works impacts beyond the established construction works area boundary. This is an accepted measure to prevent works expanding beyond the consented areas for machinery and human activity where the pathways and potential impacts were not considered for additional adverse effects. This measure will ensure that the only adverse effects needing mitigation are the ones considered within the relevant works area boundaries provided for the development.
WM85	Roadside boundaries will be maintained during the construction phase and following the removal of the boundary to provide a widened transport area or to provide sightlines, a post and mesh boundary fence will be erected immediately.	This measure will prevent any expansion of construction works impacts beyond the established construction works area boundary. This is an accepted measure to prevent works expanding beyond the consented areas for machinery and human activity where the pathways and potential impacts were not considered for additional adverse effects. This measure will ensure that the only adverse effects needing mitigation are the ones considered within the relevant works area boundaries provided for the development.
WM54	Traffic speed limits of 50km/h along the Local Roads L1807, L1806, L1804 and L5818; 30km/hr along the local roads L58141, and L18062 and 15km/hr along windfarm site roads.	This measure will minimise mortality effects to Otter.
GM52	Road traffic speed limits of 50km/h along the Local Roads L1807, L1806, L1804, and L5818; 30km/hr along the local roads L5821, L5820 and L18062; and 15km/hr along windfarm site roads.	This measure will minimise mortality effects to Otter.
GM108	The Parksgrove-Moatpark UGC works will not be carried out during the period 1st April to 31st July inclusive	This measure avoids works being carried out during critical periods of the Kingfisher lifecycle
GM109	The Promoter of the of the Gathabawn Windfarm Project will liaise with other renewable energy developers where there is potential for the timing of groundworks associated with grid connection works to overlap within a sub-catchment. The Promoter will liaise with the other developer(s) with the aim of jointly agreeing the timing of works to provide a buffer of time between works. The Project Ecologist will consult with NPWS and advise on the timing of the works to avoid or reduce cumulative impacts to habitats and species in downstream waterbodies and in the Parksgrove/Moatpark area.	This measure reduces or avoids magnitude of impacts to SCI

6.4.6.2 Sediment/Contaminant-laden Runoff Measures

The following measures will be implemented during the construction phase, through the Environmental Management Plan 2026 under the supervision of the Ecological Clerk of Works, who along with the Environmental Manger will be responsible for monitoring the implementation and effectiveness of the mitigation and monitoring measures. The EMP 2026 also includes a Sediment & Runoff/Storm Water Control Plan, Fuel Management Plan, Waste Management Plan and Dust Minimisation Plan.

Table 6-8: Sediment/Contaminant-laden Runoff Measures

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
WF Design	Avoidance of on-site sensitive hydrology features by constraints mapping (i.e. buffer zones)	This design measure minimised the extent of works in close proximity to sensitive hydrology features.
WF Design	Construction and installation of the site drainage network	This is an accepted design measure to ensure the drainage of surface water runoff from construction, operational and decommissioning works flow to areas part of the sediment catch netting and other measures design to prevent any sediment run-off offsite into WFD waterbodies of local importance or higher within the wider receiving environment.
WF Design	Implementation of the Surface Water Management Plan	The SWMP will implement mitigation principles described in the EIAR designed to ensure that work is carried out with minimal impact on the water environment.
WF Design	At D2, the existing wet drainage channel will be permanently diverted for a short distance so that it does not interact with the turbine hardstand	This drain is an existing farm drain of low - negligible flow. The installation of the turbine hardstand requires this drain be rerouted around the hardstand. This will allow the drain to flow without interaction with the new permanent artificial surfaces, or the dirty water drains around the turbine hardstand area.
	Preconstruction Surveying & Monitoring	
WM02 GM02	Water Quality Monitoring: Confirmatory surface water quality monitoring will be carried out prior to the commencement of construction works at the water quality monitoring locations to determine the pre-construction status of surface water quality in downstream watercourses. This monitoring will include laboratory analysis of water samples which will be carried out by an independent and appropriately certified laboratory. The monitoring of water quality parameters and collection of samples will be undertaken by the Environmental Clerk of Works, who will be appropriately trained on the required monitoring methods and the use, calibration and maintenance of all monitoring equipment used. Records will be kept of biological and chemical monitoring undertaken carried out prior to the commencement of construction works.	Pre-construction monitoring prior to any works commencing near surface water locations will allow works and plans to be the most accurate to avoid and prevent contaminant or sediment release that could contribute impacts to the designated sites downstream of the Gathabawn Windfarm Project.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
WM11 GM11	The construction Method Statements to be developed by the construction contractors will take full account of the EMP including the mitigation and monitoring measures and will be reviewed by the Project Engineer and the Environmental Manager prior to the commencement of construction works.	Following the refinement, design and implementation of mitigation measures, minimal sediment or contaminants will enter downslope watercourses, habitats will be maintained through restoration and the construction and design of new culverts will ensure free passage of fish and aquatic species. Therefore, any potential negative impacts on downstream waterbodies, aquatic habitats or species will be Negligible.
	Construction Phase Monitoring Arrangements	
WM12 GM12	The Environmental Management Team will monitor construction works for compliance with the Environmental Management Plan. The project Environmental Management Team which includes an Environmental Clerk of Works, the Project Ecologist and specialists as required such as archaeologists, invasive species specialists and hydrologists, who are independent of the site contractors. The Environmental Management Team will report to the owner's Project Manager.	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. In addition, the presence of a ECoW and ecologist will facilitate the Project Manager to be alerted to any emergent changes during the construction phases (i.e. changes in soil integrity surrounding work area, weather changes impact timing of works at watercourses and drains)
WM14 GM14	Engineer Supervision: a suitably qualified engineer will supervise all excavations and construction works.	This will ensure that all such works are undertaken in accordance with best practise and in such a way as to minimise the potential for pollution (aquatic and air quality) and minimise disturbance.
WM15	Drainage Network Inspections: The windfarm drainage network will be inspected regularly during the construction phase under the following schedule: Daily visual inspections by the Contractor; weekly inspections by the Environmental Management team; Event based inspections by the Contractor as follows: >10 mm/hr (i.e. high intensity localised rainfall event); or >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day); or, rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week). All inspections will include all elements of the drainage systems to ensure that the systems are operating correctly. Inspections will examine the functioning of the various elements of the drainage system, and if evidence of sedimentation or scouring and any changes in the drainage water including discolouration, odour, oily sheen or the presence of litter, then the required corrective maintenance or actions will be identified and will be implemented immediately the Contractor. Weekly site inspections of the drainage network will be carried out by members of the Environmental Management Team during construction phase and for a period of 6 months following construction. If monitoring identifies sediment or contaminant polluted waters, then the Environmental Clerk of Works will establish the cause of the pollution, and if caused by the Project, then the Environmental Clerk of	Regular inspections of drainage network will facilitate the monitoring of any unforeseen sediment build up and allow construction crew to amend actions to prevent further build up and ensure drainage network is flowing neatly and cleanly in line with the intended pathways.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
	Works will have a 'stop-works' authority to temporarily stop construction works at the Project site and the Contractor will implement the necessary actions and measures to resolve the cause of the pollution	
WM16 GM16	Surface water quality monitoring of watercourses downstream of the works will be carried out at regular intervals by the Environmental Management team during the construction phase. Laboratory analysis of water samples will also be undertaken as part of the monitoring programme by an independent and appropriately certified laboratory. The surface water monitoring locations and sampling programme are defined in the Surface Water Management Plan which forms part of the Gathabawn Windfarm Project Environmental Management Plan. Surface water quality monitoring will include Total Suspended Solids [TSS] monitoring, with readings above 25mg per litre (as specified in the Salmonid Waters Regulations, SI 293 of 1988) triggering a non-compliance issue, and resultant remedial action by the construction Contractor, in line with the EMP. Records will be kept of biological and chemical monitoring undertaken before, during and after the works, and will be made available upon request to any authorised person as defined under the Local Government (Water Pollution) Acts.	Regular inspections will facilitate the monitoring of any unforeseen sediment build up and allow construction crew to amend actions to prevent further build up and ensure the surface water network is flowing neatly and cleanly in line with the intended pathways.
WM20 GM20	Liaison with Contractor: The Project Ecologist will liaise with the Contractors on a weekly basis regarding the upcoming schedule of works and will advise the Contractors of any particular ecological protection requirements at specific locations on site.	This is a best practice measure to ensure all ecological receptors and sensitivities are considered for all works proposed and to ensure all targeted mitigation measures to prevent adverse effects on QI and SCI receptors are adhered to and implemented in full.
	Construction Phase Mitigation Measures	
WM30 GM27	Fencing of works areas: The boundaries of construction works areas in agricultural lands will be fenced to prevent the encroachment of construction phase personnel, machinery or materials beyond this boundary. Livestock proof fencing will be used, with landowner access maintained through the provision of openings along the boundary fences.	This measure will prevent any expansion of construction works impacts beyond the established Construction Works Area Boundary. This is an accepted measure to prevent works expanding beyond the consented areas for machinery and human activity where the pathways and potential impacts were not considered for additional adverse effects. This measure will ensure that the only adverse effects needing mitigation are the ones considered within the relevant works area boundaries provided for the development.
WM31	Control of Movement of Machinery/Vehicles: Construction traffic, personnel and materials will be restricted to the hardcore surfaces, particularly with respect to the newly constructed access roads.	This measure will prevent any expansion of construction works impacts beyond the established Construction works Area Boundary. This is an accepted measure to prevent works

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
	This means that machinery will be kept on the windfarm site roads and hardstanding areas, and, aside from advancing excavations, will avoid moving onto areas not delineated on the site drawings.	expanding beyond the consented areas for machinery and human activity where the pathways and potential impacts were not considered for additional adverse effects. This measure will ensure that the only adverse effects needing mitigation are the ones considered within the relevant works area boundaries provided for the development.
WM32 GM29	Land reinstatement will not be carried out during very wet weather or when the soil is waterlogged. If any compaction has occurred along the construction works area, these areas will be ploughed with a sub-soiler to loosen the subsoil layer.	Carrying out reinstatement works during very wet weather can result in sediment run off occurring in potential significant levels. All efforts should be to conduct work in weather and conditions that limit or reduce any such run-off potential. This measure will ensure even unlikely worst-case scenario effects are of negligible to no effect on the integrity of the SACs QIs.
WM33 GM30	Excavation of Materials: The excavation of earth materials during the construction stage will be kept to a minimum. The excavation of materials will be completed in accordance with best practices for the management and treatment of such materials. (i.e. British Standards BS6031:2009 Code of Practice for Earthworks, and MAFF (2000) Good Practice for Handling Soils).	Backfilling is a recommended and accepted measure to prevent any substantial change to the receiving environment at landscape level.
WM34 GM31	Storage of Overburden: During construction works, excavated material will be removed for temporary or permanent storage at designated berms. All storage berms will be placed more than 50m away from any watercourse or wet drainage channel. Temporary silt control methods such as silt fencing or curtains will be placed around all overburden storage areas and/or installed between the berms and local watercourses or wet drainage channel, depending on the location, and the existing vegetative between the berms and watercourse / drainage features will be left in place.	This measure will remove any potential for excavated sediment to experience surface run-off should a rain event occur before backfilling of excavations takes place. Silt control and vegetative buffers are key measures to avoid the potential for any adverse effects from both likely and unlikely impacts.
WM35	Protection of Soils in Berms; All storage berms will be graded and sealed following emplacement. Topsoil and subsoil will be stockpiled separately. Where possible, the upper vegetative layer (where still present) of excavated soil will be stored with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the stored spoil within the storage areas. Re-seeding will also be carried out in these areas. Measures such as interceptor ditches around the bases of these areas, and silt curtains will also be incorporated where required to prevent runoff of suspended solids, dust and soil erosion.	This measure will minimise the potential for mobilisation of silts, sediments and/or dust through the establishment of vegetation.
GM32	Protection of Soils in Berms; All storage berms will be graded and sealed following emplacement. Topsoil and subsoil will be stockpiled separately. Re-seeding of permanent berms will be carried out as soon as practical in these areas. Construction works areas along cable routes in agricultural lands will be reseeded as son as practical after reinstatement. Measures such as silt curtains around the bases of these areas and sediment traps will also be incorporated to prevent runoff of suspended solids, dust and soil erosion, if required.	This measure will minimise the potential for mobilisation of silts, sediments and/or dust through the establishment of vegetation.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
WM37	No storage of excavated material on the public road along road widening sections of the L58141 or L18062. All excavations from public roads will be removed to licensed waste facilities in accordance with the Waste Management Plan.	Public road excavations will include concrete/Tarmac type material with other contaminant material likely present. Removing is material, removes the source of impact. The covering of this material in transit will prevent any dropping/spiling of material that would be considered to have a likely harmful effect on the receiving environment due to the carcinogenic nature of these materials.
WM41 GM34	Protection of watercourses and existing drains: Additional mitigation measures will be deployed within 50m of watercourses or wet drainage features, including the placement of silt trapping arrangements along preferential surface water flowpaths, and temporary drain blocking in existing drains. Works will not take place within this 50m zone during prolonged heavy or exceptional rainfall events.	These measures are additional and precautionary to avoid even a negligible event of sediment run-off resulting from construction works near watercourses or wet drainage features.
WM42 GM35	Weather forecasts will be consulted in advance of works. If there is heavy prolonged rainfall or if an exceptional rainfall event occurs, then construction works will cease until peak flows have subsided.	This measure will prevent any works taking place near watercourses during periods which are more likely to cause significant run-off, particularly associated with excavation works or transport of excavation material to storage locations.
WM43	Drainage network: Windfarm site roads and hardstanding areas are designed to have a permanent surface water drainage network in place. Temporary works areas, such as turning heads, borrow pits and compounds will have a temporary surface water drainage network in place during works. The drainage infrastructure will not be installed during heavy or prolonged rainfall events or when the soil is waterlogged. The site drainage network will ensure that all surface water runoff from upgraded roads and new road surfaces (including hardstand areas) will be captured and treated prior to discharge/release. Transverse drains ('grips') will be constructed, where appropriate, in the surface layer of access tracks to divert any runoff into swales/track side drains; The site drainage network will include check dams and settlement ponds which will settle suspended solids in water runoff while also slowing down the rate of water run-off from these areas. Water will be released to surrounding vegetation at regular intervals via buffered outfall weirs, which also form part of the drainage network.	These measures will avoid even a negligible event of sediment run-off resulting from the use of site roads and operation of borrow pits via surface runoff by capturing and treating water before it can interact with drains or watercourses downstream of the works.
GM36	At Parksgrove Substation, a permanent surface water drainage network will be installed at the substation compound and along the associated access road, and will ensure that all surface water runoff from the access road and new the hardstand areas will be captured and treated prior to discharge/release. The drainage infrastructure will not be installed during heavy or prolonged rainfall events or when the soil is waterlogged. The site drainage network will include check dams and settlement ponds which will settle suspended solids in water runoff while also slowing down the rate of water run-off from these areas. Water will be released to surrounding vegetation via buffered outfall weirs.	These measures will avoid even a negligible event of sediment run-off resulting from the use of site roads and operation of borrow pits via surface runoff by capturing and treating water before it can interact with drains or watercourses downstream of the works

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
WM44	On-Site Borrow Pits: It is proposed that bedrock won from the on-site borrow pits during the construction phase will be used to construct the sub-base layer of proposed upgraded and new access roads and hardstand areas. Once installed the sub-base layer will be overlain by a capping layer of clean high-grade bedrock, such as limestone.	This measure will ensure the long term integrity of the project artificial surfaces and minimise any dust/sediment runoff throughout the life cycle of the project.
WM45 GM37	Where dewatering of trenches or excavations is required, there will be no direct discharge of treated water into any watercourse or drain or directly onto adjacent habitats. Rather, all pumped water will be discharged via a silt bag or infiltration trench or settlement pond, as appropriate, to surrounding vegetation.	These measures will avoid even a negligible event of sediment run-off resulting from the site via surface runoff by capturing and treating water before it can interact with drains or watercourses downstream of the works.
GM38	Any replacement culverts under the public road (if required), will be sized to cope with a minimum 100-year flood event. In all cases, culverts will be oversized to allow mammals to pass through the culvert. The replacement of drain crossing structures will be carried out in accordance with the Office of Public Works (OPW) Guidelines Construction, Replacement or Alteration of Bridges and Culverts (2013), and also with the Department of Transport, Tourism & Sport Guidelines for Managing Openings in Public Roads (April 2017). Crossings will be designed to meet IFI's *Guidelines on Protection of Fisheries during Construction Works in and adjacent to Waters 2016* and *OPW's Design Guidance For Fish Passage On Small Barriers (2021).*	These measures will prevent the need for any instream/dam and overpump works to install culverts at the windfarm, and will avoid any changes to the existing structure and depths of the drains and stream .
WM46	Isolation of flow: Works in wet drainage channels will not be undertaken without isolation of flow within the drain. The water will be isolated from the works by over pumping, flume (pipe) or channel diversion methods.	These measures will prevent the mobilsation of sediments as a result of any in-stream construction activities.
GM39	In-stream works – isolation of flow and electrofishing: In-stream works at W3, W4 and W5 will not be undertaken without isolation of flow within the watercourse by over-pumping through a flume (pipe). The Project Ecologist will supervise all watercourse crossing works at W1 to W6 inclusive. A pre-works survey will be carried out by the Project Ecologist to identify any electrofishing requirements at the watercourses, and if required electrofishing of the isolated section will be carried out under licence prior to the commencement of excavation works.	These measures will prevent the mobilsation of sediments as a result of any in-stream construction activities.
GM40	Instream works at W3, W4 and W5 will be followed by site-specific reinstatement measures to ensure the restoration of flow character and morphology within the affected reach. Measures will include: bank stabilisation using boulder armour or willow/brush bank protection; reinstatement of bank slope and character, creation of compound channels where necessary; reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and planting along the riparian margin to stabilise banks, add flood protection and provide riparian buffer.	These measures will ensure that existing flow characteristics of watercourses will be reinstated and hydrological regimes downstream of the proposed operations will be unaffacted.
GM43	Only precast concrete or double skinned HDPE pipes will be used for new drain crossing structures, if required, along the Ballylehaun-Ballyring UGC. Only precast concrete chambers will be used at Joint Bays.	This measure is to avoid setting of wet cement in close proximity to watercourses where the integrity of the cement culvert could be compromised prior to or during installation.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
WM18 GM18	Fit for Purpose: All plant and machinery which will be used during construction will be fit for purpose and in good working order prior to mobilisation to works areas. The plant and machinery will be regularly inspected by the Contractor for leaks and maintained in good working order for the duration of the works.	This measure is a key measure to ensure any accidental spills/leaks of hydrocarbons are caught immediately. This measure is majorly effective in removing the likelihood for machinery to be a source of habitat degradation impacts.
WM19 GM19	Fuel, oil and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage.	This measure is a key measure to ensure any accidental spills/leaks of hydrocarbons are caught immediately. This measure is majorly effective in removing the likelihood for storage areas to be a source of habitat degradation impacts.
WM47	Concrete control procedures will be implemented and will include the following: • No concrete batching will take place on site, all concrete will be ready-mixed and delivered just-in-time. • The pouring of concrete will be scheduled for dry days. If a sudden rainfall event should occur, then suitable covers will be ready and available at the pour site to cover the concrete. • The pour site will be kept free of standing water. • All operators involved in pouring concrete will be trained and experienced in working with concrete. • Run-off from wind turbine foundation concrete pours will not be permitted to flow over adjacent lands or enter drainage channels. The run-off will be contained within the foundation area and pumped into a skip to settle out; settled solids will be appropriately disposed of off-site. • The Contractor will not permit the discharge of cement contaminated waters to the construction phase drainage system, onto adjacent lands or directly to any artificial drain or watercourse. • Concrete trucks will be washed out at the supplier's facilities and not on site. The only concrete washing that will occur on site is the hand washing of the chutes at the rear of the trucks. Washing of chutes will only take place at the designated area and into a Roadside Concrete Washout unit.	This measure is to avoid wet cement being flushed out to watercourses where the integrity of the cement could be compromised prior to or during installation of hardstands and other foundations or flow into watercourses with connectivity to the SAC.
WM48	Refuelling control procedures will be implemented and will include the following: • On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser carried on a double axel refuelling trailer, will be refuelled off-site, and will be towed around the site by a 4x4 vehicle to where machinery is located. The 4x4 vehicle will carry fuel absorbent material and pads in the event of any accidental spillage. Mobile	This measure is a key measure to control the use/handling of fuels and oils, and to ensure any accidental spills/leaks of hydrocarbons are caught immediately . This measure is majorly effective in removing the likelihood for refuelling or use of oils/fuels on the construction site to be a source of habitat degradation impacts.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
	measures such as drip trays and fuel absorbent mats will be used during all refuelling operations. • In addition, spill response apparatus including spill-kits and fuel absorbent mats will be stored in the cabin of each vehicle and operators will be fully trained in the use of this equipment and in the implementation of the Emergency Response Plan, as contained in the Environmental Management Plan. • The fuel bowser will be parked on a level area, away from main traffic activity, in a designated part of the construction compounds when not in use. Taps, nozzles or valves associated with mobile fuel bowser will be fitted with a lock system. Only designated trained and competent operatives will be authorised to refuel plant on site. A Permit to Fuel system will be put in place. • There will be no refuelling of vehicles or plant permitted within 100m of a watercourse or wet drainage channel or local spring/well.	
GM46	Along the cable routes, there will be no refuelling of plant or machinery within 100m of a watercourse or wet drainage channel or local spring/well.	This measure is a key measure to ensure any accidental spills/leaks of hydrocarbons are caught immediately and prior to any works adjacent to or within 100m of a surface water pathway. This measure is majorly effective in removing the likelihood for refuelling activities to be a source of habitat degradation impacts.
WM49 GM47	Storage of Fuels, Oils and Chemicals: All fuels or oils or chemicals, required during construction, will be stored in a designated, bunded, locked storage area within the temporary compounds. All fuel, oil and chemical storage areas will be bunded appropriately to 110% of the volume of oils/fuels each area contains for the duration of the construction phase. All bunded areas will be fitted with a storm drainage system and an appropriate oil interceptor. Ancillary equipment such as hoses, pipes will be contained within the bunded area. Fuel, oil and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage. Safety data sheets for all chemicals used will be kept on-site. An emergency response plan to deal with accidental spillages will be contained within the Environmental Management Plan.	This measure reduces the risk to water quality through isolation and containment of potential contaminative materials and by ensuring any accidental spills/leaks of hydrocarbons are caught immediately. This measure is highly effective in removing the likelihood for accidental spillage to be a source of water quality and habitat degradation impact.
WM50 GM48	Overnight parking of plant and machinery will only be permitted at an existing hard-core surface at locations which are greater than 50m from watercourse/drainage features/Cullahill Mountain SAC. Drip trays and fuel traps will be used under and around parked plant and machinery to contain any potential leaks.	This measure reduces the risk to water quality through separation distance, and by ensuring any accidental spills/leaks of hydrocarbons are caught immediately. This measure is majorly effective in removing the likelihood for machinery to be a source of habitat degradation impacts.

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
GM49	In-stream works (W3, W4 and W5) will only be undertaken during the IFI specified period (July, August and September) and will be carried out in accordance with the *Guidelines on Protection of Fisheries during Construction Works in and adjacent to Waters* (IFI, 2016). As requested by IFI during preplanning consultations for the windfarm, a site-specific method statement for each crossing will be provided to IFI and OPW at least one month ahead of works at each crossing.	This measure is an accepted means to ensure the drains are as dry as possible at the time of works, removing any downstream likelihood for the low magnitude impact to actually occur. Removing its likelihood. and therefore removing the adverse effect from occurring as a result for the project.
GM41	HDD Control of Works: The horizontal directional drilling works will be carried out by an experienced Drilling Contractor and supervised and managed by a competent and experienced Mud Engineer who understands the technicalities and challenges of drilling works. The Mud Engineer will advise the Construction Manager on the selection of competent drillers for the HDD works; monitor the watercourse bed during drilling works and will supervise the drilling works including the drilling pressures and the implementation of any contingency measures. From a surface water quality protection perspective, the area around the launch/reception pit, bentonite batching, pumping and recycling plant will be bunded using appropriate terram geotextile and/or sandbags in order to contain any spillages. Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area. Spills of drilling fluid will be cleaned up immediately and stored in an adequately sized watertight skip before being taken off-site to a suitably licensed waste facility. The HDD works from preparatory stage through to reinstatement will be supervised by the Project Ecologist. In the event of a break-out occurring, the Environmental Emergency Response Procedure for Frac-Out will be implemented which includes the following contingency measures; • In the event of break-out occurring in the stream/river bed, the rig will immediately shut off the pumps and the drilling assembly will be pulled off to reduce annular pressures; • In the event of break-out on the road an excavator will be available to dig a pit to contain fluid with vacuum trucks/pumps available to transfer drill fluid from the containment point back to the recycling point; and in either scenario, drilling fluid additives designed to plug the formation will be introduced to the circulation system and let set. Environmental Emergency Response Procedures are included in the Whole Gathabawn Windfarm Project Environmental Management Plan.	These measures are accepted best practice to prevent and manage any breach to a riverbed during direction drilling works. Given the timing of the works will be at a period when this stream is dry, these measures are unlikely to be needed but will be sufficient to mitigate any potential breach or contamination event.
	Operational Phase Monitoring and Mitigation	
WM102 GM93	Environmental Management Plan for the Operational Phase: Following the completion of the construction and commissioning of the Project, the Environmental Management Plan will be updated, and the operation of the Gathabawn Windfarm Project will be carried out in accordance with the	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately during the operation stage. In addition, the presence of an

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
	updated Plan. A suitably qualified Environmental Manager will be appointed by the Project Promoter, and it will be their responsibility to ensure that the EMP is implemented through liaising with the Asset Manager and by carrying out regular audits on EMP compliance. The EMP will be an important contract document for the Asset Management contractor who will be contractually obliged to comply with the EMP and the requirements of the Environmental Manager.	Environmental Manager will facilitate the Project Manager to be alerted to any emergent changes during the operation phase.
WM112	Control of vehicle/machinery movement: Operational phase traffic, personnel and materials will be restricted to the windfarm site roads and hardstanding areas.	This measure will minimise mortality effects to Otter.
	Decommissioning Phase Monitoring and Mitigation	
WM132 GM98	Noise and GHG emissions from plant/machinery: Plant and machinery will not be permitted to idle. Machinery used intermittently will be shut down when not in use. All vehicles and plant will be fitted with effective exhaust silencers. Noise dampeners will be fitted where required. The best means practicable, including proper maintenance of plant, will be employed to minimise noise and GHG emissions.	This measure will minimise disturbance and displacement effects to Otter.
WM133	Fuel Controls: Overnight parking of plant and machinery will only be permitted at the turbine locations. There will be no refuelling of vehicles or plant permitted within 100m of a watercourse or drainage feature or within 100m of the Cullahill Mountain SAC or the Gales Hill Nature Reserve. Any re-fuelling of machinery on site will be carried out using a mobile double skinned fuel bowser which will carry fuel absorbent material and pads in the event of any accidental spillages. In addition, spill response apparatus including 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.	This measure reduces the risk to water quality through separation distance, and by ensuring any accidental spills/leaks of hydrocarbons are caught immediately. This measure is majorly effective in removing the likelihood for machinery to be a source of habitat degradation impacts.
WM135	Land reinstatement: Following the completion of decommissioning, the hardcore areas at the turbines and at widened site entrances and facilitating works locations will be covered over, using the soil in the deposition areas. The areas will be reseeded/replanted as appropriate to the location. The areas will we fenced from livestock until revegetation has occurred. Land reinstatement works will not take place during periods of prolonged heavy rain or exceptional rainfall events or when the soil is waterlogged.	The measure will be effective by restoring disturbed areas to their pre-construction land use and supporting the rapid re-establishment of vegetation. Reusing stored soil and reseeding/replanting will minimise exposed ground and the potential for soil erosion, while fencing areas from livestock and avoiding works during wet or waterlogged conditions will protect the reinstated areas and promote successful revegetation.
GM106	Reinstatement Works: Following cable pulling works, the covers will be replaced on the chambers, and ground above the chamber reinstated as appropriate to the location. If in agricultural lands, the area will be reseeded as appropriate and fenced from livestock until revegetation has occurred. Land reinstatement works will not take place during periods of prolonged heavy rain or exceptional rainfall events or when the soil is waterlogged.	The measure will be effective by restoring disturbed areas to their pre-construction land use and supporting the rapid re-establishment of vegetation. Reusing stored soil and reseeding/replanting will minimise exposed ground and the potential for soil erosion, while fencing areas from livestock and avoiding works during wet or waterlogged conditions will

ID	Description of the Measure – Sediment/Contaminant-laden Runoff	Effectiveness of the measure
		protect the reinstated areas and promote successful revegetation.
WM136 GM107	Revegetation: The Asset Manager and Project Ecologist will check the rate of re-vegetation of exposed soils and reinstated areas quarterly following decommissioning works (until revegetation is attained). Where revegetation is slower than expected, that area will be prepared and re-seeded in an appropriate manner.	The measure will be effective by restoring disturbed areas to their pre-construction land use and supporting the rapid re-establishment of vegetation.
GM109	The Promoter of the of the Gathabawn Windfarm Project will liaise with other renewable energy developers where there is potential for the timing of groundworks associated with grid connection works to overlap within a sub-catchment. The Promoter will liaise with the other developer(s) with the aim of jointly agreeing the timing of works to provide a buffer of time between works. The Project Ecologist will consult with NPWS and advise on the timing of the works to avoid or reduce cumulative impacts to habitats and species in downstream waterbodies and in the Parksgrove/Moatpark area.	This measure reduces or avoids magnitude of impacts to SCI

6.4.6.3 Spread of Invasive Species Measures

The following measures will be implemented to reduce the risk of spreading invasive species during all phases of the Project. These measures will be implemented through the Environmental Management Plan and under the supervision of the Environmental Clerk of Works during the construction phase, and under the supervision of the Asset Manager during the operational and decommissioning phases. The Environmental Clerk of Works and Asset Manager will be responsible for monitoring the implementation and effectiveness of the mitigation and monitoring measures.

The residual effect of the Project on the integrity of the SAC follows in Section 6.3.7.

Table 6-9: Invasive Species Measures

ID	Description of the Measure - Invasive Species	Effectiveness of the measure
	Pre-Construction Surveys	
SM03 GM03	Pre-construction surveys for invasive species will be carried out to determine if any new infestations of invasive species have been established in the interim period between the submission of the planning application and the commencement of construction works. These pre-construction confirmatory surveys for invasive species will be carried out at the construction works areas plus 7m, by the Project Ecologist, to accurately determine the extent of new invasive species infestations. Mapping, showing the most up to date distribution and extent of each infestation, will be distributed to the Environmental Clerk of Works and to the Project Engineer.	These pre-construction surveys will confirm the identified locations of invasive species have not expanded or changed between the time of submission for planning and the commencement of construction works.
	Construction Phase Monitoring and Surveys	
SM12 GM12	The Environmental Management Team will monitor construction works for compliance with the Environmental Management Plan. The project Environmental Management Team which include an Environmental Clerk of Works, the Project Ecologist and specialists as required such as a archaeologists, invasive species specialists and hydrologists, who are independent of the site contractors. The Environmental Management Team will report to the owner's Project Manager	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. In addition, the presence of a ECoW and ecologist will facilitate the Project Manager to be alerted to any emergent changes during the construction phases (i.e. changes in soil integrity surrounding work area, weather changes impact timing of works at watercourses and drains)
SM20 GM20	Liaison with Contractor: The Project Ecologist will liaise with the Contractor on a weekly basis regarding the upcoming schedule of works and will advise the Contractor of any particular ecological protection requirements at specific locations on site.	This measure is the key compliance measure to ensure all mitigation measures are employed properly and appropriately. In addition, the presence of a ECoW and ecologist will facilitate the Project Manager to be alerted to any emergent changes during the construction phases (i.e. appearance of new invasive plant species locations)
SM21 MM20 GM21	Any excavation works in close proximity (7m) to an invasive species infestation location will be carried out under the direct supervision of an invasive species specialist ecologist.	These are best practice measures related to managing invasive species that change their locations, or related to new infestations which have established, between the time of surveying for invasive plant species and the commencement of construction works.
SM22	Invasive Species Control: Visual inspections will be carried out by the Contractor on all machinery and equipment (particularly for machinery and equipment which has come into contact with water	This is the accepted practice to ensure machinery and personnel do not inadvertently cause the transportation of invasive species either

ID	Description of the Measure - Invasive Species	Effectiveness of the measure
GM22	or soils) for evidence of attached plant or animal material, or adherent mud or debris. Any attached or adherent material will be removed before entering or leaving the site, securely stored away from traffic for removal to a contaminated waste storage bin at either the Ballylehaun and Ballyring temporary construction compounds, or in the temporary construction compound at Parksgrove.	within the construction area sites or across the wider receiving environment.
	Construction Phase Mitigation Measures	
MM03	Control of Movement of Machinery/Vehicles: Construction traffic, personnel and materials will be restricted to the hardcore surfaces, particularly with respect to the newly constructed access roads. This means that machinery will be kept on the windfarm site roads and hardstanding areas, and, aside from advancing excavations, will avoid moving onto areas not delineated on the site drawings.	This is the accepted practice to ensure machinery and personnel do not inadvertently cause the transportation of invasive species either within the construction area sites or across the wider receiving environment
GM27	Control of Movement of Machinery/Vehicles: Construction traffic, personnel and materials will be restricted to within the construction works area fence and will avoid moving onto areas not delineated on the site drawings.	This is the accepted practice to ensure machinery and personnel do not inadvertently cause the transportation of invasive species either within the construction area sites or across the wider receiving environment
MM19 GM49	Treatment/management of invasive species infestations: Any infestations of Japanese knotweed or other high-impact invasive species within 7m of works will be covered with high density polyethylene grass carpet terram prior to any works commencing at the location. The covering of any new infestations will only be carried out under the direct supervision of a specialist invasive species ecologist, and works within 7m of the infestation will be under the direct supervision of this specialist invasive species ecologist	This biosecurity measure is in line with best practice for construction works to prevent the expansion and/or spread of invasive plant material.
	Operational Phase Monitoring and Mitigation	
OMM06	Invasive Species Survey during major maintenance: Prior to facilitating works for turbine component transportation, the works locations will be surveyed for invasive plant species. Should a new infestation be identified, then the works within 7m of the infestation will be carried out under the direct supervision of an ecologist with prior experience of invasive species.	This biosecurity measure is in line with best practice for operation works to prevent the expansion and/or spread of invasive plant material.
	Decommissioning Phase Monitoring and Mitigation	
DMM06	Invasive Species survey: Before any decommissioning works commence, the works locations will be surveyed for invasive plant species infestations and should any be present within 7m of the works, then the works within 7m of the infestation will be under the direct supervision of an ecologist with prior experience of invasive species.	This biosecurity measure is in line with best practice for decommissioning works to prevent the expansion and/or spread of invasive plant material.
GM92	Invasive Species: Before any reopening of jointing chambers, works locations will be surveyed for invasive plant species infestations and should any be present within 7m of the works, then the works within 7m of the infestation will be under the direct supervision of an ecologist with prior experience of invasive species.	This biosecurity measure is in line with best practice for decommissioning works to prevent the expansion and/or spread of invasive plant material.

6.4.6.4 Monitoring of the Implementation and Effectiveness of the Mitigation Measures

Monitoring:

The construction of the Whole Gathabawn Windfarm Project will be carried out in accordance with the Environmental Management Plan 2026, which accompanies the planning application. The Environmental Management Plan 2026 includes a Sediment & Erosion/Storm Water Control Plan, a Fuel Management Plan, a Waste Management Plan, a Dust Minimisation Plan and an Invasive Species Management Plan. The implementation of the Environmental Management Plan including all of the mitigation and monitoring measures proposed herein, will be monitored by an Environmental Clerk of Works and an Environmental Manager during the construction works.

Weekly auditing of the construction works for compliance with the Mitigation Measures will be carried out by the Environmental Clerk of Works, who will also monitor construction works in order to Identify any unforeseen adverse effects to the environment. The Environmental Clerk of Works will be appointed by the Project Promoter, be independent of the Construction Contractor, and will report directly to the Promoters Project Manager.

Once the Gathabawn Windfarm Project is constructed, the environmental management of the project will be carried out by the Gathabawn Windfarm site manager, who will be responsible for the implementation of mitigation and monitoring measures during any operational maintenance and decommissioning works.

On-going monitoring of the implementation and effectiveness of the Mitigation Measures will ensure that the above mitigation measures are implemented and working effectively which will ensure that the Gathabawn Windfarm Project will not adversely affect the integrity of a European Site.

Effectiveness:

It is considered that the measures provided in 6.4.5 above are appropriate and comprehensive to prevent any potential direct and indirect effects from resulting in even a negligible magnitude adverse effect on the QI habitat and typical species of the River Barrow and River Nore SAC.

Given the likelihood of sediment and contamination-laden run-off to occur as a result of construction works associated with the Candidate Gathabawn Grid Connection, the mitigation measures provided above are appropriate and comprehensive to prevent any such effects from resulting in even a negligible magnitude adverse effect on aquatic QIs.

The spread of invasive species is a common and increasing impact source from developments across Ireland. In the absence of mitigation, this impact almost always poses low to high magnitude adverse effects on sensitive receptors. The measures provided in Section 6.4.5 above are accepted best practice to manage and prevent this impact from occurring. As such, these measures remove any potential for invasive species spread within the boundaries of the SAC or in suitable habitat of QI species ex-situ the SAC.

Following the implementation of the mitigation measures, it can be concluded that the Proposed Gathabawn Windfarm will not result in adverse effects on the conservation objectives for the QI habitats and species of the River Barrow and River Nore SAC in circumstances where no reasonable scientific doubt remains.

6.4.7 Evaluation of the Residual Effect of the proposed development on the Integrity of the River Barrow and River Nore SAC [002162]

Using the checklist in the table below and taking into account the mitigation measures and monitoring arrangements for the Proposed Gathabawn Windfarm and the Candidate Gathabawn Grid Connection, presented in Section 6.4.6, the Proposed Gathabawn Windfarm development is examined, both alone and in-combination with the other parts of the Whole Gathabawn Windfarm Project and with the other projects, plans and land-use activities, for adverse impacts on the integrity of the River Barrow and River Nore SAC.

AA Table 19: Integrity of Site checklist for the River Barrow and River Nore SAC (Site Code: 002162)

***Does the project or plan have the potential to*:**	**(Yes/No)**
- cause delays in progress towards achieving the conservation objectives of the site?	No
- interrupt progress towards achieving the conservation objectives of the site?	No
- disrupt those factors that help to maintain the favourable conditions of the site?	No
- interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	No
- change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	No
- interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No
- reduce the area of key habitats?	No
- reduce the population of key species?	No
- change the balance between key species?	No
- reduce diversity of the site?	No
- result in disturbance that could affect population size or density or the balance between key species?	No

In summary,

as no adverse impacts on the integrity of the River Barrow and River Nore SAC are predicted for the Proposed Gathabawn Windfarm, whether considered alone or in-combination with the other parts of the whole Gathabawn Windfarm Project and with other projects, plans or land-use activities, it can be objectively concluded that Proposed Gathabawn Windfarm will not result in adverse impacts on the integrity of the River Barrow and River Nore SAC, in circumstances where no reasonable scientific doubt remains.

6.5 Natura Impact Statement Conclusion

This Natura Impact Statement has been prepared as part of the Proposed Gathabawn Windfarm application, in order to allow an Appropriate Assessment determination in the context of Article 6(3) of the Habitats Directive, in view of existing case law.

The current proposal relates to twelve (12) wind turbines, windfarm site roads of 8km in total length, 2 electrical Control Buildings, underground electrical cabling within the windfarm site, a 30m lattice tower mast, a LiDAR unit, 7 site entrances, temporary works turbine delivery facilitating works, integrated drainage system, 2 borrow pits, the creation of biodiversity areas and all associated infrastructure, services and ancillary site works. The proposal forms the main part of a larger whole project - the Whole Gathabawn Windfarm Project, which also includes the Candidate Gathabawn Windfarm and Off-Site Activities along the Turbine Delivery Route. This Report has been prepared in order to evaluate the significance of potential effects on European Sites from Proposed Gathabawn Windfarm, both alone and in-combination with the other elements of the Whole Gathabawn Windfarm Project and with other projects and land-use activities.

A Screening evaluation was carried out for all European Sites within the zone of influence of the whole Gathabawn Windfarm Project. This identified 16 European Sites within the relevant Zone of Influence. The Screening evaluation concluded that the potential for likely adverse effects on Cullahill Mountain SAC (000831), River Nore SPA (004233) and River Barrow and River Nore SAC (002162) could not be excluded and therefore these European Sites were brought forward for further examination at Stage 2. Likely significant effects on the other 18 European Sites were screened out from further assessment due to the absence of potential impact pathways or where there was no potential or likelihood for significant impacts to occur as a result of the Proposed Gathabawn Windfarm (either alone or in-combination).

The Stage 2 assessment determines that, following the implementation of mitigation measures for the protection of semi-natural grassland habitats, orchid species, Otter, Kingfisher, aquatic based habitats and species, and water quality, and measures to prevent the spread of dust emissions and invasive species, and monitoring of whole project construction works under a Construction and Environmental Management Plan, and the monitoring arrangements for the Project during operation and decommissioning, it is evaluated that the Proposed Gathabawn Windfarm development will not, alone or in-combination, give rise to adverse impacts on the integrity of the Cullahill Mountain SAC (000831), River Nore SPA (004233) and River Barrow and River Nore SAC (002162).

The provisions of Article 6 of the 'Habitats' Directive 92/43/EC defines integrity as the 'coherence of the sites ecological structure and function, across its whole area, or the habitats, complex of habitats and/or population of species for which the site is classified'. Given the application of prescribed protective measures for the avoidance of impacts and the implementation of monitoring arrangements, it is evaluated that the Proposed Gathabawn Windfarm, whether considered alone or in-combination, in view of best scientific knowledge and on the basis of objective information, will not give rise to adverse impacts on the integrity of any of the European Sites evaluated in Stage 1 or Stage 2 of this document.

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APPENDIX TO APPROPRIATE ASSESSMENT REPORT 2026

APPENDIX A1: FINDING OF NO SIGNIFICANT EFFECTS (FONSE) REPORT

The data and descriptions in this appendix have informed the evaluation of the Proposed Gathabawn Windfarm both alone, and in-combination with the Candidate Gathabawn Grid Connection and other plans and projects in the Stage I Screening for Appropriate Assessment.

1.1 Finding of No Significant Effects Report

In accordance with the EC (2001) guidance document, Assessment of plans and projects significantly affecting Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, A Finding of No Significant Effects Report has been completed for the Proposed Gathabawn Windfarm. The standard matrix for this report provided in Annex 2 of the guidance document was followed.

Finding of No Significance Effects Report	
Name and location of the Natura 2000 sites	The Stage 1 Screening appraisal provided herein has examined potential effects via source pathway linkages on the designated SACs and SPAs within the Zone of Influence of the proposed Gathabawn Windfarm Project. There are 16 European Sites within the extended Study Area - eight Special Areas of Conservation (SAC) and eight Special Protection Area (SPA for birds): • Cullahill Mountain SAC [000831] • River Barrow and River Nore SAC [002162] • River Nore SPA [004233] • Galmoy Fen SAC [001858] • The Loughans SCA [000407] • Lisbigney Bog SAC [000869] • Spahill and Clomantagh Hill SAC [000849] • Ballynafagh Lake SAC [001387] • East Burren Complex SAC [001926] • Wicklow Mountains SPA [004040] • Wexford Harbour and Slobs SPA [004076] • Tramore Back Strand SPA [004027] • Mid Waterford Coast SPA [004193] • Helvick Head to Ballyquin SPA [004192] • Middle Shannon Callows SPA [004096] • Little Brosna Callows SPA [004086] In the AA, each of the European Sites within the study area were initially screened for connectivity with the proposed Gathabawn Windfarm Project. All phases of the Proposed Gathabawn Windfarm and the Candidate Gathabawn Grid Connection were considered- i.e. construction, operational, and decommissioning phases. Following the examination of potential connectivity to European Sites, 13 European Sites – Galmoy Fen SAC [Site Code: 001858], The Loughans SAC [Site Code: 000407], Lisbigney Bog SAC [Site Code: 000869], Spahill and Clomantagh Hill SAC [Site Code: 000849], Ballynafagh Lake SAC [Site Code: 001387], East Burren Complex SAC [Site Code: 001926], Wicklow Mountains SPA [Site Code: 004040], Wexford Harbour and Slobs SPA [Site Code: 004076], Tramore Back Strand SPA [Site Code: 004027], Mid Waterford Coast SPA [Site Code: 004193], Helvick Head to Ballyquin SPA [Site Code: 004192], Middle Shannon Callows SPA [Site Code: 004096], and Little Brosna Callows SPA [Site Code: 004086], were shown to have no connectivity to the Gathabawn Windfarm Project. These sites are considered to be located outside of the zone of influence due to (i) not located downstream of the Project and/or (ii) separation distance, and/or (iii) characteristics of the Qis/SCIs. Therefore, there is no potential for significant impacts to these European Sites and as a result, these sites are scoped out from further consideration herein. There is potential connectivity between the Proposed Gathabawn Windfarm with the remaining three European Sites – Cullahill Mountain SAC (Site Code: 004233], the

	River Barrow and River Nore SAC [Site Code: 002162] and the River Nore SPA [Site Code: 004233]. <u>Natura 2000 sites geographically overlapping</u> • N/A – the Project does not overlap the boundary of any Natura 2000 site. <u>Natura 2000 Sites downstream of the Proposed Gathabawn Windfarm:</u> • River Barrow and River Nore SAC • River Nore SPA <u>Natura 2000 Sites within 500m of the Proposed Gathabawn Windfarm:</u> • Cullahill Mountain SAC <u>Natura 2000 Sites within 500m of Other Elements of the Whole Project:</u> • River Barrow and River Nore SAC • River Nore SPA <u>Natura 2000 Sites within 10km of the Proposed Gathabawn Windfarm:</u> • Cullahill Mountain SAC • River Barrow and River Nore SAC • River Nore SPA <u>Natura 2000 Sites affected by interruptions to ecological linkages</u> • N/A - The Project will not affect features of the landscape that connect Natura 2000 sites or that may obstruct the movement of species.
Description of the project or plan	**<u>Overview:</u>** The proposal is to build a 12-turbine windfarm and ancillary works to be called Gathabawn Windfarm. It is expected that the Gathabawn Windfarm will connect to the national electricity system at the EirGrid Ballyragget Substation. The proposed 12-turbine Gathabawn Windfarm will comprise the following elements: <u>Gathabawn Windfarm</u> 12 No. Wind Turbines and associated works including foundations and hardstanding areas, windfarm roads, electrical control buildings and internal underground cabling connecting the wind turbines to the control buildings, to be located in two separate areas; Ballylehaun area (7 turbines) and Ballyring area (5 turbines). The proposed Gathabawn Windfarm site is located in the townlands of Coolnacrutta, Glashare, Ballylehaun, Gorteennamuck, Rathlogan, Ballyring Lower, Ballyring Upper, Tentore, Foyle South, Coolcashin and Garrydague. <u>Ancillary Works</u> In addition to the 12 turbines and hardstanding areas, the windfarm development also includes site access roads, 2 Control Buildings; 1 met mast, underground cabling, temporary works to facilitate turbine deliveries, and other associated and ancillary works. <u>The Whole Gathabawn Windfarm Project includes the Candidate Gathabawn Grid Connection, comprised ofBallylehaun to Ballyring Underground Grid Connection</u> • Ballylehaun-Ballyring UGC: Underground cabling between Ballylehaun and Ballyring, in the townlands of Ballylehaun, Gorteennamuck, Ballygowney and Ballyring Upper. • Ballyring-Parksgrove UGC: Underground cabling between Ballyring and Parksgrove Substation, in the townlands of Ballyring Lower, Lisdowney, Seskin South, Grange, Ballyconra and Parksgrove.

	• Parksgrove Substation: 110kV Electrical Substation in Parksgrove townland and associated access road. • Parksgrove-Moatpark UGC: Underground cabling between Parksgrove Substation and the existing Eirgrid Ballyragget Substation in Moatpark, in the townlands of Parksgrove, Ballyconra and Moatpark. Off-Site Activities for the project involve street furniture and potential roadside vegetation trimming or removal on the Portlaoise M7/N77 interchange roundabout. **Description:** The Proposed Gathabawn Windfarm is located entirely within County Kilkenny, with the wind turbines located on two areas of high ground – at Ballylehaun and at Ballyring. The nearest village is Gathabawn village which is 1km southeast from the nearest Ballylehaun turbine and 3km west from the nearest Ballyring turbine. Lisdowney village is also located 3km to the northeast of the nearest Ballyring turbine, while in neighbouring County Laois, Cullahill village is located 3km north of the Ballylehaun turbines. The larger settlements of Ballyragget, Freshford, Johnstown, Urlingford and Durrow occur in the wider surrounding area. The project location is characterised as rural open countryside with farmlands enclosed mainly by hedgerows. There are farmsteads and one-off housing located along the local roads and generally the commercial, civic and community services are in the surrounding small towns and villages. Farming in the area is predominantly grassland supporting dairy and beef cattle and to a lesser degree sheep farming and tillage. The majority of the landuse at the whole project site consists of improved agricultural grassland as part of dairy farming operations. Similar to the proposed windfarm, the Candidate Gathabawn Grid Connection is also located in County Kilkenny. The Candidate Gathabawn Grid Connection is routed along public road between Ballylehaun and Ballyring, and across agricultural farmlands between Ballyring and the existing Eirgrid Ballyragget Substation in Moatpark. A new substation is located beside the N77 national road in Parksgrove townland. The Parksgrove-Moatpark UGC is located in both agricultural grassland and public road and includes HDD works to install the cable ducts under the N77 road and under the River Nore. **Purpose:** The purpose of the Gathabawn Windfarm is to generate electricity from the power in the wind and export that electricity to the national electricity system.
Is the Project or Plan directly connected with or necessary to the management of the site (provide details)?	No
Are there other projects or plans that together with the project of plan being assessed could affect the site (provide details)?	Yes. In addition to any in-combination effects of the whole project (i.e. the proposed Gathabawn Windfarm and Grid connection, etc.), the other projects which were included in the impact evaluation, were considered in this Screening Evaluation. These projects are listed below: • Existing Lisdowney Wind Farm; • Existing Wind Farms on cutover peatlands, west of Johnstown and Galmoy; • Existing Wind Farms and Turbines on the southern Slieveardagh Hills; • Existing and Consented Wind Farms on the Castlecomer Plateaux (Pinewood, Ballynalacken); • Consented Briskalagh Wind Farm Grid Connection (could connect to Eirgrid Ballyragget);

	• Consented Battery Energy Storage System projects in the Moatpark area (BESS 1 and BESS 2); • In-Planning (under appeal to ACP) Seskin Wind Farm and Grid Connection (Counties Laois, Kilkenny); • In-Planning (SID) Littleton Wind Farm Grid Connection (could connect to Eirgrid Ballyragget); • Potential Killoshulan Wind Farm (c.3km south of the Ballylehaun Area); • Intensive management of agricultural lands; and • Kilkenny County Council Ballyragget Masterplan (2024).
The Assessment of Significant Effects	
Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site	The Proposed Gathabawn Windfarm is not located within the boundary of any SPA or SAC site. It is however, located 5m adjacent to the Cullahill Mountain SAC, with part of the Candidate Gathabawn Grid Connection also located 8m adjacent to this SAC. The Proposed Gathbawn Windfarm site is located in the catchment of the River Nore, with hydrological connectivity to the River Barrow and River Nore SAC and the River Nore SPA via drains and watercourses that drain the windfarm area. The Candidate Gathbawn Grid Connection also involves HDD works under the River Nore within the boundary of the SAC and SPA at the crossing point, with watercourse crossing works (5) in streams upstream of the River Nore. Potential effects to European sites from the Proposed Gathabawn Windfarm Project have been identified via the following project sources: • Construction activities effects of dust soiling; • Construction activities effects on water quality (potential run-off water carrying contaminants and/or silt/sediment); • Construction activities effects for the spread of invasive species; • Construction activities effects of disturbance/displacement or mortality of QI/SCI species; • Operation activities effects of disturbance/displacement of QI/SCI species; • Operation activities effects of direct mortality of QI/SCI species; • Decommissioning activities effects on water quality (potential run-off water carrying contaminants and/or silt/sediment); • Decommissioning activities effects for the spread of invasive species; • Decommissioning activities effects of disturbance/displacement or mortality of QI/SCI species; In relation to SPA sites, the Proposed Gathabawn Windfarm may result in any changes to sources of loss, degradation, fragmentation or loss/reduction in connectivity of suitable habitat for Special Conservation Interests. However, due to the proximity of the Candidate Gathbawn Grid Connection to the River Nore SPA and to ex-situ suitable habitat, there is potential for adverse effects. In relation to SAC sites, the Proposed Windfarm will not result in any changes to sources of loss, degradation, fragmentation or loss/reduction in connectivity of Qualifying Interest habitats or plant species or to suitable habitat for Qualify Interest animal species, and will not result in any changes to sources of disturbance, displacement or mortality of Qualifying Interest species. However, due to the proximity of the Candidate Gathbawn Grid Connection to the River Barrow and River Nore SAC and to ex-situ suitable habitat, there is potential for adverse effects.

Explain why these effects are not considered significant	Two SACs, Cullahill Mountain SAC and the River Barrow and River Nore SAC and one SPA, the River Nore SPA, are brought forward for further examination at Stage 2 due to pathways for potential indirect effects in respect of QI/SCI habitats and species for which the site is designated. As evaluated in the AA Screening, the Gathabawn Windfarm is not likely to cause significant adverse effects to any other European Sites and will not adversely affect the integrity of any other Special Protection Area or any other Special Area of Conservation in view of the site's conservation objectives. It is concluded that the Gathabawn Windfarm either alone or in-combination with the other elements and other projects, is not likely to cause significant adverse effects to any other European Sites and will not adversely affect the integrity of other European Sites in view of the site's conservation objectives. Therefore, as it can be objectively concluded that the Proposed Gathabawn Windfarm, either alone or in-combination, is not likely to cause significant impacts to the remaining European Sites, all the remaining European Sites listed in the AA screening are 'Screened Out' at Stage One of the Appropriate Assessment process. We refer to the Stage II Natura Impact Statement for detailed examination of the following sites: the Cullahill Mountain SAC, the River Barrow and River Nore SAC, and the River Nore SPA, respectively.
Name of Agency or Body Consulted	**Summary of Response**
An Coimisiún Pleanála	The planning application for the Proposed Gathabawn Windfarm to include an AA Report.

Data Collected to Carry out the Assessment

Who carried out the assessment	**Sources of Data**	**Level of assessment completed**	**Where can the full results of the assessment be accessed and viewed**
INIS Environmental Consultants Ltd Planning and Environmental Consultants Suite 16, Shannon Commercial Properties, Information Age Park, Ennis, County Clare, Ireland.	Extensive field surveys and assessment; Conservation objectives, site synopsis, site boundary information for all European Sites; Appropriate Assessment Reports for other projects (where available); and descriptions and drawings of the Proposed Windfarm.	Stage 1: Screening for Appropriate Assessment. Following screening it can reasonably be concluded that Significant Effects are likely to occur to three of the European sites (the River Barrow and River Nore SAC and one SPA, the River Nore SPA) as a result of the Proposed Gathabawn Windfarm.	The public office for An Coimisiún Pleanála, 64 Marlborough Street, Dublin 1. D01 V902 The public office for Kilkenny County Council, County Hall, John Street, Kilkenny, Co. Kilkenny. R95 A39T On the dedicated planning website: www.gathabawnwindfarmplanning.ie

Appendix to the Screening for Appropriate Assessment Report

Appendix B: Species Records held by NBDC

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A13.3.1 National Biodiversity Data Centre Data Results

A13.3.1.1 NBDC Protected and Invasive Species Records for the Target Grid Square S36

Grid Square S36			
Species	**Numbers**	**Most Recent Record**	**Designations**
Birds			
Barn Owl (*Tyto alba*)	2	31/07/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Bar-tailed Godwit (*Limosa lapponica*)	2	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List=
Black-headed Gull (*Chroicocephalus ridibundus*)	15	20/01/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Gull (*Larus canus*)	1	20/01/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Coot (*Fulica atra*)	9	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Amber List
Curlew (*Numenius arquata*)	9	20/01/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Gadwall (*Mareca strepera*)	2	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Goldcrest (*Regulus regulus*)	22	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Plover (*Pluvialis apricaria*)	3	06/12/2021	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Protected Species:

Grid Square S36			
Species	**Numbers**	**Most Recent Record**	**Designations**
			EU Birds Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Greenfinch (*Chloris chloris*)	25	01/02/2021	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Grey Wagtail (*Motacilla cinerea*)	13	01/02/2021	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Herring Gull (*Larus argentatus*)	3	24/03/2024	Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
House Martin (*Delichon urbicum*)	19	03/08/2024	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
House Sparrow (*Passer domesticus*)	28	31/05/2021	Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Kestrel (*Falco tinnunculus*)	16	03/08/2024	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Lapwing (*Vanellus vanellus*)	15	23/12/2022	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Lesser Black-backed Gull (*Larus fuscus*)	11	20/01/2023	Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Linnet (*Linaria cannabina*)	24	14/07/2021	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Little Egret (*Egretta garzetta*)	2	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species
Little Grebe (*Tachybaptus ruficollis*)	3	31/12/2011	Protected Species: Wildlife Acts
Mallard (*Anas platyrhynchos*)	9	23/12/2022	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species ||

Grid Square S36			
Species	**Numbers**	**Most Recent Record**	**Designations**
			Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Meadow Pipit (*Anthus pratensis*)	22	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Mistle Thrush (*Turdus viscivorus*)	20	01/02/2021	Protected Species: Wildlife Acts
Mute Swan (*Cygnus olor*)	7	23/12/2022	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Peregrine (*Falco peregrinus*)	6	23/12/2022	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species
Pheasant (*Phasianus colchicus*)	24	26/04/2020	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
Redwing (*Turdus iliacus*)	11	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Robin (*Erithacus rubecula*)	31	01/02/2021	Protected Species: Wildlife Acts
Rock Dove (*Columba livia*)	3	17/04/2019	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species
Sand Martin (*Riparia riparia*)	5	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Shoveler (*Spatula clypeata*)	1	08/03/2004	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Skylark (*Alauda arvensis*)	13	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Snipe (*Gallinago gallinago*)	10	06/01/2025	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species ||

Grid Square S36			
Species	**Numbers**	**Most Recent Record**	**Designations**
			Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Spotted Flycatcher (*Muscicapa striata*)	7	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Starling (*Sturnus vulgaris*)	33	07/02/2024	Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Stock Dove (*Columba oenas*)	11	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Stonechat (*Saxicola rubicola*)	8	31/12/2011	Protected Species: Wildlife Acts
Swallow (*Hirundo rustica*)	23	18/04/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Swift (*Apus apus*)	9	23/07/2021	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Teal (*Anas crecca*)	7	20/01/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Wigeon (*Mareca penelope*)	7	20/01/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Willow Warbler (*Phylloscopus trochilus*)	17	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Yellowhammer (*Emberiza citrinella*)	20	10/11/2021	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Terrestrial Mammals			
Badger (*Meles meles*)	110	31/12/2016	Protected Species: Wildlife Acts

Grid Square S36			
Species	**Numbers**	**Most Recent Record**	**Designations**
Hedgehog (*Erinaceus europaeus*)	1	29/06/2021	Protected Species: Wildlife Acts
Otter (*Lutra lutra*)	2	09/10/2015	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Pine Marten (*Martes martes*)	3	31/12/2012	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
Red Deer (*Cervus elaphus*)	1	30/04/2011	Protected Species: Wildlife Acts
Red Squirrel (*Sciurus vulgaris*)	5	03/04/2016	Protected Species: Wildlife Acts
Bats			
Brown Long-eared Bat (*Plecotus auritus*)	2	11/08/2018	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Common Pipistrelle (*Pipistrellus pipistrellus sensu stricto*)	125	03/08/2019	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Leisler's Bat (*Nyctalus leisleri*)	18	03/08/2019	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Natterer's Bat (*Myotis nattereri*)	1	11/08/2018	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	23	31/07/2023	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	18	31/07/2023	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Invasive Species			
American Mink (*Neovison vison*)	2	17/01/2010	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland) || Invasive Species: The Wildlife (Northern Ireland) Order 1985
Brown Rat (*Rattus norvegicus*)	2	16/03/2013	Invasive Species: High Risk Invasive Species (2013 Report)
Fallow Deer (*Dama dama*)	3	16/12/1991	Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland) || Protected Species: Wildlife Acts

Grid Square S36			
Species	**Numbers**	**Most Recent Record**	**Designations**
Grey Squirrel (*Sciurus carolinensis*)	3	31/12/2012	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland)
Giant Hogweed (*Heracleum mantegazzianum*)	1	02/07/2019	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland)
Japanese Knotweed (*Fallopia japonica*)	1	25/05/2010	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland) || Invasive Species: The Wildlife (Northern Ireland) Order 1985

A13.3.1.2 NBDC Protected and Invasive Species Records for the Target Grid Square S37

Grid S37				
Species		**Numbers**	**Most Recent Record**	**Designations**
Amphibians				
Common Frog (*Rana temporaria*)	6	15/08/2019	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts	
Smooth Newt (*Lissotriton vulgaris*)	1	13/07/2016	Protected Species: Wildlife Acts	
Invertebrates				
Marsh Fritillary (*Euphydryas aurinia*)	20	06/06/2023	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Threatened Species: Vulnerable	
Birds				
Barn Owl (*Tyto alba*)	7	26/05/2025	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Bewick's Swan (*Cygnus columbianus bewickii*)	1	31/12/2001	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Black-headed Gull (*Chroicocephalus ridibundus*)	9	20/08/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Common Gull (*Larus canus*)	2	07/11/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Common Sandpiper (*Actitis hypoleucos*)	1	14/04/2010	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Coot (*Fulica atra*)	5	18/02/2024	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Cormorant (*Phalacrocorax carbo*)	37	04/01/2025	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	

Grid S37				
Species		**Numbers**	**Most Recent Record**	**Designations**
Curlew (*Numenius arquata*)	13	11/02/2024		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Dunlin (*Calidris alpina*)	8	18/02/2024		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Gadwall (*Mareca strepera*)	2	07/11/2023		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Goldcrest (*Regulus regulus*)	31	13/08/2023		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Golden Plover (*Pluvialis apricaria*)	17	06/10/2024		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Great Spotted Woodpecker (*Dendrocopos major*)	1	13/06/2022		Protected Species: Wildlife Acts
Greenfinch (*Chloris chloris*)	48	01/08/2025		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Greenland White-fronted Goose (*Anser albifrons flavirostris*)	2	31/12/2011		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Grey Wagtail (*Motacilla cinerea*)	32	06/10/2024		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Greylag Goose (*Anser anser*)	3	06/03/2019		Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: Regulation S.I. 374/2024 (Ireland) || Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List

Grid S37				
Species		**Numbers**	**Most Recent Record**	**Designations**
Hen Harrier (*Circus cyaneus*)	2	29/10/2019	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Herring Gull (*Larus argentatus*)	2	06/03/2020	Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
House Martin (*Delichon urbicum*)	27	01/08/2025	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
House Sparrow (*Passer domesticus*)	28	01/08/2025	Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Jack Snipe (*Lymnocryptes minimus*)	1	28/11/2024	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species	
Kestrel (*Falco tinnunculus*)	43	17/07/2025	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Kingfisher (*Alcedo atthis*)	27	30/01/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Lapwing (*Vanellus vanellus*)	38	09/01/2025	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Lesser Black-backed Gull (*Larus fuscus*)	11	07/11/2023	Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Linnet (*Linaria cannabina*)	18	29/04/2025	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Little Egret (*Egretta garzetta*)	43	04/01/2025	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species	
Little Grebe (*Tachybaptus ruficollis*)	9	04/01/2025	Protected Species: Wildlife Acts	

Grid S37				
Species		**Numbers**	**Most Recent Record**	**Designations**
Mallard (*Anas platyrhynchos*)	14	04/01/2025		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Meadow Pipit (*Anthus pratensis*)	28	25/10/2024		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Merlin (*Falco columbarius*)	5	13/10/2024		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Mistle Thrush (*Turdus viscivorus*)	47	03/01/2025		Protected Species: Wildlife Acts
Mute Swan (*Cygnus olor*)	41	04/01/2025		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Peregrine (*Falco peregrinus*)	8	01/01/2024		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species
Pheasant (*Phasianus colchicus*)	22	01/01/2021		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
Pink-footed Goose (*Anser brachyrhynchus*)	2	31/10/2020		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species
Pintail (*Anas acuta*)	8	14/01/2024		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Pochard (*Aythya ferina*)	2	18/02/2023		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List

Grid S37				
Species		**Numbers**	**Most Recent Record**	**Designations**
Redshank (*Tringa totanus*)	4	14/01/2024		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Redwing (*Turdus iliacus*)	27	04/01/2025		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Robin (*Erithacus rubecula*)	54	04/01/2025		Protected Species: Wildlife Acts
Rock Dove (*Columba livia*)	7	27/02/2024		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species
Ruff (*Calidris pugnax*)	3	23/10/2022		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Sand Martin (*Riparia riparia*)	15	21/03/2020		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Shelduck (*Tadorna tadorna*)	4	18/02/2024		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Shoveler (*Spatula clypeata*)	6	14/01/2024		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Skylark (*Alauda arvensis*)	19	19/04/2024		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Snipe (*Gallinago gallinago*)	30	01/08/2025		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Sparrowhawk (*Accipiter nisus*)	12	01/08/2025		Protected Species: Wildlife Acts
Spotted Flycatcher (*Muscicapa striata*)	11	01/08/2022		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List

Grid S37				
Species		**Numbers**	**Most Recent Record**	**Designations**
Starling (*Sturnus vulgaris*)	28	04/01/2025	Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Stock Dove (*Columba oenas*)	8	31/07/1991	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Stonechat (*Saxicola rubicola*)	16	18/02/2024	Protected Species: Wildlife Acts	
Swallow (*Hirundo rustica*)	53	22/09/2024	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Swift (*Apus apus*)	15	10/05/2025	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Teal (*Anas crecca*)	10	14/01/2024	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Tree Sparrow (*Passer montanus*)	2	12/01/2021	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Tufted Duck (*Aythya fuligula*)	1	10/12/2020	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Wheatear (*Oenanthe oenanthe*)	4	06/10/2024	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
White-fronted Goose (*Anser albifrons*)	6	04/12/2022	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species	
Whooper Swan (*Cygnus cygnus*)	36	04/01/2025	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Wigeon (*Mareca penelope*)	7	14/01/2024	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species ||	

Grid S37				
Species		**Numbers**	**Most Recent Record**	**Designations**
			Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Willow Warbler (*Phylloscopus trochilus*)	19	02/06/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Woodcock (*Scolopax rusticola*)	7	02/05/2021	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Yellowhammer (*Emberiza citrinella*)	46	10/05/2025	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Terrestrial Mammals				
Badger (*Meles meles*)	128	14/01/2018	Protected Species: Wildlife Acts	
Hedgehog (*Erinaceus europaeus*)	3	20/10/2012	Protected Species: Wildlife Acts	
Otter (*Lutra lutra*)	7	27/09/2018	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts	
Pine Marten (*Martes martes*)	5	11/05/2021	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts	
Red Squirrel (*Sciurus vulgaris*)	14	28/10/2015	Protected Species: Wildlife Acts	
Bats				
Brown Long-eared Bat (*Plecotus auritus*)	3	08/08/2009	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts	
Common Pipistrelle (*Pipistrellus pipistrellus sensu stricto*)	7	08/08/2009	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts	
Daubenton's Bat (*Myotis daubentonii*)	2	08/08/2009	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts	

Grid S37				
Species		**Numbers**	**Most Recent Record**	**Designations**
Leisler's Bat (*Nyctalus leisleri*)	5	08/08/2009	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts	
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	1	31/07/2006	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts	
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	3	08/08/2009	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts	
Invasives				
American Mink (*Neovison vison*)	7	07/05/2017	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland) || Invasive Species: The Wildlife (Northern Ireland) Order 1985	
Fallopia japonica x sachalinensis = F. x bohemica	1	13/05/2016	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland)	
Grey Squirrel (*Sciurus carolinensis*)	2	31/12/2007	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland)	
Japanese Knotweed (*Fallopia japonica*)	4	19/01/2015	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland) || Invasive Species: The Wildlife (Northern Ireland) Order 1985	
Rhododendron ponticum	2	02/02/2020	Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: Detailed Risk Assesment || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland) || Invasive Species: Detailed Risk Assesment >> High Risk	

A13.3.1.3 NBDC Protected and Invasive Species Records for the Target Grid Square S46

Grid Square S46			
Species	**Numbers**	**Most Recent Record**	**Designations**
Amphibians			

Grid Square S46			
Species	**Numbers**	**Most Recent Record**	**Designations**
Common Frog (*Rana temporaria*)	1	19/04/2014	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
Smooth Newt (*Lissotriton vulgaris*)	1	19/04/2014	Protected Species: Wildlife Acts
Birds			
Balearic Shearwater (*Puffinus mauretanicus*)	1	30/03/2019	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: OSPAR Convention || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Barn Owl (*Tyto alba*)	11	07/01/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Black-headed Gull (*Chroicocephalus ridibundus*)	7	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Coot (*Fulica atra*)	7	25/01/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Cormorant (*Phalacrocorax carbo*)	5	24/11/2022	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Curlew (*Numenius arquata*)	17	23/12/2022	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Dunlin (*Calidris alpina*)	1	05/12/2022	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Goldcrest (*Regulus regulus*)	25	04/11/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Golden Plover (*Pluvialis apricaria*)	10	25/01/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Protected Species: EU Birds

Grid Square S46			
Species	**Numbers**	**Most Recent Record**	**Designations**
			Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Great Spotted Woodpecker (*Dendrocopos major*)	10	06/06/2024	Protected Species: Wildlife Acts
Greenfinch (*Chloris chloris*)	17	04/11/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Grey Wagtail (*Motacilla cinerea*)	18	04/11/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Herring Gull (*Larus argentatus*)	1	14/08/2019	Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
House Martin (*Delichon urbicum*)	15	30/07/2024	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
House Sparrow (*Passer domesticus*)	20	19/07/2024	Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Kestrel (*Falco tinnunculus*)	20	31/05/2021	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Kingfisher (*Alcedo atthis*)	18	22/09/2025	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Lapwing (*Vanellus vanellus*)	25	25/01/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Lesser Black-backed Gull (*Larus fuscus*)	2	31/12/2011	Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Linnet (*Linaria cannabina*)	10	14/08/2019	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Little Egret (*Egretta garzetta*)	19	04/11/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species

Grid Square S46			
Species	**Numbers**	**Most Recent Record**	**Designations**
Little Grebe (*Tachybaptus ruficollis*)	7	31/12/2011	Protected Species: Wildlife Acts
Mallard (*Anas platyrhynchos*)	22	25/01/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Meadow Pipit (*Anthus pratensis*)	12	23/05/2017	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Mistle Thrush (*Turdus viscivorus*)	22	04/11/2023	Protected Species: Wildlife Acts
Mute Swan (*Cygnus olor*)	27	25/01/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Peregrine (*Falco peregrinus*)	2	07/08/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species
Pheasant (*Phasianus colchicus*)	21	20/04/2021	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
Redshank (*Tringa totanus*)	2	05/12/2022	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Redwing (*Turdus iliacus*)	7	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Robin (*Erithacus rubecula*)	34	19/07/2024	Protected Species: Wildlife Acts
Rock Dove (*Columba livia*)	8	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species
Sand Martin (*Riparia riparia*)	46	23/04/2021	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Shoveler (*Spatula clypeata*)	2	24/11/2022	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species || Threatened

Grid Square S46			
Species	**Numbers**	**Most Recent Record**	**Designations**
			Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Skylark (*Alauda arvensis*)	9	23/05/2017	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Snipe (*Gallinago gallinago*)	6	05/11/2020	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Sparrowhawk (*Accipiter nisus*)	7	10/04/2018	Protected Species: Wildlife Acts
Spotted Flycatcher (*Muscicapa striata*)	4	31/07/1991	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Starling (*Sturnus vulgaris*)	24	19/07/2024	Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Stock Dove (*Columba oenas*)	6	20/03/2018	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Stonechat (*Saxicola rubicola*)	5	22/09/2025	Protected Species: Wildlife Acts
Swallow (*Hirundo rustica*)	32	30/07/2024	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Swift (*Apus apus*)	10	30/07/2024	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Teal (*Anas crecca*)	6	25/01/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Tree Sparrow (*Passer montanus*)	2	09/06/2013	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List

Grid Square S46			
Species	**Numbers**	**Most Recent Record**	**Designations**
Whooper Swan (*Cygnus cygnus*)	9	25/01/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Wigeon (*Mareca penelope*)	7	25/01/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Willow Warbler (*Phylloscopus trochilus*)	17	23/04/2021	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Yellowhammer (*Emberiza citrinella*)	17	19/07/2024	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Terrestrial Mammals			
Badger (*Meles meles*)	132	31/12/2016	Protected Species: Wildlife Acts
Hedgehog (*Erinaceus europaeus*)	18	24/07/2025	Protected Species: Wildlife Acts
Otter (*Lutra lutra*)	4	16/04/2013	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Pine Marten (*Martes martes*)	8	23/08/2021	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
Pygmy Shrew (*Sorex minutus*)	1	02/08/2012	Protected Species: Wildlife Acts
Red Squirrel (*Sciurus vulgaris*)	4	18/01/2023	Protected Species: Wildlife Acts
Bats			
Brown Long-eared Bat (*Plecotus auritus*)	4	11/09/2018	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Common Pipistrelle (*Pipistrellus pipistrellus sensu stricto*)	3	11/08/2021	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts

Grid Square S46			
Species	**Numbers**	**Most Recent Record**	**Designations**
Daubenton's Bat (*Myotis daubentonii*)	230	18/08/2021	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Leisler's Bat (*Nyctalus leisleri*)	3	10/08/2018	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Natterer's Bat (*Myotis nattereri*)	2	11/09/2018	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	5	10/08/2018	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Invasives			
American Mink (*Neovison vison*)	2	10/10/2012	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland) || Invasive Species: The Wildlife (Northern Ireland) Order 1985
Brown Rat (*Rattus norvegicus*)	3	13/10/2013	Invasive Species: High Risk Invasive Species (2013 Report)
Canadian Waterweed (*Elodea canadensis*)	4	31/12/1999	Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: The Wildlife (Northern Ireland) Order 1985
Cherry Laurel (*Prunus laurocerasus*)	3	02/08/2012	Invasive Species: High Risk Invasive Species (2013 Report)
Giant Hogweed (*Heracleum mantegazzianum*)	1	01/06/2021	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland)
Grey Squirrel (*Sciurus carolinensis*)	11	01/08/2017	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland)
Himalayan Balsam (*Impatiens glandulifera*)	9	17/01/2025	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: Detailed Risk Assessment || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland) || Invasive Species: Detailed Risk Assessment >> High Risk

Grid Square S46			
Species	**Numbers**	**Most Recent Record**	**Designations**
Japanese Knotweed (*Fallopia japonica*)	2	26/06/2015	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland) || Invasive Species: The Wildlife (Northern Ireland) Order 1985
Sika Deer (*Cervus nippon*)	1	15/10/2014	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland) || Protected Species: Wildlife Acts

A13.3.1.4 NBDC Protected and Invasive Species Records for the Target Grid Square S47

Grid Square S47				
Species		**Numbers**	**Most Recent Record**	**Designations**
Amphibians				
Common Frog (*Rana temporaria*)	13	15/03/2011	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts	
Invertebrates				
Marsh Fritillary (*Euphydryas aurinia*)	16	27/05/2023	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Threatened Species: Vulnerable	
Birds				
Barn Owl (*Tyto alba*)	2	11/08/2021	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Bar-tailed Godwit (*Limosa lapponica*)	1	31/12/2001	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Black-headed Gull (*Chroicocephalus ridibundus*)	9	13/11/2014	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Common Sandpiper (*Actitis hypoleucos*)	2	14/04/2010	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Coot (*Fulica atra*)	3	31/12/2001	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Cormorant (*Phalacrocorax carbo*)	7	27/11/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Curlew (*Numenius arquata*)	8	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Goldcrest (*Regulus regulus*)	61	18/02/2024	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	

Grid Square S47				
Species		**Numbers**	**Most Recent Record**	**Designations**
Golden Plover (*Pluvialis apricaria*)	7	19/12/2022		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Great Spotted Woodpecker (*Dendrocopos major*)	10	11/06/2024		Protected Species: Wildlife Acts
Greenfinch (*Chloris chloris*)	33	12/06/2022		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Grey Wagtail (*Motacilla cinerea*)	52	25/05/2025		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Herring Gull (*Larus argentatus*)	2	12/06/2022		Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
House Martin (*Delichon urbicum*)	29	19/05/2025		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
House Sparrow (*Passer domesticus*)	47	20/05/2024		Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Kestrel (*Falco tinnunculus*)	24	31/08/2025		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Kingfisher (*Alcedo atthis*)	30	04/03/2024		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Lapwing (*Vanellus vanellus*)	17	19/12/2022		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Lesser Black-backed Gull (*Larus fuscus*)	4	08/05/2023		Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Linnet (*Linaria cannabina*)	24	19/07/2023		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Little Egret (*Egretta garzetta*)	17	02/04/2025		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species

Grid Square S47				
Species		**Numbers**	**Most Recent Record**	**Designations**
Little Grebe (*Tachybaptus ruficollis*)	5	31/12/2011	Protected Species: Wildlife Acts	
Mallard (*Anas platyrhynchos*)	37	29/03/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Meadow Pipit (*Anthus pratensis*)	31	19/07/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Mistle Thrush (*Turdus viscivorus*)	44	19/02/2024	Protected Species: Wildlife Acts	
Mute Swan (*Cygnus olor*)	21	19/12/2022	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Peregrine (*Falco peregrinus*)	2	31/10/2024	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species	
Pheasant (*Phasianus colchicus*)	33	08/05/2023	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species	
Quail (*Coturnix coturnix*)	1	31/07/1991	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Red Kite (*Milvus milvus*)	1	01/07/2014	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Redwing (*Turdus iliacus*)	22	04/03/2022	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	
Robin (*Erithacus rubecula*)	77	18/02/2024	Protected Species: Wildlife Acts	
Rock Dove (*Columba livia*)	6	31/10/2024	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species	
Sand Martin (*Riparia riparia*)	68	23/05/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	
Skylark (*Alauda arvensis*)	22	16/06/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	

Grid Square S47				
Species		**Numbers**	**Most Recent Record**	**Designations**
Snipe (*Gallinago gallinago*)	19	18/02/2024		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Sparrowhawk (*Accipiter nisus*)	11	21/12/2021		Protected Species: Wildlife Acts
Spotted Flycatcher (*Muscicapa striata*)	21	19/07/2023		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Starling (*Sturnus vulgaris*)	48	18/02/2024		Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Stock Dove (*Columba oenas*)	9	31/07/1991		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Stonechat (*Saxicola rubicola*)	7	04/03/2022		Protected Species: Wildlife Acts
Swallow (*Hirundo rustica*)	61	20/05/2024		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Swift (*Apus apus*)	13	11/08/2025		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Teal (*Anas crecca*)	6	18/02/2024		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Tree Sparrow (*Passer montanus*)	4	27/11/2022		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Whooper (*Cygnus cygnus*)	2	17/12/2021		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Wigeon (*Mareca penelope*)	1	31/12/2001		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List

Grid Square S47				
Species		**Numbers**	**Most Recent Record**	**Designations**
Willow Warbler (*Phylloscopus trochilus*)	38	19/07/2023		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Woodcock (*Scolopax rusticola*)	3	13/03/2018		Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Yellowhammer (*Emberiza citrinella*)	24	13/05/2025		Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Terrestrial Mammals				
Badger (*Meles meles*)	86	17/06/2018		Protected Species: Wildlife Acts
Hedgehog (*Erinaceus europaeus*)	15	04/10/2025		Protected Species: Wildlife Acts
Otter (*Lutra lutra*)	6	09/10/2015		Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Pine Marten (*Martes martes*)	7	15/04/2021		Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
Pygmy Shrew (*Sorex minutus*)	2	03/08/2012		Protected Species: Wildlife Acts
Red Squirrel (*Sciurus vulgaris*)	7	05/12/2017		Protected Species: Wildlife Acts
Bats				
Brown Long-eared Bat (*Plecotus auritus*)	1	05/09/2018		Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Common Pipistrelle (*Pipistrellus pipistrellus sensu stricto*)	8	05/09/2018		Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Daubenton's Bat (*Myotis daubentonii*)	110	14/06/2022		Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts

Grid Square S47				
Species		**Numbers**	**Most Recent Record**	**Designations**
Leisler's Bat (*Nyctalus leisleri*)	7	05/09/2018	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts	
Natterer's Bat (*Myotis nattereri*)	1	02/08/2007	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts	
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	1	08/11/2021	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts	
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	8	05/09/2018	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts	
Invasives				
American Mink (*Neovison vison*)	1	06/05/1991	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland) || Invasive Species: The Wildlife (Northern Ireland) Order 1985	
Cherry Laurel (*Prunus laurocerasus*)	8	01/08/2023	Invasive Species: High Risk Invasive Species (2013 Report)	
Japanese Knotweed (*Fallopia japonica*)	1	13/07/2015	Invasive Species: EU Invasive Alien Species Regulation No. 1143/2014 || Invasive Species: Regulation S.I. 477/2011 (Ireland) || Invasive Species: High Risk Invasive Species (2013 Report) || Invasive Species: Regulation S.I. 374/2024 (Ireland) || Invasive Species: The Wildlife (Northern Ireland) Order 1985	

Appendix to the Screening for Appropriate Assessment Report

Appendix C: Invertebrates, Amphibians, Reptiles and Terrestrial Mammals Survey Data

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A13.3.1 Survey Data

Table 1: Mammal Walkover Survey Efforts 2024 and 2025

Date	Observer	Start Time	End Time
22/04/2025	KS	08:58	13:35
23/04/2025	KME & JOC	14:40	17:40
03/07/2025	KME	09:00	14:30
30/07/2025	KME	08:30	13:30
31/07/2025	KME	07:30	13:00
10/09/2025	DMC	09:00	13:00

Table 2: Badger Survey Efforts 2025

Date	Observer	Start Time	End Time
22/04/2025	KS	08:58	13:35
10/09/2025	DMC	09:00	13:00

Table 3: Otter Survey Efforts 2025

Date	Observer	Start Time	End Time
04/07/2025	KME	09:00	14:30
30/07/2025	KME	08:30	13:30
31/07/2025	KME	07:30	13:00
11/09/2025	KME & CMK	09:30	10:30

Table 4: Mammal Camera Trap Survey Efforts 2025

Surveyor	Trap No.	Date Deployed	Date Collected	ITM	Notes
KS	19072	22/04/2025	08/05/2025	633675.63, 670468.35	
KS	19068	22/04/2025	08/05/2025	633712.08, 671494.82	In ditch beside track
KS	19071	22/04/2025	08/05/2025	634903.24, 669795.64	
KS	19073	22/04/2025	08/05/2025	638807.98, 669197.33	
KS	19084	22/04/2025	08/05/2025	638519.65, 668811.42	Nil Sightings- no data
DMC	19073	10/09/2025	23/09/2025	638511.28, 668807.75	Placed beside mammal path in hedgerow

Surveyor	Trap No.	Date Deployed	Date Collected	ITM	Notes
DMC	19072	10/09/2025	23/09/2025	638336.09, 669159.65	Placed here to capture movement from woodland to west
DMC	19071	10/09/2025	23/09/2025	635032.35, 669619.94	Badger snuffle holes just adjacent field
DMC	19068	10/09/2025	23/09/2025	633739.16, 670331.46	
DMC	19076	10/09/2025	23/09/2025	633764.85, 671224.18	

Table 5: Marsh Fritillary Suitability Survey Efforts 2025

Date	Observer	Cloud	Precipitation	Wind Speed	Wind Direction	Temperature
15/08/2025	KME	3/8	None	F1	S	19

Table 6: Marsh Fritillary Larval Web Survey Efforts 2025 and 2026

Date	Observer	Cloud	Precipitation	Wind Speed	Wind Direction	Temperature
23/09/2025	KME	2/8	None	F1	SSE	11
17/09/2026	MMcK	6/8	None	F3	W	14

Table 7: Amphibian Suitability Survey Efforts 2025

Date	Observer	Cloud	Visibility	Precipitation	Wind Speed	Wind Direction	Temperature
25/04/2025	CMCK & KME	8/8	3	Moderate rain	F3	SE	11
22/05/2025	CMCK & KME	2/8	5	None	F1	S	13

Table 8: Amphibian Nocturnal Survey Efforts 2025

Date	Observer	Cloud	Visibility	Precipitation	Wind Speed	Wind Direction	Temperature
01/05/2025	JOC & MVA	5	2/8	None	F2	N	13
22/05/2025	CMCK & KME	5	2/8	None	F1	S	13

Table 9: Reptile Mat Deployment Survey Efforts 2025

Date	Observer	Cloud	Visibility	Precipitation	Wind Speed	Wind Direction	Temperature
22/05/2025	KME	0/8	16	None	F2	WNW	20

Table 10: Reptile Survey Efforts 2025

Date	Observer	Cloud	Visibility	Precipitation	Wind Speed	Wind Direction	Temperature
24/06/2025	JOC	7/8	10	None	F3	W	19

Date	Observer	Cloud	Visibility	Precipitation	Wind Speed	Wind Direction	Temperature
15/07/2025	AH	5/8	20	None	F5	SW	17
13/08/2025	SS	6/8	20	None	F2	SSW	21
23/09/2025	KME	2/8	16	None	F1	SSE	11

A13.3.2 Results

Table 11: Mammal Walkover Survey Results 2025

Date	Survey	Species	Field Sign	ITM	Notes
22/04/2025	General Mammal Walkover	Other (specify in notes)	Path	633715.49, 671513.76	Mammal track worn through grass leading through hedge. Likely Red Fox
22/04/2025	General Mammal Walkover	Other (specify in notes)	Path	633929.84, 671312.34	Well-defined mammal track from woods
22/04/2025	General Mammal Walkover	Other (specify in notes)	Path	633726, 671116.84	Track following hedgerow/ field boundary
22/04/2025	General Mammal Walkover	Other (specify in notes)	Path	633710.93, 670519.69	Several well-defined tracks throughout the treeline used by both livestock and other mammals
22/04/2025	General Mammal Walkover	Other (specify in notes)	Path	634958.35, 669898.32	Well-defined trail following linear features from road to T7 location
23/04/2025	General Mammal Walkover	Otter	Active holt	*Redacted*	*Redacted*
03/07/2025	General Mammal Walkover	Nil Sightings	Nil Sightings	637965.97, 669394.33	
30/07/2025	General Mammal Walkover	Nil Sightings	Nil Sightings	638134.69, 669328.32	
31/07/2025	General Mammal Walkover	Nil Sightings	Nil Sightings	644082.4, 671034.52	
10/09/2025	General Mammal Walkover	Nil Sightings	Other (specify in notes)	638738.73, 668516.96	No access, cattle in field
10/09/2025	General Mammal Walkover	Nil Sightings	Other (specify in notes)	638157.33, 669308.18	No access cattle in field
10/09/2025	General Mammal Walkover	Nil Sightings	Other (specify in notes)	638171.54, 669409.13	No access cattle in field
10/09/2025	General Mammal Walkover	Nil Sightings	Other (specify in notes)	634604.8, 669641.77	Cattle in field no access
10/09/2025	General Mammal Walkover	Nil Sightings	Other (specify in notes)	634315.11, 669752.17	No access cattle in field
10/09/2025	General Mammal Walkover	Nil Sightings	Other (specify in notes)	634177.62, 669716.29	No access cattle in field
10/09/2025	General Mammal Walkover	Nil Sightings	Other (specify in notes)	633723.46, 670661.71	No access cattle in field
10/09/2025	General Mammal Walkover	Nil Sightings	Other (specify in notes)	634374.35, 670553.01	No access cattle in field

Date	Survey	Species	Field Sign	ITM	Notes
10/09/2025	General Mammal Walkover	Nil Sightings	Other (specify in notes)	634705.59, 670531.48	No access cattle in field

Table 12: Badger Survey Results 2025

Date	Survey	Species	Field Sign	ITM	Notes
10/09/2025	Badger	Badger	Snuffle holes	635106.02, 669531.64	
10/09/2025	Badger	Badger	Snuffle holes	635170.55, 669444.17	
10/09/2025	Badger	Badger	Snuffle holes	635136.36, 669193.28	
10/09/2025	Badger	Badger	Snuffle holes	633748.11, 671145.24	
10/09/2025	Badger	Badger	Multiple paths into dense blackthorn scrub	633745.21, 671146.4	

Table 13: Otter Survey Results 2025

Date	Survey	Species	Field Sign	ITM	Notes
04/07/2025	Otter	Nil Sightings	Nil Sightings	644026, 671505.08	
30/07/2025	Otter	Nil Sightings	Nil Sightings	639117.57, 669643.53	
31/07/2025	Otter	Nil Sightings	Nil Sightings	644179.18, 671267.99	
11/09/2025	Otter	Nil Sightings	Nil Sightings	636077, 669700	
22/09/2026	Otter	Otter	Old Spraint	637018, 668254	
22/09/2026	Otter	Nil Sightings	Nil Sightings	637539, 669054	
22/09/2026	Otter	Otter	Fresh Spraint	642000, 670183	
22/09/2026	Otter	Nil Sightings	Nil Sightings	642627, 669930	

Table 14: Mammal surveys incidentals

Date	Survey	Species	Field Sign	ITM/10km OS Grid Square	Notes
22/04/2025	Badger	Red Fox	Live Sightings	633804.35, 671211.74	
22/04/2025	Badger	Red Fox	Live Sightings	633826.2, 670861.21	
22/04/2025	Badger	Rabbit	Live Sightings	633822.3, 670760.03	
22/04/2025	Badger	Snipe	Live Sightings	635134.89, 670112.02	
01/05/2025	Badger	Red Fox	Foot prints	638557.21, 669599.1	

Date	Survey	Species	Field Sign	ITM/10km OS Grid Square	Notes
01/05/2025	Kingfisher	Otter	Otter tracks on muddy riverbank	S47	
02/05/2025	Static Detector Deployment	Badger	Possible Badger sett	S37	Burrow, no snuffle holes or scatt evidence.
02/05/2025	Bat Transect	Badger	Live Sighting	S36	
09/05/2025	Kingfisher	Otter	Otter spraint	S47	On willow tree washed up in the river.
09/05/2025	Kingfisher	Otter	Otter spraint	S47	
18/09/2026	Habitat	Otter	Slide	S47	

Table 15: Mammal Camera Trap Survey Results 2025

Date of Recording	Survey	Species	Number	Trap No.	ITM	Notes
24/04/2025	Mammal Camera Traps	Red Fox	1	19072	633675.63, 670468.35	
24/04/2025	Mammal Camera Traps	Red Fox	1	19072	633675.63, 670468.35	
02/05/2025	Mammal Camera Traps	Badger	1	19072	633675.63, 670468.35	
05/05/2025	Mammal Camera Traps	Badger	1	19072	633675.63, 670468.35	
30/04/2025	Mammal Camera Traps	Badger	1	19068	633712.08, 671494.82	
28/04/2025	Mammal Camera Traps	Badger	1	19071	634903.24, 669795.64	
12/09/2025	Mammal Camera Traps	Badger	1	19068	633739.16, 670331.46	
12/09/2025	Mammal Camera Traps	Badger	1	19068	633739.16, 670331.46	
12/09/2025	Mammal Camera Traps	Badger	1	19068	633739.16, 670331.46	
12/09/2025	Mammal Camera Traps	Badger	1	19068	633739.16, 670331.46	
15/09/2025	Mammal Camera Traps	Hare	1	19068	633739.16, 670331.46	
20/09/2025	Mammal Camera Traps	Hare	1	19068	633739.16, 670331.46	
20/09/2025	Mammal Camera Traps	Hare	1	19068	633739.16, 670331.46	
20/09/2025	Mammal Camera Traps	Hare	1	19068	633739.16, 670331.46	
20/09/2025	Mammal Camera Traps	Hare	1	19068	633739.16, 670331.46	
20/09/2025	Mammal Camera Traps	Hare	1	19068	633739.16, 670331.46	
20/09/2025	Mammal Camera Traps	Hare	1	19068	633739.16, 670331.46	
20/09/2025	Mammal Camera Traps	Hare	1	19068	633739.16, 670331.46	

Date of Recording	Survey	Species	Number	Trap No.	ITM	Notes
20/09/2025	Mammal Camera Traps	Hare	1	19068	633739.16, 670331.46	
21/09/2025	Mammal Camera Traps	Badger	1	19068	633739.16, 670331.46	
22/09/2025	Mammal Camera Traps	Red Fox	1	19068	633739.16, 670331.46	
	Mammal Camera Traps	Nil Sightings		19071	635032.35, 669619.94	Camera disturbed by cattle on first night
	Mammal Camera Traps	Nil Sightings		19073	638511.28, 668807.75	Camera disturbed by cattle on fourth night
19/09/2025	Mammal Camera Traps	Brown Rat	1	19076	633764.85, 671224.18	

Table 16: Marsh Fritillary Suitability Survey Results 2025

Date	Habitat Type	Abundance of Devils bit Scabious	Average Vegetation Height (cm)	Animal Poaching	No of Occupied Webs	Notes
15/08/2025	WS1/ED3	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	ED3/ ED2/ WS1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.

Date	Habitat Type	Abundance of Devils bit Scabious	Average Vegetation Height (cm)	Animal Poaching	No of Occupied Webs	Notes
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GS4	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.

Date	Habitat Type	Abundance of Devils bit Scabious	Average Vegetation Height (cm)	Animal Poaching	No of Occupied Webs	Notes
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	WS1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.

Date	Habitat Type	Abundance of Devils bit Scabious	Average Vegetation Height (cm)	Animal Poaching	No of Occupied Webs	Notes
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.

Date	Habitat Type	Abundance of Devils bit Scabious	Average Vegetation Height (cm)	Animal Poaching	No of Occupied Webs	Notes
15/08/2025	GA1	Rare	<5cm	No livestock hoof marks	0	Nil Sightings of Devil's-bit Scabious plants.

Table 17: Marsh Fritillary Larval Web Survey Results 2025

Date	Habitat Type	Abundance of Devils bit Scabious	Average Vegetation Height (cm)	Animal Poaching	No of Occupied Webs	Notes
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	No Devil's-bit Scabious present
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	

Date	Habitat Type	Abundance of Devils bit Scabious	Average Vegetation Height (cm)	Animal Poaching	No of Occupied Webs	Notes
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	WS1/ ED2	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	

Date	Habitat Type	Abundance of Devils bit Scabious	Average Vegetation Height (cm)	Animal Poaching	No of Occupied Webs	Notes
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	

Date	Habitat Type	Abundance of Devils bit Scabious	Average Vegetation Height (cm)	Animal Poaching	No of Occupied Webs	Notes
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	WS1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	WS1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	WS1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	

Date	Habitat Type	Abundance of Devils bit Scabious	Average Vegetation Height (cm)	Animal Poaching	No of Occupied Webs	Notes
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1/WS1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	

Date	Habitat Type	Abundance of Devils bit Scabious	Average Vegetation Height (cm)	Animal Poaching	No of Occupied Webs	Notes
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1/WS1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	WD1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	

Date	Habitat Type	Abundance of Devils bit Scabious	Average Vegetation Height (cm)	Animal Poaching	No of Occupied Webs	Notes
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	

Date	Habitat Type	Abundance of Devils bit Scabious	Average Vegetation Height (cm)	Animal Poaching	No of Occupied Webs	Notes
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
23/09/2025	GA1	Rare	12 to 25cm	No livestock hoof marks	0	
17/09/2026	GA1	Rare	>25cm	Hoof marks confined to tracks	0	Low Suitability

Table 18: Amphibian Suitability Survey Results 2025

Date	Time of Sighting	ITM	Site Type	Site Suitability	Notes
25/04/2025	10:12	644879.9, 672970.46	Exposed	Poor	Shown as waterbody on EPA maps website. Agricultural grassland with no standing water present, negligible suitability
25/04/2025	10:29	644386.29, 673061.33	River	Good	Fast flow rate at this location. However, areas of low flow rate which may be of suitability for amphibians
25/04/2025	11:10	644175.66, 671278.41	River	Good	
25/04/2025	11:32	642149.11, 671866.07	River	Good	
25/04/2025	11:56	641033.14, 671334.7	River	Good	
25/04/2025	12:39	638672.44, 668615.13	Pond	Good	
25/04/2025	13:01	637170.85, 670107.81	River	Good	
25/04/2025	13:20	636079.39, 669685.55	River	Good	
25/04/2025	13:33	635302.2, 670354.19	River	Good	
25/04/2025	13:42	635367.17, 670329.5	River	Good	
25/04/2025	13:49	634979.79, 670494.32	River	Good	
25/04/2025	14:12	644525.42, 672743.08	River	Good	
22/05/2025	22:38	638671.68, 668626.04	Pond	Good	Nil Sightings. Excellent newt spawning habitat

Date	Time of Sighting	ITM	Site Type	Site Suitability	Notes
22/05/2025	23:05	637184.44, 670111.02	River	Poor	Nil Sightings
22/05/2025	23:15	636081.18, 669678.27	River	Poor	Nil Sightings
22/05/2025	23:22	635331.28, 670346.35	River	Poor	Nil Sightings
22/05/2025	23:30	634978.16, 670502.33	River	Poor	Nil Sightings

Table 19: Amphibian Nocturnal Survey Results 2025

Date	Time of Sighting	ITM	Site Type	Site Suitability	Species	Life Stage	Spawn Count	Number of adults	Sex	Notes
01/05/2025	21:18	644878.76, 672976.31	Exposed	Poor						Nil Sightings, field is dry.
01/05/2025	21:33	644524.38, 672742.22	Ditch	Good						Nil Sightings
01/05/2025	21:56	642148.03, 671861	Ditch	Good						Nil Sightings
01/05/2025	22:17	638695.13, 668611.04	Quarry	Good	Smooth Newt	Adult		4	Both	3 males, 1 female
01/05/2025	22:21	638671.27, 668621.14	Quarry	Good	Smooth Newt	Adult		3	Both	2 males, 1 female
01/05/2025	22:23	638656.01, 668611.75	Quarry	Good	Smooth Newt	Adult		5		At least 1 female
01/05/2025	22:52	635302.11, 670356.83	Ditch	Good						Nil Sightings
22/05/2025	22:38	638671.68, 668626.04	Pond	Good						Nil Sightings. Excellent newt spawning habitat
22/05/2025	23:05	637184.44, 670111.02	River	Poor						Nil Sightings
22/05/2025	23:15	636081.18, 669678.27	River	Poor						Nil Sightings

Date	Time of Sighting	ITM	Site Type	Site Suitability	Species	Life Stage	Spawn Count	Number of adults	Sex	Notes
22/05/2025	23:22	635331.28, 670346.35	River	Poor						Nil Sightings
22/05/2025	23:30	634978.16, 670502.33	River	Poor						Nil Sightings

Table 20: Reptile Mat Deployment Survey Results 2025

Date	Time of Sighting	ITM	Site Type	Site Suitability
22/05/2025	10:58	634102.97, 670780.73	Artificial Cover	Good
22/05/2025	11:20	634059.6, 670284.49	Artificial Cover	Good
22/05/2025	12:41	638716.59, 668629.46	Artificial Cover	Good
22/05/2025	12:54	638664.64, 668659.66	Artificial Cover	Good
22/05/2025	13:07	638684.47, 668669.15	Artificial Cover	Good

Table 21: Reptile Survey Results 2025

Date	Time of Sighting	ITM	Site Type	Site Suitability	Notes
24/06/2025	10:49	638718.05, 668629.14	Quarry	Unknown	Nil Sightings
24/06/2025	10:51	638664.73, 668658.65	Quarry	Unknown	Nil Sightings
24/06/2025	10:55	638688.48, 668667.28	Quarry	Unknown	Nil Sightings
24/06/2025	14:33	634058.8, 670283.78	Exposed	Unknown	Nil Sightings
24/06/2025	15:06	634105.3, 670780.43	Exposed	Unknown	Nil Sightings
15/07/2025	15:09	638716.39, 668628.28	Artificial Cover	Good	Nil Sightings, reptile mat 3
15/07/2025	15:12	638664.53, 668659.31	Artificial Cover	Good	Nil Sightings, reptile mat 4
15/07/2025	15:15	638684.95, 668668.91	Artificial Cover	Good	Nil Sightings, reptile mat 5
15/07/2025	17:09	634067.94, 670280.17	Natural Cover	Good	Reptile mat 2 could not be found
15/07/2025	17:17	634101.28, 670778.82	Natural Cover	Good	Reptile mat 1 could not be found
13/08/2025	13:16	633182.22, 671540.92	Natural Cover	Good	Nil Sighting. Stones suitable for Common Lizards with crevices to hide. No mat deployed here, but area is suitable for Common Lizard activity. Habitat: Stone wall, improved agricultural grassland, hedgerows
13/08/2025	13:54	633913.15, 670841.97	Natural Cover	Good	Nil Sighting. Stones covered in grass with sufficient cover present in the area. Suitable for Common Lizards. No mats deployed here
13/08/2025	14:03	634102.09, 670781.65	Natural Cover	Good	Nil Sighting. Reptile Mat 1 displaced

Date	Time of Sighting	ITM	Site Type	Site Suitability	Notes
13/08/2025	14:18	634059.42, 670284.52	Natural Cover	Unknown	Nil Sighting. Reptile mat 2 displaced
13/08/2025	14:19	634055.54, 670278.87	Natural Cover	Good	Nil Sighting. Stone surrounded by GA1. Potential for Common Lizard activity
13/08/2025	14:23	634081.28, 670286.6	Natural Cover	Good	Nil Sighting. Stones present under trees. Has plenty of cover. Ideal for Common Lizards
13/08/2025	14:27	634125.16, 670282.11	Natural Cover	Good	Nil Sighting. Stone wall with crevices present, surrounded by hedges and GA1. No mat deployed here but area ideal for Common Lizards
13/08/2025	15:42	638716.12, 668629.74	Artificial Cover	Good	Nil Sighting at reptile Mat 3
13/08/2025	15:56	638663.63, 668659.08	Artificial Cover	Good	Nil Sighting at reptile Mat 4
13/08/2025	15:59	638685.08, 668668.68	Artificial Cover	Good	Nil Sighting at reptile Mat 5
23/09/2025	09:30	638715.58, 668627.83	Artificial Cover	Good	Nil Sightings
23/09/2025	09:35	638664.97, 668660.38	Artificial Cover	Good	Nil Sightings
23/09/2025	09:40	638684.13, 668668.2	Artificial Cover	Good	Nil Sightings
23/09/2025	09:45	638664.69, 668610.8	Quarry	Good	Nil Sightings
23/09/2025	11:45	634102.65, 670781.32	Artificial Cover	Good	Nil Sightings
23/09/2025	11:50	634105.48, 670725.45	Natural Cover	Good	Dry stonewall. Nil Sightings
23/09/2025	12:20	634058.39, 670283.52	Artificial Cover	Good	Nil Sightings
23/09/2025	12:25	634091.65, 670286.28	Natural Cover	Good	Rocky outcrop. Nil Sightings

A13.3.3 Otter Sensitive Data

Table 22: *Redacted* Mammal Walkover Survey Results 2025

Date	Survey	Species	Field Sign	10km OS Grid Square	Notes
23/04/2025	General Mammal Walkover	Otter	Active holt	S47	Potential Otter holt. Could only observe through binoculars from the eastern bank of the river; the farmer who owned the land to the west would not allow us to access his land. Soil around apparent holt entrance looked disturbed and churned up
01/05/2025	Kingfisher	Otter	Possible Otter holt	S47	Possible otter holt - looks active, tracks heading down to river
01/05/2025	Kingfisher	Otter	Otter tracks on muddy riverbank	S47	
02/05/2025	Static Detector Deployment	Badger	Possible Badger sett	S37	Burrow, no snuffle holes or scatt evidence.
02/05/2025	Bat Transect	Badger	Live Sighting	S36	
09/05/2025	Kingfisher	Otter	Otter spraint	S47	On willow tree washed up in the river.
09/05/2025	Kingfisher	Otter	Otter spraint	S47	
18/09/2026	Habitat	Otter	Slide	S47	

Gathabawn Windfarm, Co. Kilkenny

Appendix to the Screening for Appropriate Assessment Report

Appendix D: Aquatic Ecology Baseline & Fisheries Report

September 2026

This report considers the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

INIS Environmental Consultants Ltd.

Suite 16,
Block A,
Clare Technology Park,
Gort Road,
Ennis,
County Clare
Ireland.

Triturus

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The findings outlined within this report and the data we have provided are to our knowledge true and express our bona fide professional opinions. This report has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) good practice guidelines. Where pertinent CIEEM Guidelines used in the preparation of this report include the *Guidelines for Ecological Report Writing* (CIEEM, 2017a), *Guidelines for Preliminary Ecological Appraisals* (CIEEM, 2017b) and *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*, (CIEEM, 2018). CIEEM Guidelines include model formats for Preliminary Ecological Appraisal and Ecological Impact Assessment. Also, where pertinent, evaluations presented herein take cognisance of recommended Guidance from the EPA such as *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2022), and in respect of European sites, *Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC* (European Commission, 2018).

Due cognisance has been given at all times to the provisions of the *Wildlife Acts 1976-2024,* the *European Union (Natural Habitats) Regulations*, the *European Communities (Birds and Natural Habitats) Regulations 2011-2021,* EU Regulation on Invasive Alien Species under *EU Regulation 1143/2014*, the *EU Birds Directive 2009/147/EC* and *Habitats Directive 92/43/EEC*.

No method of assessment can completely remove the possibility of obtaining partially imprecise or incomplete information. Any limitation to the methods applied or constraints however are clearly identified within the main body of this document.

Version	**Date**		**Name**	**Signature**
1 (rebadge)	14/04/2026	**Report prepared by:**	Laura Stenson BSc. (Hons) ACIEEM	
1	16/04/2026	**Report checked by:**	Conor Daly MSc BSc ACIEEM	
Project Reference	**2214L**	**Title**	Ecopower: Gathabawn Windfarm, Co. Kilkenny – Aquatic Ecology Report	

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1. INTRODUCTION

1.1. Background

Triturus Environmental Ltd. were commissioned by Inis Environmental Consultants Ltd. to conduct baseline aquatic surveys to inform EIAR preparation for the proposed Gathabawn Windfarm development in north County Kilkenny, and undertake a baseline fisheries assessment of numerous watercourses in the vicinity of the Gathabawn Windfarm (**Figure 2.1**).

Undertaken on a catchment-wide scale, this report provides a baseline assessment of the aquatic ecology including fisheries and biological water quality, as well as protected species and habitats in the vicinity of the proposed development. Aquatic surveys were undertaken in July 2025. In order to gain an accurate overview of the existing and potential fisheries value of the watercourses within the vicinity of the proposed development a catchment-wide electro-fishing survey across 15 no. riverine sites was undertaken (**Table 2.1; Figure 2.2**). A fisheries appraisal of 1 no. riverine site (prohibitive depths) and 1 no. pond site was also undertaken. Electro-fishing helped to identify the importance of the watercourses as nurseries and habitats for salmonids, Lamprey (*Lampetra* sp.) and European Eel (*Anguilla anguilla*). Other species of lower conservation value were also recorded. The presence and or absence of fish populations and or associated supporting habitat would help inform impact assessment and any subsequent mitigation for the development.

Triturus Environmental Ltd. made an application under Section 14 of the Fisheries (Consolidation) Act, 1959 as substituted by Section 4 of the Fisheries (Amendment) Act, 1962, to undertake a catchment-wide electro-fishing survey in the vicinity of the proposed Gathabawn Windfarm. The surveys were undertaken in July 2025.

1.2. Project description

A full description of the proposed Gathabawn Windfarm is provided in Chapter 5: Description of the Development of the Environmental Impact Assessment Report (EIAR).

1.3. Statements of Authority

This report has been prepared by:

Ross Macklin B.Sc. (Hons) MCIEEM., MIFM, HDip GIS, PDip IPM is an ecologist with over 16 years' professional experience in Ireland. He specialises in freshwater fisheries ecology, biology and water quality. He has considerable experience in a wide range of ecological and environmental projects including EIAR, EcIA, AA/NIS, CEMP reporting, as well as biodiversity, water quality monitoring, invasive species and fisheries management. He also has expert identification skills in macrophytes, freshwater invertebrates, protected aquatic habitats and protected aquatic species including freshwater pearl mussel. His diverse project list includes work on renewable energy developments, flood relief schemes, road schemes, blueways/greenways, biodiversity projects, fisheries management projects and catchment wide water quality management. He is currently completing his Ph.D. on the ecology and impact of Common Carp (Cyprinus carpio) in Irish waters.

Bill Brazier B.Sc. (Hons) MIFM is an aquatic ecologist with over 10 years' professional experience in Ireland. He specialises in freshwater fisheries ecology, biology and water quality. He has considerable

experience in a wide range of ecological and environmental projects including EIAR, EcIA and AA/NIS reporting, as well as biodiversity, invasive species and fisheries management. His diverse project list includes work on renewal energy developments, flood relief schemes, road schemes, blueways/greenways and biodiversity projects. He is currently completing his Ph.D. on the genetics, reproductive biology and invasive potential impact of Common Carp (Cyprinus carpio) in Irish waters. Additionally, Bill runs the highly respected Off the Scale magazine, Ireland's most-read recreational angling publication and is the national coordinator for the novel Anglers National Line Recycling Scheme (ANLRS).

This report was reviewed and amended for the submitted EIAR by INIS:

Ms Laura Stenson BSc ACIEEM is an Ecologist with Inis Environmental Consultants Ltd**.** who amended this report. Laura has an honours BSc in Earth and Ocean Sciences from University of Galway and has three years' experience working in consultancy. Laura has extensive report writing experience, which includes the production, review and editing of Appropriate Assessment Screening Reports (AA), Natura Impact Statements (NIS) and Ecological Impact Assessments (EcIA);

She has experience in multi-disciplinary surveys, including habitat classification, mammal surveys, various bird surveys (e.g. Wintering and Breeding birds, I-WeBS, Adapted Brown & Shepherd), invasive species surveys, pre-construction mammal surveys, and bat surveys.

Conor Daly MSc BSc ACIEEM is the Report Team Lead and Ecologist with Inis Environmental Consultants Ltd. who checked this report. Conor was awarded a MSc in Biodiversity and Conservation and an Honours BSc (Hons) in Zoology. Conor has conducted bird, mammal, habitat and entomological surveys for renewable energy projects, conservation monitoring projects and private developments. Over his three years as an ecologist, Conor has written Preliminary Environmental Assessments (PEA), Appropriate Assessment (AA) Screening, NIS and EIA reports. During his employment with Inis, Conor has been involved in conducting a range of reports, including Appropriate Assessment (AA) Screenings, Natura Impact Statements (NIS), and Environmental Impact Assessment (EIA) Screenings and reports.

2. METHODOLOGY

2.1. Selection of watercourses for assessment

All freshwater watercourses which could be affected directly or indirectly by the proposed development were considered as part of the current assessment. Thus, a total of 17 no. sites were selected for detailed aquatic assessment (see **Table 2.1, Figure 2.1**). The courses and nomenclature for the watercourses surveyed followed Environmental Protection Agency (EPA) mapping.

Riverine survey sites were present on the Coolnacrutta Stream (EPA code: 15C50), River Goul (15G02), Lismaine Stream (15L16), Gorteenahilla River (15G08), Nuenna River (15N02), Gorteennamuck Stream (15G39), Ballyring Upper Stream (15B73), Lisdowney (Stream) (15L02), Ballyconra Stream (15B86) and River Nore (15N01) in the Goul_SC_010 and Nore_SC_070 river sub-catchments (**Table 2.1**). A small pond adjoining the site boundary was also surveyed.

A total of 2 no. survey sites were located within the River Barrow and River Nore SAC (002162), with these also located within the River Nore SPA (004233). Numerous survey locations share downstream hydrological connectivity with these European sites. Please note this aquatic report should be read in conjunction with the Environmental Impact Assessment Report (EIAR) prepared for the Proposed Gathabawn Windfarm.

2.2. Aquatic site surveys

Aquatic surveys were conducted on the 29th, 30th and 31st July 2025. Survey effort focused on both instream and riparian habitats at each aquatic sampling location and included a fisheries assessment (electro-fishing and fisheries habitat appraisal), White-clawed Crayfish (*Austropotamobius pallipes*) survey, macrophyte and aquatic bryophyte survey and biological water quality sampling (Q-sampling). Environmental DNA (eDNA) samples were also collected from the River Goul and Nuenna River. This holistic approach informed the overall aquatic ecological evaluation of each site/watercourse in context of the proposed development and ensured that any habitats and species of high conservation value would be detected to best inform mitigation.

In addition to the ecological characteristics of the Whole Gathabawn Windfarm Project, a broad aquatic and riparian habitat assessment was conducted utilising elements of the methodology given in the Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (EA, 2003) and the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). This broad characterisation helped define the watercourses' conformity or departure from naturalness. All sites were assessed in terms of:

- Physical watercourse/waterbody characteristics (i.e. width, depth etc.) including associated evidence of historical drainage;
- Substrate type, listing substrate fractions in order of dominance (i.e. bedrock, boulder, cobble, gravel, sand, silt etc.);
- Flow type by proportion of riffle, glide and pool in the sampling area;
- An appraisal of the macrophyte and aquatic bryophyte community at each site; and
- Riparian vegetation composition

Table 2.1: *Location of 17 no. aquatic survey sites in vicinity of Gathabawn Windfarm, Co. Kilkenny.*

Site no.	Watercourse	EPA code	Location	X (ITM)	Y (ITM)
A1	Coolnacrutta Stream	15C50	Tobar na Súil	633751	669421
A2	Coolnacrutta Stream	15C50	R639 crossing	632395	670967
A3	River Goul	15G02	Ballinfrase	631492	673559
A4	River Goul	15G02	Ballyboodin	636296	677402
B1	Lismaine Stream	15L16	L1809 road crossing	639539	669606
B2	Lisaine Stream	15L16	R694 road crossing	642124	667563
B3	Lismaine Stream	15L16	L10003	643822	665914
B4	Gorteenahilla River	15G08	Tinnascarty	638182	667370
B5	Nuenna River	15N02	Millenium Park, Freshford	640442	664845
B6	Nuenna River	15N02	L10003 road crossing	644439	664231
P1*	Pond	n/a	Ballyring Upper	638684	668586
C1	Gorteennamuck Stream	15G39	Gorteennamuck	635335	670340
C2	Gorteenahilla River	15G08	Ballygowney	636074	669680
C3	Ballyring Upper Stream	15B73	Ballyring Upper	637540	669049
C4	Lisdowney Stream	15L02	L1807 road crossing	641405	671018
C5	Ballyconra Stream	15B86	L1807 road crossing	642618	670660
C6*	River Nore	15N01	Parksgrove	644038	671499

*fisheries appraisal only

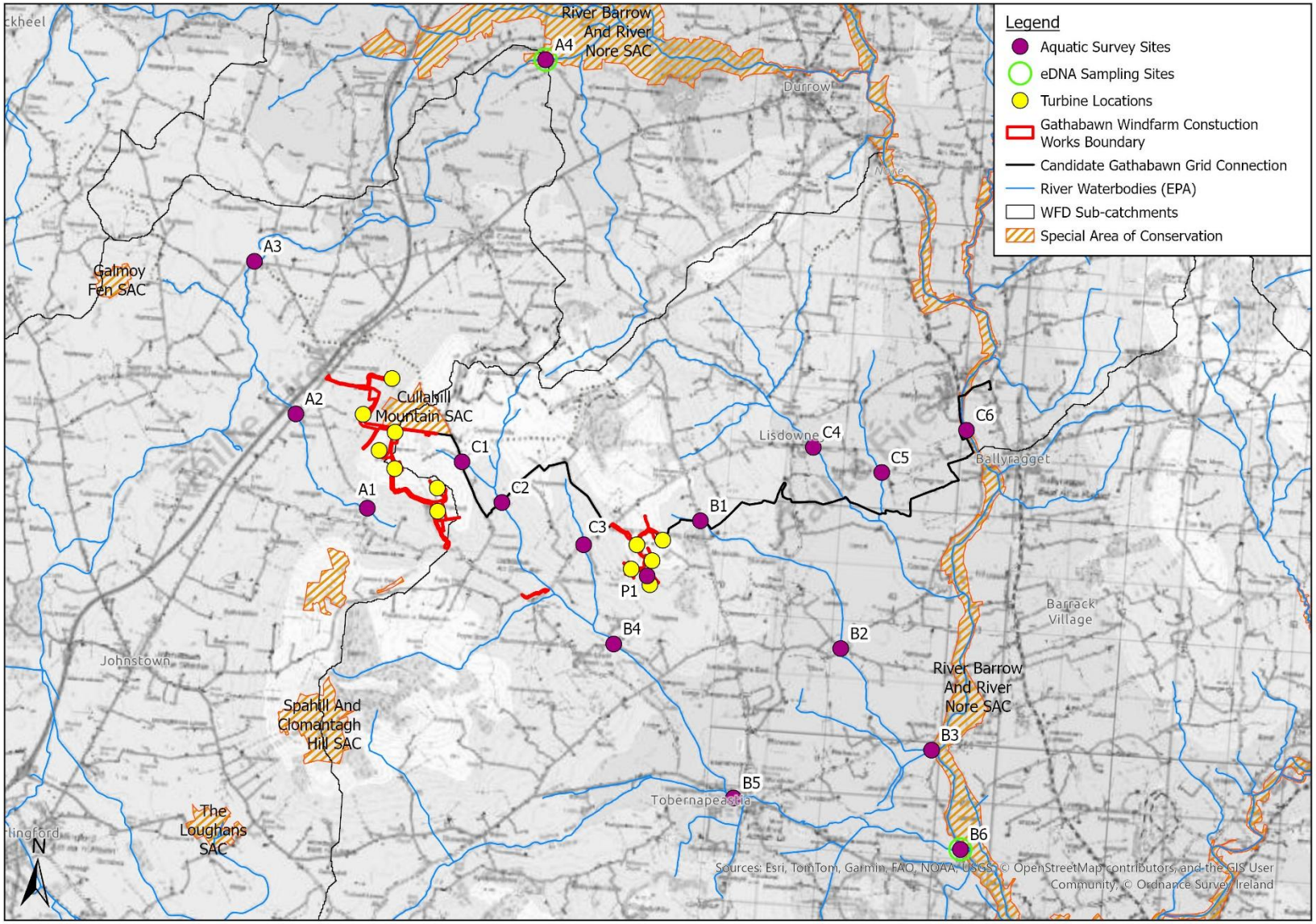


Figure 2.1: *Overview of the aquatic survey sites, July 2025.*

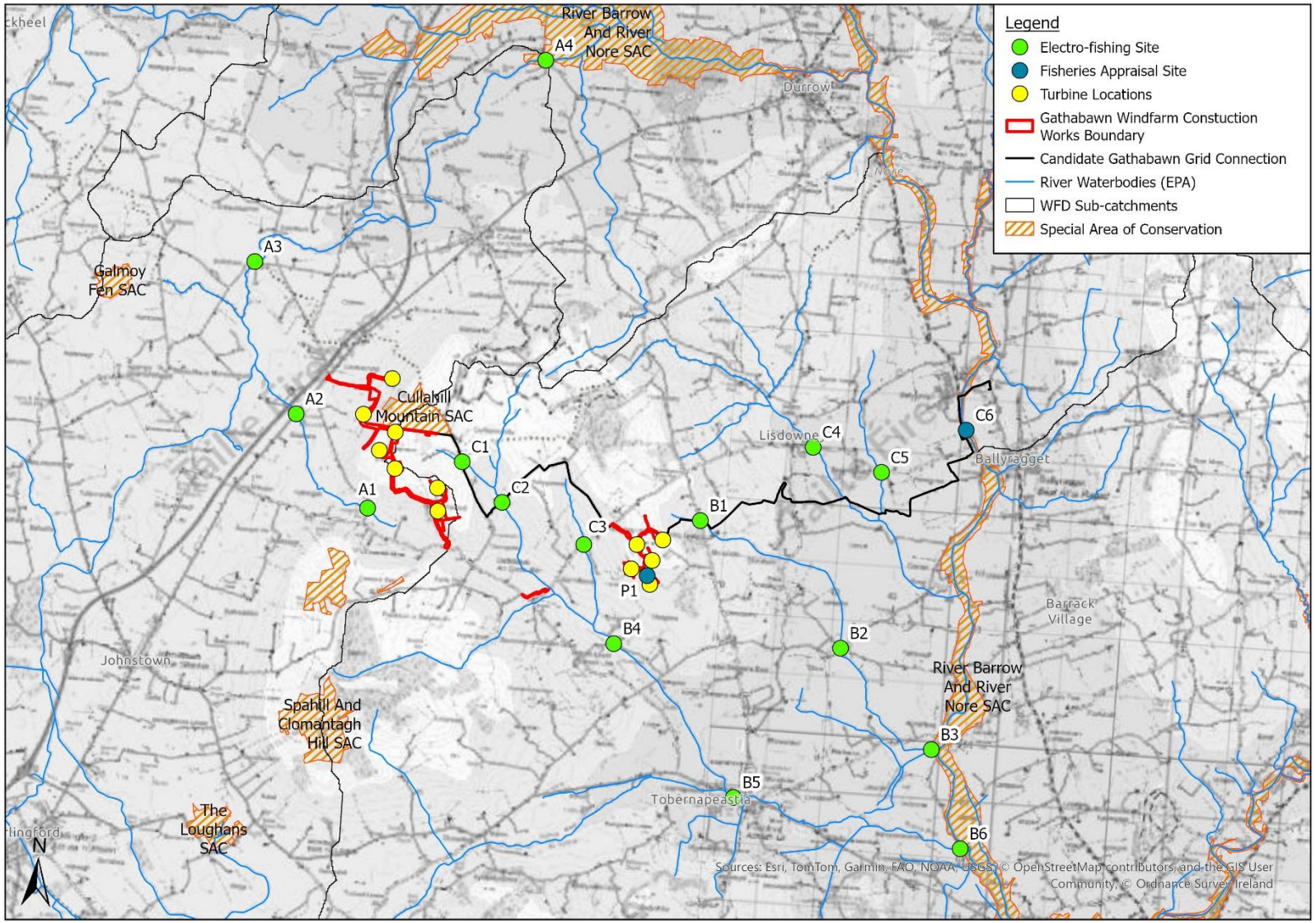


Figure 2.2: *Overview of the electro-fishing & fisheries appraisal survey site locations for the proposed Gathabawn Windfarm, Co. Kilkenny*

2.3. Fisheries assessment (electro-fishing)

To collate a more accurate baseline, a catchment-wide approach was adopted, and the electro-fishing survey was undertaken across 15 no. riverine sites (see **Table 2.1, Figure 2.1**). A single anode Smith-Root LR24 backpack (12V DC input; 300V, 100W DC output) was used to electro-fish riverine sites on the 29th, 30th and 31st July 2025 following notification to Inland Fisheries Ireland and under the conditions of a Department of Climate, Energy and the Environment (DCEE) licence. The survey was undertaken in accordance with best practice (CFB, 2008; CEN, 2003) and Section 14 licencing requirements.

Both river and holding tank water temperature was monitored continually throughout the survey to ensure temperatures of 20°C were not exceeded, thus minimising stress to the captured fish due to low dissolved oxygen levels. A portable battery-powered aerator was also used to further reduce stress to any captured fish contained in the holding tank. Salmonids, European Eel and other captured fish species were transferred to a holding container with oxygenated fresh river water following capture. To reduce fish stress levels, anaesthesia was not applied to captured fish. All fish were measured to the nearest millimetre and released in-situ following a suitable recovery period.

As three primary species groups were targeted during the survey, i.e., salmonids, Lamprey, and Eel, the electro-fishing settings were tailored for each species. By undertaking electro-fishing using the rapid electro-fishing technique (see methodology below), the broad characterisation of the fish community at each sampling reach could be determined as a longer representative length of channel was surveyed. Electro-fishing methodology followed accepted European standards (CEN, 2003) and adhered to best practice (e.g., CFB, 2008).

Furthermore, a fisheries habitat appraisal of all aquatic survey sites (**Table 2.1**) was undertaken to establish their importance for Salmonid, Lamprey (*Lampetra* sp.), European Eel (*Anguilla anguilla*) and other fish species. The baseline assessment also considered the quality of fisheries habitats within the vicinity of the survey sites.

2.3.1. Salmonids and European Eel

For salmonid species and European Eel, as well as all other incidental species, electro-fishing was carried out in an upstream direction for a 10-minute CPUE, an increasingly common standard approach for wadable streams (Matson *et al.,* 2018a). A total of approximately 30-75m channel length was surveyed at each site, where feasible, in order to gain a better representation of fish stock assemblages.

Relative conductivity of the water at each site was checked in-situ with a conductivity meter and the electro-fishing backpack was energised with the appropriate voltage and frequency to provide enough draw to attract salmonids and European Eel to the anode without harm. For the high conductivity waters of the sites a voltage of 200-240v, frequency of 35-40Hz and pulse duration of 3.5-4ms was utilised to draw fish to the anode without causing physical damage.

2.3.2. Lamprey

Electro-fishing for Lamprey ammocoetes was conducted using targeted quadrat-based electro-fishing (as per Harvey & Cowx, 2003) in objectively suitable areas of sand/silt, where encountered. As Lamprey take longer to emerge from silts and require a more persistent approach, they were targeted at a lower frequency (30Hz) burst DC pulse setting which also allowed detection of European Eelin sediment, if present. Settings for Lamprey followed those recommended and used by Harvey & Cowx (2003), APEM (2004) and Niven & McAuley (2013). Using this approach, the anode was placed under the water's surface, approximately 10-15cm above the sediment, to prevent immobilising Lamprey ammocoetes within the sediment. The anode was energised with 100V of pulsed DC for 15-20 seconds and then turned off for approximately five seconds to allow ammocoetes to emerge from their burrows. The anode was switched on and off in this way for approximately two minutes. Immobilised ammocoetes were collected by a second operator using a fine-mesh hand net as they emerged.

Lamprey species were identified to species level, where possible, with the assistance of a hand lens, through external pigmentation patterns and trunk myomere counts as described by Potter & Osborne (1975) and Gardiner (2003).

2.4. Fisheries Habitat

A fisheries habitat appraisal of 17 no. sites was undertaken to establish their importance for salmonid, Lamprey, European Eel and other fish species. The appraisals of salmonids and Lamprey were cognisant of species-specific habitat requirements and preferences as outlined in O'Grady (2006), Hendry *et al*. (2003), Armstrong *et al*. (2003), Harvey & Cowx (2003), Maitland (2003) and Hendry & Cragg-Hine (1997). River habitat surveys and fisheries assessments were also carried out utilising elements of the approaches in the River Habitat Survey Methodology (EA, 2003) and Fishery Assessment Methodology (O'Grady, 2006) to broadly characterise the riverine sites (i.e. channel profile, substrata etc.).

2.5. White-clawed Crayfish survey

White-clawed Crayfish surveys were undertaken at the aquatic survey sites in July 2025 under a National Parks and Wildlife (NPWS) open national licence (C164/2025) as prescribed by Sections 9, 23 and 34 of the Wildlife Act (1976-2023), to capture and release Crayfish to their site of capture. As per Inland Fisheries Ireland aquatic biosecurity recommendations, the Crayfish sampling started at the uppermost site(s) of each catchment or sub-catchment in the survey area to minimise the risk of transfer invasive propagules (including Crayfish plague (*Aphanomyces astaci*)) in an upstream direction.

Hand-searching of instream refugia and sweep netting was undertaken according to Reynolds *et al*. (2010). An appraisal of White-clawed Crayfish habitat at each site was conducted based on physical habitat attributes (Gammell *et al*., 2021; Peay, 2003), water chemistry and incidental records in mustelid spraint. Additionally, a desktop review of Crayfish records within the wider survey area was completed.

2.6. Environmental DNA

To further validate site surveys and to detect potentially cryptically low populations of high conservation value aquatic species within the survey area, composite water samples were collected from the River Goul (A4) and Nuenna River (B6) on the 31st of July 2025 (**Table 2.1; Figure 2.1**). These were analysed for Freshwater Pearl Mussel (*Margaritifera margaritifera*), White-clawed Crayfish and Crayfish plague eDNA. The sites were strategically chosen to maximise longitudinal (instream) coverage within the survey area/catchment (i.e. facilitating a greater likelihood of species detection).

In accordance with laboratory guidance, a composite (500ml) water sample was collected from the sampling point, maximising the geographic spread at the site (20 x 25ml samples at each site), thus increasing the chance of detecting the target species' DNA. The composite sample was filtered and fixed on site using a sterile proprietary eDNA sampling kit. The sample was stored at room temperature and sent to the laboratory for analysis with 48 hours of collection. A total of n=12 qPCR replicates were analysed for the site. Given the high sensitivity of eDNA analysis, a single positive qPCR replicate is considered as proof of the species' presence (termed qPCR No Threshold, or qPCR NT). Whilst an eDNA approach is not currently quantitative, the detection of the target species' DNA indicates the presence of the species at and or upstream of the sampling point. Please refer to **Appendix A** for full eDNA laboratory analysis methodology.

2.7. Biological water quality (Q-sampling)

The 14 no. riverine survey sites were assessed for biological water quality through Q-sampling in July 2025. All samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a 2-minute kick sample, as per Environmental Protection Authority (EPA) methodology (Feeley *et al*., 2020). Large cobble was also washed at each site for 1-minute (where present) to collect attached macro-invertebrates (as per Feeley *et al*., 2020). Samples were elutriated and fixed in 70% ethanol for subsequent laboratory identification to species level. Samples were converted to Q-ratings as per Toner *et al*. (2005) and assigned to WFD status classes (**Table 2.2**). Any rare invertebrate species were identified from the NPWS Red List publications for beetles (Foster *et al*., 2009), mayflies (Kelly-Quinn & Regan, 2012), stoneflies (Feeley *et al*., 2020) and other relevant taxa (i.e. Byrne *et al*., 2009; Nelson *et al*., 2011).

Table 2.2: *Reference categories for EPA Q-ratings (Q1 to Q5) (Toner et al., 2005).*

Q value	WFD status	Pollution status	Condition
Q5 or Q4-5	High status	Unpolluted	Satisfactory
Q4	Good status	Unpolluted	Satisfactory
Q3-4	Moderate status	Slightly polluted	Unsatisfactory
Q3 or Q2-3	Poor status	Moderately polluted	Unsatisfactory
Q2, Q1-2 or Q1	Bad status	Seriously polluted	Unsatisfactory

2.8. Lacustrine macro-invertebrate communities

Pond site P1 was sampled for macro-invertebrates via sweep netting. A standard pond net (250mm width, mesh size 500µm) was used to sweep macrophytes to capture macro-invertebrates. The net was also moved along the pond bed to collect epibenthic and epiphytic invertebrates from the substratum (as per Cheal *et al*., 1993). A 3-minute sampling period was employed. To ensure

appropriate habitat coverage, the sampling period was also divided amongst the range of meso-habitats present at the survey site to get a representative sample for sub-habitats.

2.9. Macrophytes and aquatic bryophytes

Surveys of the macrophyte and aquatic bryophyte community were conducted by instream wading at each of the survey sites, with specimens collected (by hand or via grapnel) for on-site identification. An assessment of the aquatic vegetation community helped to identify any rare macrophyte species listed under the FPO, 2022, Irish Red list for vascular plants (Wyse-Jackson *et al*., 2016) and or aquatic bryophytes (Lockhart *et al*., 2012), or habitats corresponding to Annex I aquatic habitats such as floating river vegetation (3260) or hydrophilous tall herb (6430).

2.10. Aquatic ecological evaluation

The evaluation of aquatic ecological receptors contained within this report uses the geographic scale and criteria defined in the 'Guidelines for Assessment of Ecological Impacts of National Road Schemes' (NRA, 2009).

2.11. Biosecurity

A strict biosecurity protocol following IFI (2010) and the Check-Clean-Dry approach was adhered to during surveys for all equipment and PPE used. Disinfection of all equipment and PPE before and after use with Virkon™ was conducted to prevent the transfer of pathogens or invasive propagules between survey sites. Surveys were undertaken at sites in a downstream order to minimise the risk of upstream propagule mobilisation. Particular cognisance was given towards preventing the spread or introduction of highly virulent Crayfish plague (*Aphanomyces astaci*). Any aquatic invasive species or pathogens recorded within or adjoining the survey areas were geo-referenced. All Triturus staff are certified in 'Good fieldwork practice: slowing the spread of invasive non-native species' by the University of Leeds.

3. DESKTOP REVIEW

3.1. Survey Area

The watercourses in the vicinity of proposed development (**Table 2.1; Figure 2.1**) were typically historically modified lowland depositing channels (FW2; Fossitt, 2000) and more natural upland eroding channels (FW1) within the Goul_SC_010 and Nore_SC_070 river sub-catchments. Land use practices in the wider survey area are dominated by pastures (CORINE 231). Predominantly, the watercourses flow over areas of Visean limestone & calcareous shale and Tournaisian limestone (Geological Survey of Ireland data).

3.2. Fisheries

The River Goul, a tributary of the River Erkina, is a low-energy limestone river fed from aquifer and ground-water sources (Sullivan, 2007) is known to support Atlantic Salmon (*Salmo salar*), Brown Trout (*Salmo trutta*), European Eel, Stone Loach (*Barbatula barbatula*) and Three-spined Stickleback (*Gasterosteus aculeatus*) (Triturus 2021-2024 data; IFI data). The Coolnacrutta Stream, a tributary of the River Goul, is known to support Atlantic Salmon, Brown Trout and European Eel (Triturus 2021-2024 data).

The River Nore in the vicinity of Ballyragget is known to support Atlantic Salmon, Brown Trout, *Lampetra* sp., European Eel, Stone Loach, Minnow (*Phoxinus phoxinus*) and Rudd (*Scardinius erythropthalmus)* (Triturus 2021-2024 data). Historical Sea Lamprey (*Petromyzon marinus*) records were available for the River Nore at Ballyragget (1968 and 1972).

The Nuenna River, a major tributary of the River Nore, is known to support Brown Trout, Three-spined Stickleback and low densities of *Lampetra* sp. (Gordon *et al*., 2021; Matson *et al*., 2018b). This species assemblage has been recorded over multiple years, with Brown Trout growth identified as 'slow' according to the criteria of Kennedy & Fitzmaurice (1971) (Kelly *et al*., 2014).

The Gorteenahilla River, a tributary of the Nuenna River, is known to support Atlantic Salmon, Brown Trout, European Eel and Three-spined Stickleback (Triturus 2021-2024 data; Matson *et al*., 2018).

The Lismaine Stream, a heavily modified Nore tributary that suffers from frequent low flows, is known to support Three-spined Stickleback (Triturus 2021-2024 data).

The Lisdowney Stream, a small alkaline tributary of the River Nore, is known to support Atlantic Salmon, Brown Trout, European Eel and Three-spined Stickleback (Triturus 2023 data; IFI data[1]).

Fisheries data for the other watercourses of interest was not available prior to these survey efforts.

3.3. Protected and rare aquatic species

A comprehensive desktop review of available data from the National Parks and Wildlife Service (NPWS), National Biodiversity Data Centre (NBDC), Inland Fisheries Ireland (IFI), Botanical Society of Britain and Ireland (BSBI), National Crayfish Plague Surveillance Programme (NCPSP), Environmental Protection Agency (EPA) and Triturus databases for the 10km grid squares containing and adjoining the Proposed Gathabawn Windfarm and Candidate Gathabawn Grid Connection (i.e. S36, S37, S46 &

[1] *Inland Fisheries Ireland data available at https://opendata-ifigis.hub.arcgis.com/datasets/IFIgis::water-framework-directive-fish-ecological-status-2008-2021/*

S47) identified records for a low number of rare and or protected aquatic species within the vicinity of the proposed development.

A low number of records for Annex II White-clawed Crayfish were available in the wider survey area, with more contemporary records for the River Goul and River Nore (2005-2023 data; **Figure 3.1**). Crayfish remains have previously been identified in Otter (*Lutra lutra*) spraint on the lower reaches of the Coolnacrutta Stream (current survey site A2) (Triturus 2022 data).

Contemporary Annex II Otter records were widespread throughout the respective grid squares, with contemporary records available for the Coolnacrutta Stream, River Goul, Gorteenahilla River, Nuenna River, Lisdowney Stream and River Nore (2005-2023 data; **Figure 3.1**).

Smooth Newt (*Lissotriton vulgaris*), protected under the Wildlife Acts 1976-2023, were known from several locations in the 2013-2016 period (NBDC data) but none of these directly overlapped with the survey area (data not shown). A small former quarry pond c. 3km southwest of the proposed site boundary is known to support a newt population (Triturus 2023 data).

Multiple records for the critically endangered hard-water form of the Freshwater Pearl Mussel were available for the River Nore. This species has declined significantly in recent years and is now confined to areas in the River Nore upstream of the Nore and Erkina confluence, Durrow (NPWS & Triturus data). It has recently been concluded that pearl mussel is no longer present in the River Nore downstream of the Erkina confluence (Sweeney, 2022).

A low number of historical records for opposite-leaved pondweed (*Groenlandia densa*), a macrophyte protected under the Flora Protection Order (FPO), 2022, were available for the River Goul in the 1975-1991 period (data not shown). No other contemporary NPWS records for macrophytes or aquatic bryophytes protected under the FPO, 2022 were available for the respective grid squares.

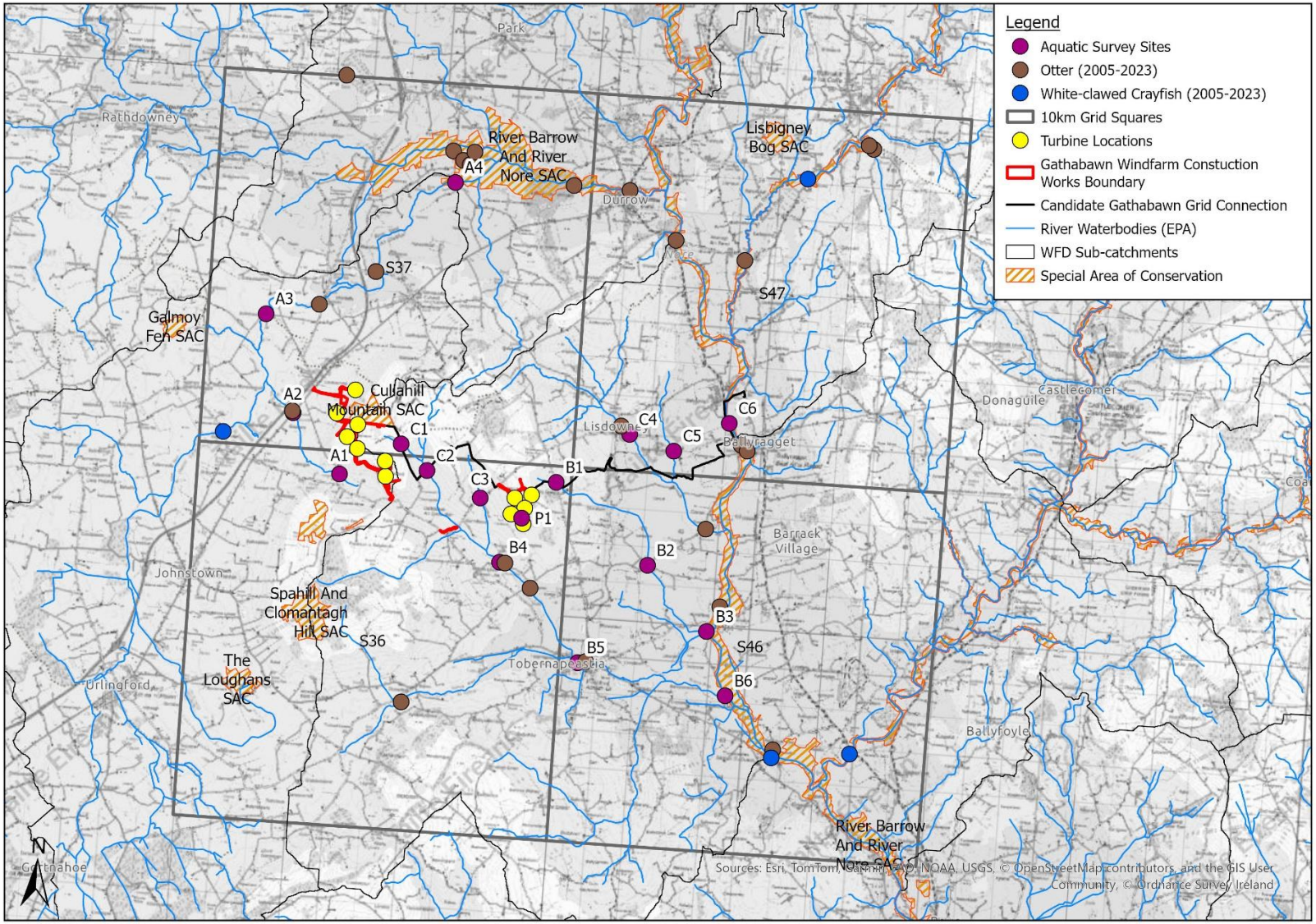


Figure 3.1: *Selected rare/protected aquatic species records in vicinity of the proposed development (source: NPWS, NBDC, EPA & Triturus data).*

4. RESULTS OF AQUATIC SURVEYS

The following section summarises each of the 17 no. survey sites in terms of aquatic habitats, physical characteristics and overall value for fish and macrophyte/aquatic bryophyte communities. Biological water quality (Q-sample) results are summarised for each riverine sampling site and presented in full in **Appendix B**. A summary of the fish species recorded at each survey site is provided in **Table 4.2** and **Table 4.3**. A summary of the aquatic species and habitats of high conservation concern recorded during the surveys is provided in **Table 4.4**. An evaluation of the aquatic ecological importance of each survey site based on these aquatic surveys is provided and summarised in **Table 4.5**. Habitat codes are according to Fossitt (2000). Scientific names are provided at first mention only. Sites were surveyed in July 2025.

4.1. Aquatic survey sites

4.1.1. Site A1 – Coolnacrutta Stream, Tobar na Súil

Site A1 was located on the uppermost reaches of the Coolnacrutta Stream (15C50) at a local road crossing, c. 50m downstream of Tobar na Súil (source of the stream). The small lowland stream (FW2) was 1.5-2m wide and 0.05-0.1m deep at the time of survey, suffering from low summer flows (a known occurrence at this location; Triturus data). An over-widened ponding area upstream of the road crossing was 0.2m deep. The profile was exclusively of shallow glide. The substrata were dominated by grossly silted mixed gravels and small cobble, with occasional boulder. Soft sediment deposits were up to 0.3m deep. The site was heavily vegetated with frequent Fool's Watercress (*Helosciadium nodiflorum)* and Watercress (*Nasturtium officinale*) with occasional marginal brooklime (*Veronica beccabunga*), Blue Water Speedwell (*Veronica anagallis-aquatica*), Common Water Starwort (*Callitriche stagnalis*) and Water Mint (*Mentha aquatica*). Filamentous algae cover was high, indicating significant eutrophication. Aquatic bryophytes were limited to *Leptodictyum riparium* on larger cobble and boulder. The riparian areas had been cleared historically, with no remaining tree cover and sparse herbaceous vegetation present. The site was bordered by low-intensity semi-improved grassland (GA1) with mosaics of wet grassland (GS4).

No fish were recorded via electro-fishing at site A1. Despite the occasional presence of fish, including Brown Trout, Lamprey and European Eel (Triturus data), the site was unsuitable for resident fish at the time of survey given low summer flows in addition to gross siltation pressures. Despite some low suitability, no White-clawed Crayfish were recorded. No Otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q2-3** (**poor status**) (Appendix B). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site A1 was of **Local Importance (Lower Value)** (Table 4.5).



Plate 4.1: Representative image of site A1 on the upper reaches of the Coolnacrutta Stream, July 2025.

4.1.2. Site A2 – Coolnacrutta Stream, R639 crossing.

Site A2 was located on the lower reaches of the Coolnacrutta Stream, 1.2km upstream of the River Goul confluence. The site was representative of an upland eroding stream (FW1) of lower energy. The channel was 2-2.5m wide and 0.1m deep at the time of survey, with low summer flows. The stream had been straightened historically, with boulder revetments along both banks in the vicinity of the single masonry arch bridge. The profile comprised shallow riffle and glide with frequent small pools. The substrata were dominated by boulder and cobble with heavily silted mixed gravels locally. Given heavy shading, macrophytes were restricted to more open areas with locally frequent Watercress, Fool's Watercress, Lesser Water Parsnip (*Berula erecta*) and Water Mint downstream of the bridge. Coverage of aquatic bryophytes was high, with abundant *Rhynchostegium riparoides* on boulder and large cobble. The stream was heavily shaded by mature treelines of Sycamore (*Acer psuedoplatanus*), Elder (*Sambucus nigra*) and Ash (*Fraxinus excelsior*) with Hazel (*Corylus avellana*) and Bramble (*Rubus fruticosus agg.*) scrub. The site was bordered by heavily improved pasture (GA1).

Atlantic Salmon (n=2), Brown Trout (n=3), Lamprey (n=1) and European Eel (n=1) were recorded via electro-fishing at site A2 (Table 4.3). The quality of Salmonid spawning and nursery habitat was compromised by poor flows, shallow water and evident eutrophication, with only very low densities recorded. Fish were largely confined to deeper pool areas underneath the road bridge. Furthermore, a significant barrier (debris dam at a livestock gate) was located at the upstream side of the bridge, which impaired fish migration and potentially blocked access to better-quality spawning habitat present upstream (finer gravels). European Eel habitat was poor overall but locally good underneath the road bridge (abundant boulder refugia). The site was of poor quality for Lamprey given the limited pockets of superficial silt downstream of the bridge with only a single ammocoete recorded. Despite some low suitability and previous records for the species at this site (Triturus 2022 data), no White-clawed Crayfish were recorded. A single Otter spraint was recorded on boulders immediately upstream of the bridge.

Biological water quality, based on Q-sampling, was calculated as **Q3** (**poor status**) (Appendix B). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of Salmonids (including Atlantic Salmon), Lamprey and Red-listed European Eel, the aquatic ecological evaluation of site A2 was of **Local Importance (Higher Value)** (Table 4.5).



Plate 4.2: Representative image of site A2 on the Coolnacrutta Stream, July 2025.

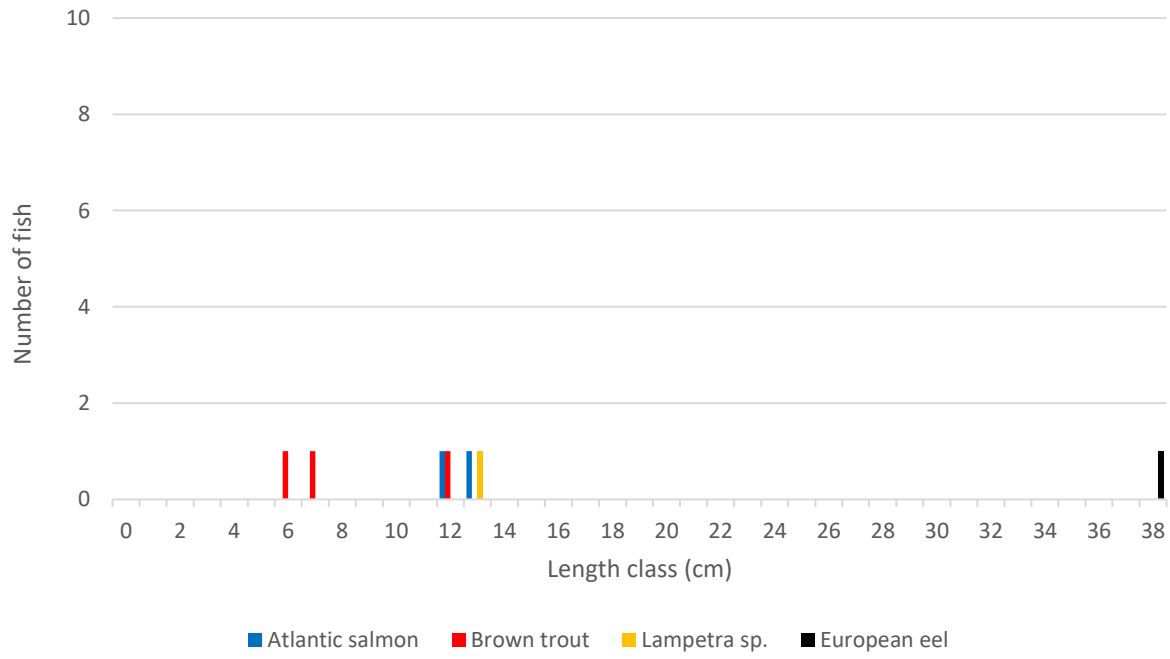


Figure 4.1: *Length frequency distribution recorded via electro-fishing at site A2, July 2025.*



Plate 4.3: Juvenile Brown Trout recorded at site A2 on the Coolnacrutta Stream, July 2025.

4.1.3. Site A3 – River Goul, Ballinfrase

Site A3 was located on the River Goul (15G02) at a local road (L5572) road crossing. The semi-natural lowland depositing watercourse (FW2) was 7-8m wide and 0.3m to 0.6m deep. The profile comprised riffle, glide and pool sequences with a bed of compacted boulder, cobble and gravels that were moderately silted. Eutrophication pressures were also evident given the high cover of filamentous algae (c. 20%) and floc. The site supported frequent Lesser Water Parsnip, Watercress and Water Mint with occasional Branched Bur-reed (*Sparganium erectum*), Water Forget-me-not (*Myosotis scorpioides*) and Common Water Starwort. The instream boulders supported occasional *Fontinalis antipyretica* with the liverwort *Pellia endiviifolia* locally frequent. The riparian areas supported scattered mature Ash, Alder, Hawthorn and Grey Willow (*Salix cinerea*) with frequent Reed Canary Grass (*Phalaris arundinacea*), Great Willowherb (*Epilobium hirsutum*), Nettle (*Urtica dioica*), Thistles (*Cirsium* sp.) and Bramble. The site was bordered by improved pasture (GA1).

Atlantic Salmon (n=6), Brown Trout (n=18), Minnow (n=7) and Stone Loach (n=1) were recorded via electro-fishing at site A3 (Table 4.3). The site supported good densities of adult (1+ & 2+) trout with a lower density of juvenile Salmonids (both trout and salmon). The nursery conditions were of moderate quality given mixed riffle and glide with a rocky bed. However, the bed condition was compromised by siltation and enrichment pressures consequential of bordering heavily improved pastures. The poorer bed condition also resulted in poorer quality spawning habitat, despite locally pockets being present where swifter flows cleaned the bed. Good quality Salmonid holding habitat was present in deeper pool and glide between stands of macrophyte and in bank scours. Lamprey nursery habitat was of poor quality as soft organic rich silts were very limited due to higher flows and poor rates of accretion. Lamprey spawning habitat was however of moderate quality given the presence of fine gravels adjoining riffle. The site was of good quality for European Eel given ample refugia and food resources albeit none were recorded. Despite good suitability for White-clawed Crayfish, with ample refugia, none were recorded. No Otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3** (**poor status**) (Appendix B). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of Salmonids (including Atlantic Salmon) and Red-listed European Eel, the aquatic ecological evaluation of site A3 was of **Local Importance (Higher Value)** (Table 4.5).



Plate 4.4: Representative image of site A3 on the River Goul, July 2025.

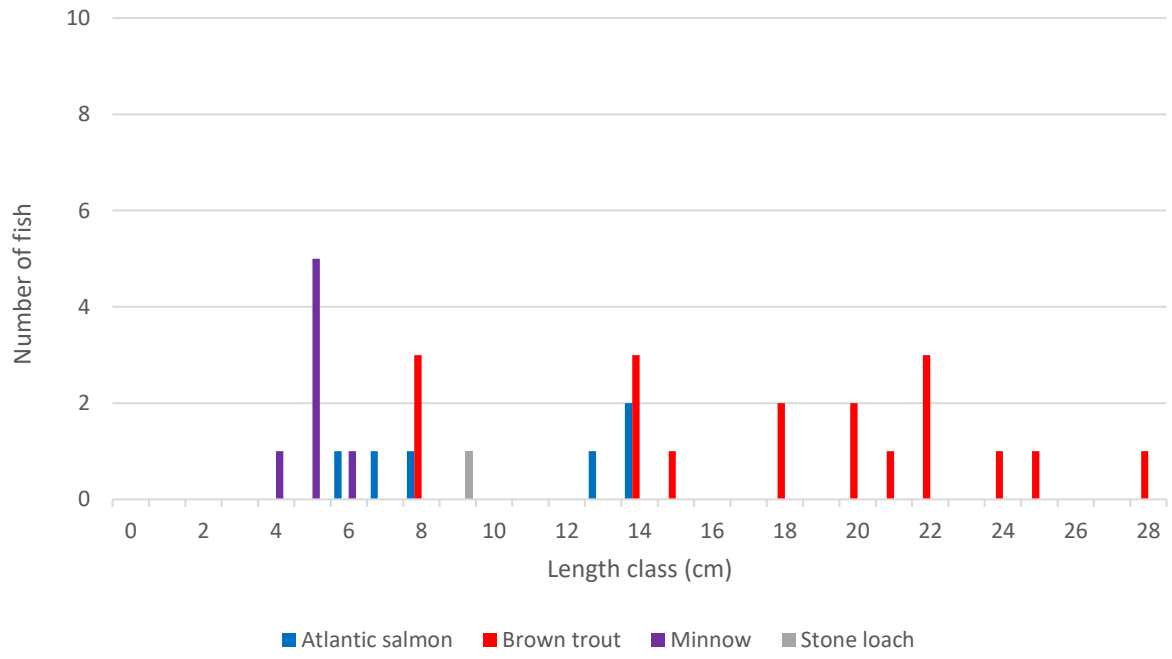


Figure 4.2: *Length frequency distribution recorded via electro-fishing at site A3, July 2025.*



Plate 4.5: Well conditioned adult Brown Trout recorded at site A3 on the River Goul, July 2025.

4.1.4. Site A4 – River Goul, Ballyboodin

Site A4 was located on the River Goul (15G02) at a local road crossing. The lowland depositing watercourse had been historically deepened and locally straightened resulting in a site with poor hydromorphology. The river was 7-8m wide and 0.3-0.8m deep. The profile was dominated by deep, very slow flowing glide with occasional pool (no riffle). The bed comprised compacted boulder, cobble and gravels that were heavily bedded with gross siltation. Very high enrichment pressures were also evident with high cover of filamentous algae (c. 40%) and floc. The site supported profuse growth of Common Clubrush (*Schoenoplectus lacustris*), Lesser Water Parsnip, Watercress, Branched Bur-reed and Water Mint. Water-forget-me-not and Common Water Starwort were occasional. Instream boulders supported locally frequent *Fontinalis antipyretica* with *Cinclidotus fontinaloides* on the bridge apron. The liverwort (*Pellia endiviifolia*) was present locally on the riverbed. The riparian areas supported scattered mature Crack Willow (*Salix fragilis*), Grey Willow and White Willow (*Salix alba*) with understories of Reed Canary Grass, Great Willowherb and Bramble. The site was bordered by improved pasture (GA1).

Atlantic Salmon (n=4), Brown Trout (n=18), Lamprey (n=3), European Eel (n=1), Minnow (n=4), Stone Loach (n=2) and Three-spined Stickleback (n=3) were recorded via electro-fishing at site A4 (Table 4.3). Despite hydromorphological impacts the site supported moderate densities of adult 1+ and 2+ trout with a low density of juvenile Salmonids (both trout and salmon). The nursery conditions were evidently of poor quality given the absence of riffle habitat and the slow flowing, heavily enriched and silted nature of the river at this location. The poor bed condition also resulted in poor quality spawning habitat. Holding habitat, however, was of good quality given the presence of deeper pool and glide between stands of macrophytes and overhanging willow trees. Lamprey nursery habitat sub-optimal with compacted silts supporting only low densities of ammocoetes. Furthermore, Lamprey spawning habitat was of very poor quality given high siltation, bed compaction and enrichment pressures. Good quality eel habitat was present given ample refugia and food resources albeit only a single adult was

recorded. The site had some moderate suitability for White-clawed Crayfish albeit high sedimentation, bed compaction and enrichment pressures impacted the quality of habitat. None were recorded during the survey. No Otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (Appendix B). However, this rating was tentative given the absence of suitable riffle areas for sampling (as per Toner *et al*., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of Salmonids (including Atlantic Salmon), Lamprey and Red-listed European Eel, the aquatic ecological evaluation of site A4 was of **Local Importance (Higher Value)** (Table 4.5)**.**



Plate 4.6: Representative image of site A4 on the River Goul, July 2025.

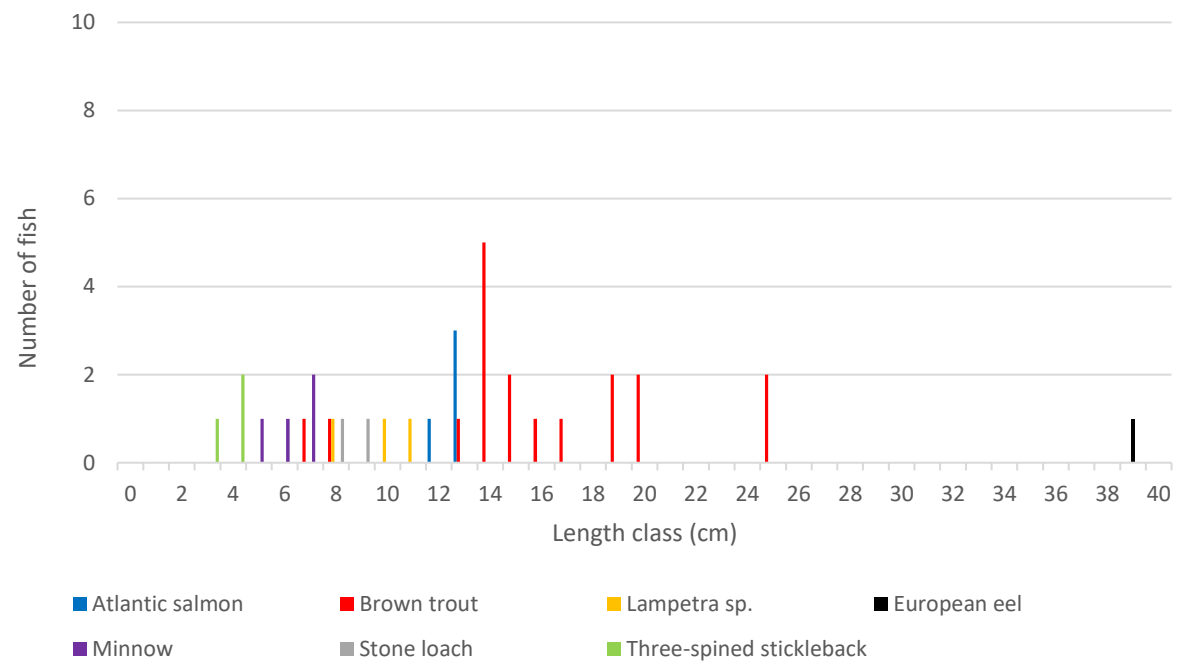


Figure 4.3: *Length frequency distribution recorded via electro-fishing at site A4, July 2025.*



Plate 4.7: European Eel recorded at site A4 on the River Goul, July 2025.

4.1.5. Site B1 – Lismaine Stream, L1809 road crossing

Site B1 was located on the upper reaches of the Lismaine Stream (15L16) at a local road crossing. The upland eroding stream (FW1) flowed over a high gradient in a meandering incised valley and was 4-6m wide with 2m high banks. The stream was semi-dry at this location with water restricted to isolated stagnant pools of 0.05-0.2m depth. The bed comprised of mixed rounded boulder, cobble and gravels that were predominantly exposed and dry. Due to the heavily compacted bed and high shading,

macrophytes were absent. Instream boulders supported occasional *Rhynchostegium riparioides* with the liverwort (*Chiloscyphus polyanthos*) being rare. Stable shaded riverbanks supported abundant *Thamnobryum alopercum*. The riparian zone supported scrubby treelines of mature Ash, Sycamore and Holly (*Ilex aquilinum*). The site was bordered by extensive pastures (GA1).

No fish were recorded via electro-fishing at site B1. The stream was semi-dry at this location with water restricted to isolated stagnant pools of 0.05-0.2m depth. The site was unsuitable for resident fish given the seasonality of flows in the uppermost reaches of the watercourse. However, the fisheries value improved moving downstream. The site was unsuitable for White-clawed Crayfish (none recorded). No Otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (Appendix B). However, this rating was tentative given poor flows and the absence of suitable riffle areas for sampling (as per Toner *et al*., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site B1 was of **Local Importance (Lower Value)** (Table 4.5).



Plate 4.8: Representative image of the upper reaches of the Lismaine Stream, July 2025 (semi-dry channel).

4.1.6. Site B2 – Lismaine Stream, R694 road crossing

Site B2 was located on the upper reaches of the Lismaine Stream (15L16) at the R694 road crossing c. 3.8km downstream of site B1. The River Nore tributary (FW1) was semi-dry at the time of survey with stagnant impounded pools of 0.1m deep water downstream of the bridge and under the box culvert. The stream had been historically straightened and deepened was 2-3m wide in a steep, trapezoidal channel with 2.5-3m high banks. The mostly exposed bed was dominated by small boulder, bedded cobble and sand, with abundant mud (silt). Macrophytes were not recorded with localised *Pellia endiviifolia* along the banks and on littoral substrata. The site was heavily shaded by mature Sycamore,

Wych Elm (*Ulmus glabra*), Hawthorn, Ash and Willow (*Salix* spp.) with Bramble, Ivy (*Hedera* sp.) and non-native Snowberry (*Symphoricarpos albus*) scrub. The site was bordered by improved grassland (GA1).

Three-spined Stickleback (n=6) was the only fish species recorded via electro-fishing at site B2. With the exception of low densities of stickleback in stagnant pools, the site was not of significant fisheries value given extensive modifications and poor/absent summer flows. There was no suitability for White-clawed Crayfish. No Otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q2-3 (poor status)** (Appendix B). However, this rating was tentative given poor flows and the absence of suitable riffle areas for sampling (as per Toner *et al*., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site B2 was of **Local Importance (Lower Value)** (Table 4.4).



Plate 4.9: Representative image of site B2 on the Lismaine Stream, July 2025 (semi-dry channel).

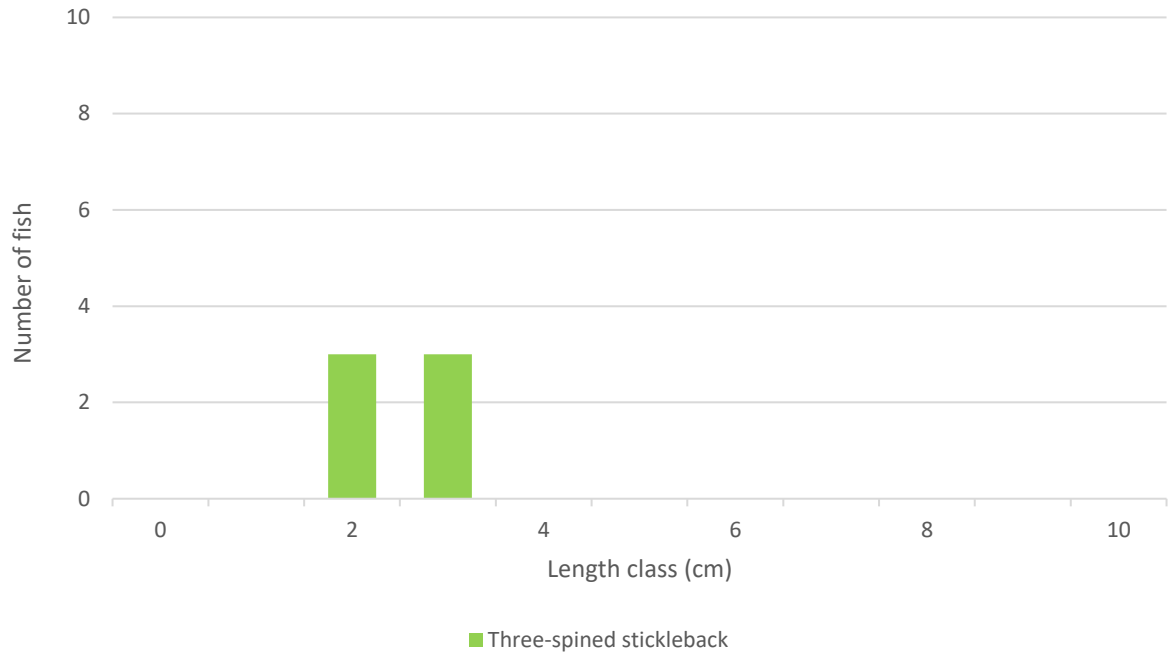


Figure 4.4: *Length frequency distribution recorded via electro-fishing at site B2, July 2025.*

4.1.7. Site B3 – Lismaine Stream, L10003 road crossing

Site B3 was located on the Lismaine Stream (15L16) at a livestock ford c. 2.6km downstream of site B2. Here, the lowland depositing stream (FW2) featured much improved water flows and was 2m wide and 0.1-0.3m deep with low lying banks. The stream had been historically deepened with widespread bank clearance works and often poor recovery. The profile comprised localised riffle and pool with frequent deeper glide. The substrata were dominated by cobble and mixed gravels although much of the bed was covered by silt. Scattered boulders and bricks were present near the ford. Calcification of the bed was evident. The site supported frequent Fool's Watercress with occasional water-forget-me not. Aquatic bryophytes were limited to rare *Leptodictyum riparium*. The cleared banks supported only scattered grey Willow, Ash and Alder with a typical nitrophilous ruderal community dominated by Cleavers (*Galium aparine*), Hedge Bindweed (*Calystegia sepium*), Nettle and rank grasses. The site was bordered by heavily improved pasture (GA1) with very narrow buffers.

Atlantic Salmon (n=1), Brown Trout (n=5), Lamprey (n=6), Stone Loach (n=4), Minnow (n=4) and Three-spined Stickleback (n=2) were recorded via electro-fishing at site B3. Despite evident hydromorphological and siltation impacts, the site was of some value as a Salmonid nursery although supported only low densities of juvenile salmon and trout. Significant siltation as well as bed calcification reduced the availability of spawning habitat for Salmonids and Lamprey. The survey reach was not of high value for adult Salmonids given low summer flows and the generally shallow depths (poor holding opportunities). The site had moderate suitability as a Lamprey nursery given abundant flocculent beds of organic rich silt. However, these were often encrusted with cyanobacterial films (reducing quality) and only a low density of ammocoetes was recorded. The heavily silted site was of poor suitability for European Eel or White-clawed Crayfish (limited refugia), and none were recorded. No Otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (Appendix B). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of Salmonids (including Atlantic Salmon) and Lamprey, the aquatic ecological evaluation of site B3 was of **Local Importance (Higher Value)** (Table 4.4).



Plate 4.10: Representative image of site B3 on the Lismaine Stream, July 2025.

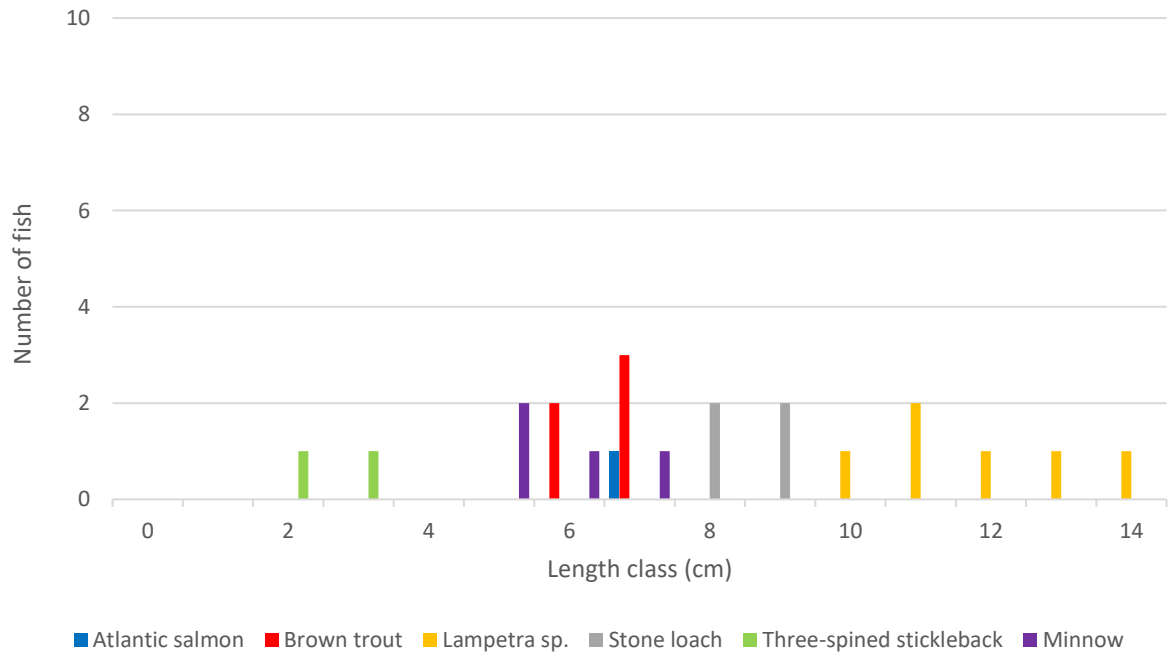


Figure 4.5: *Length frequency distribution recorded via electro-fishing at site B3, July 2025.*



Plate 4.11: *Lampetra* sp. ammocoete and Stone Loach recorded at site B3 on the Lismaine Stream, July 2025.

4.1.8. Site B4 – Gorteenahilla River, Tinnascarty

Site B4 was located on the Gorteenahilla River (15G08). The higher energy lowland river (FW2) had been historically deepened but demonstrated good instream recovery with a varied flow profile of riffle, glide and pool. The river as 3-4m wide and 0.1-0.3m deep with 1.5-2m high banks. The substrata comprised mixed boulder, cobble and gravels. However, these were heavily silted with high floc and filamentous algal cover indicating eutrophication pressures. A significant point source of pollution was identified immediately upstream of the bridge with sewage fungus on the bed. The site supported limited macrophytes due to the higher energy of the channel with localised Fool's Watercress, Watercress, Branched Bur-reed, Water Mint and Whorled Mint (*Mentha x verticillata*). Cover of aquatic bryophytes was low with *Leptodictyum riparium* dominating. *Rhynchostegium riparioides* was also present locally. The riparian areas were predominantly open (previously cleared) but supported a dense nitrophilous herbaceous community with maturing Willows. The site was bordered by improved pasture (GA1).

Atlantic Salmon (n=16), Brown Trout (n=7), Lamprey (n=14) and Three-spined Stickleback (n=2) were recorded via electro-fishing at site B4. The site was of moderate value as a Salmonid nursery, despite evident impacts. Holding opportunities for adults were limited. The quality of spawning habitat for both Salmonids and Lamprey was significantly reduced due to siltation. The site had relatively high suitability as a Lamprey nursery given abundant organic rich flocculent beds of silt, especially near the bridge. These areas supported a moderate density of ammocoetes. Suitability for European Eel and White-clawed Crayfish was poor (limited refugia), and neither were recorded. No Otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (Appendix B). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of Salmonids (including Atlantic Salmon) and Lamprey, the aquatic ecological evaluation of site B4 was of **Local Importance (Higher Value)** (Table 4.4).



Plate 4.12: Representative image of site B4 on the Gorteenahilla River, July 2025.

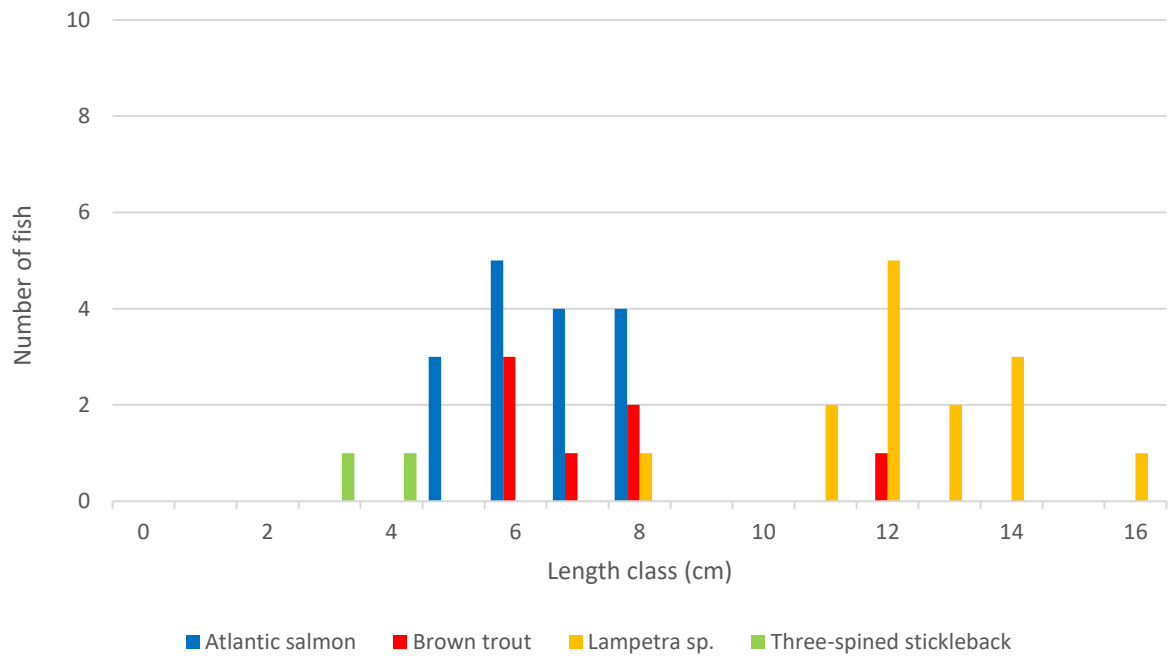


Figure 4.6: *Length frequency distribution recorded via electro-fishing at site B4, July 2025.*



Plate 4.13: 0+ Atlantic Salmon parr recorded at site B4 on the Gorteenahilla River, July 2025.

4.1.9. Site B5 – Nuenna River, Millenium Park, Freshford

Site B5 was located on the Nuenna River (15N02) at Millenium Park in Freshford, upstream of Old Bridge. The river (FW1) had been heavily modified in the park with historical retaining walls present. The typically high energy river suffered from low summer water levels at the time of survey and was 6-8m wider and 0.1-0.8m deep, with occasional deeper pool to 1.4m. The alkaline river substrata were heavily calcified with boulder, cobble and mixed gravels dominating. Siltation was high with significant eutrophication pressures evident given a relatively high cover of filamentous algae. Due to the high energy characteristics and high shading, macrophytes were limited to Fool's Watercress. Instream boulder and cobble supported abundant calcified *Rhynchostegium riparioides* with occasional *Fissidens* sp. in the margins. The riparian areas supported mature Beech (*Fagus sylvatica*), Ash, Oak (*Quercus* sp.), Hawthorn, Ash, Grey Willow, Weeping Willow (*Salix babylonica*), Elder and Horse Chestnut (*Aesculus hippocastanum*) and Grey Alder (*Alnus incana*) with Ivy understories. The site was bordered by mixed broadleaved woodland (WD1) on the west bank and scattered trees and parkland (WD5) on the east bank.

Atlantic Salmon (n=11) and Brown Trout (n=42) were the only fish species recorded via electro-fishing at site B5. The site was a good quality Salmonid nursery given ample water flows and good flow heterogeneity with healthy mixed cohort populations present. However, high siltation and bed calcification reduced the value of the site considerably both as a nursery and spawning habitat. Deeper pool and bank scours offered excellent quality holding areas for adult Salmonids. The river had no suitability for Lamprey in the survey area given the high calcification of the bed and none were recorded. While the channel had some suitability for eel, given deeper water with high shading, downstream barriers and high bed calcification limited its potential to support eel (none recorded but known from site: Triturus data). Despite some suitability for White-clawed Crayfish in the highly

alkaline river, none were recorded with bed calcification reducing accessibility of instream refugia. No Otter signs were recorded in vicinity of the site albeit very high foraging suitability existed.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (Appendix B). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of Salmonids (including Atlantic Salmon), the aquatic ecological evaluation of site B5 was of **Local Importance (Higher Value)** (Table 4.4).



Plate 4.14: Representative image of site B5 on the Nuenna River, July 2025.

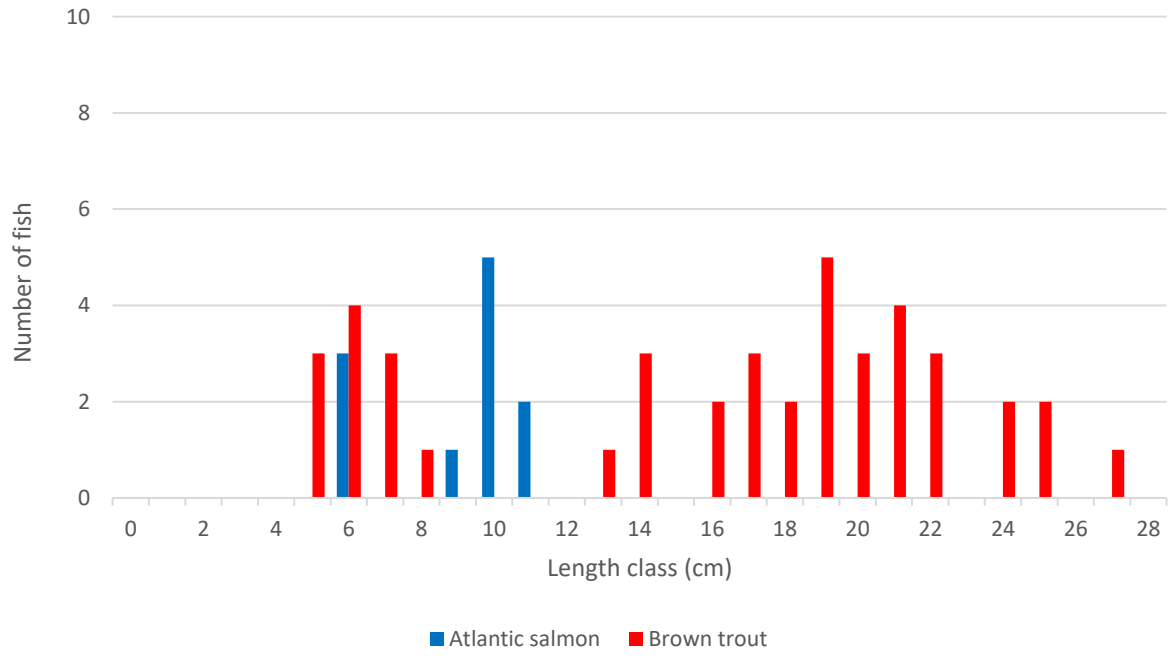


Figure 4.7: *Length frequency distribution recorded via electro-fishing at site B5, July 2025.*



Plate 4.15: Adult Brown Trout recorded at site B5 on the Nuenna River, July 2025.

4.1.10. Site B6 – Nuenna River, L10003 road crossing

Site B6 was located on the lower reaches of the Nuenna River (15N02) at a local road crossing just upstream of the River Nore confluence. The high energy lowland river at this location had been historically deepened but demonstrated good instream recovery. The river was 5-6m wide and 0.2-0.5m deep with steep loamy banks of 2-2.5m in height. Natural bank scouring was frequent. The site had equal proportions of riffle, glide and pool. The substrata were dominated by abundant cobble and gravels with banks of sand and silt in the depositing margins. The gravels were moderately compacted but heavily silted. Given high shading macrophytes were restricted to occasional Fool's Watercress and Common Water Starwort. The exposed muddy banks of the channel supported the calcicolous liverwort *Pellia endiviifolia*. The well-developed riparian zones supported abundant Grey Willow and Osier (*Salix viminalis*), with frequent Crack Willow, Hazel, Hawthorn, Blackthorn (*Prunus spinosa*) and occasional Ash. The understories featured Reed Canary Grass, Nettle, Hedge Bindweed and Bramble. The site was bordered by intensive pasture (GA1).

Atlantic Salmon (n=27), Brown Trout (n=19) and European Eel (n=1) were recorded via electro-fishing at site B6. The site was of high value for Salmonids with good flow heterogeneity and abundant spawning substrata providing good quality nursery and spawning habitat. However, the quality of the habitat was compromised by siltation pressures and historical hydromorphological impacts (despite good recovery). Mature riparian buffers protected the river from thermal stress. Valuable holding areas for adult Salmonids were frequent in deep glide and pool in bank undercuts and behind woody debris dams. Eel habitat was locally good between boulders under the masonry bridge crossing where a single large adult eel was recorded. The site had good potential to support Crayfish given the presence of swift flowing water, muddy banks for burrowing and good cover from overhanging trees. However, none were recorded. The channel also had high suitability for Otter given high cover and abundant food resources. An Otter latrine site was recorded on exposed gravels immediately downstream of the bridge.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (Appendix B). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the location of the site within the River Barrow and River Nore SAC (002162) and the River Nore SPA (004233), the aquatic ecological evaluation of site B6 was of **International Importance** (Table 4.4).



Plate 4.16: Representative image of site B6 on the lowermost reaches of the Nuenna River, July 2025.

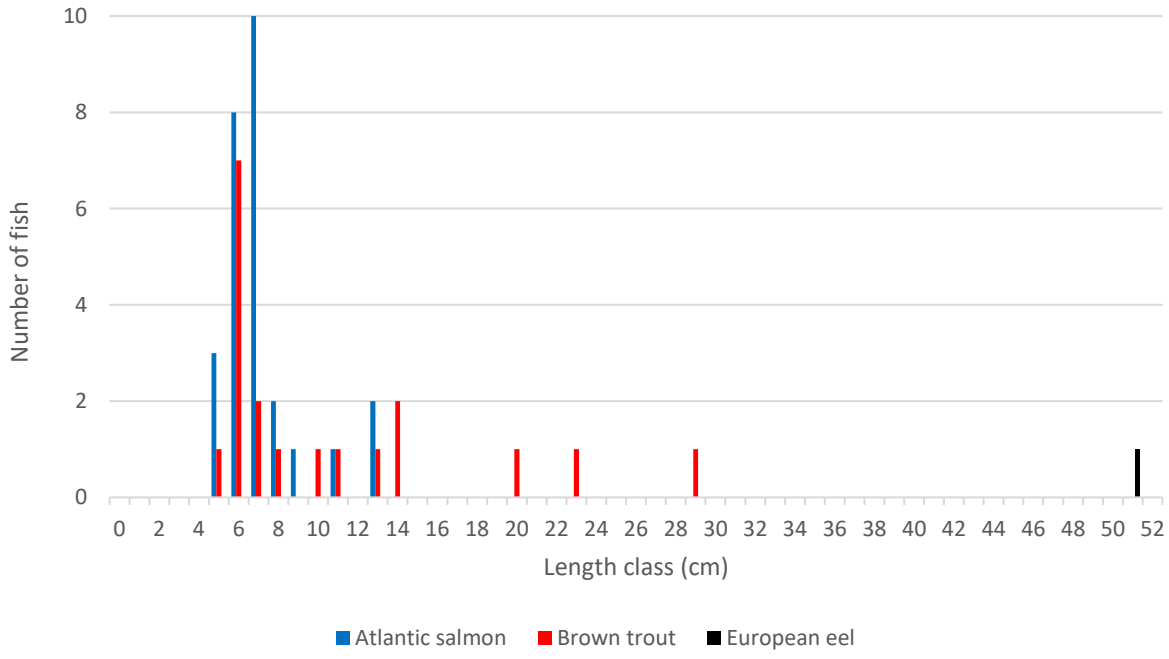


Figure 4.8: *Length frequency distribution recorded via electro-fishing at site B6, July 2025.*



Plate 4.17: 1+ Atlantic Salmon parr recorded at site B6 on the lowermost reaches of the Nuenna River, July 2025.

4.1.11. Site P1 – Pond, Ballyring Upper

Site P1 was a small pond located adjacent to proposed site boundary and turbine array. The former quarry pond was 0.05ha in size with depths of 0.1-0.5m. While the pond had gently sloping margins and a wide inundation zone it evidently retained water during dry summer periods. The bed supported compacted limestone gravels and silt. These were strewn with frequent Tolypella species, Curled Pondweed (*Potamogeton crispus*) and Pond Water Crowfoot (*Ranunculus peltatus*). The pond also supported occasional Common Water Starwort, Watercress and Fennel Pondweed (*Stuckenia pectinata*) with frequent emergent Common Spikerush (*Eleocharis palustris*) and Bulrush (*Typha latifoli*a) in the littorals at the base of step quarry escarpments. The pond borders supported abundant Sharp Flowered Rush (*Juncus acutiflorus*), Black Medick (*Medicago lupulina*) and Great Willowherb with occasional Water Figwort (*Scrophularia auriculata*) in the wet margins.

Site P1 was not of fisheries value given its shallow, artificial nature and isolation from other fisheries habitats. However, the pond had very high suitability for amphibians with Smooth Newt efts recorded via sweep sampling. The ample depth, high macrophyte cover, gently sloping margins and nearby refugia for winter torpor created optimal conditions for amphibians. There was poor habitat suitability for White-clawed Crayfish, and none were recorded. No Otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (Appendix B).

Given the presence of Smooth Newt, the aquatic ecological evaluation of site P1 was of **Local Importance (Higher Value)** (Table 4.4).



Plate 4.18: Representative image of site P1, July 2025.



Plate 4.19: Smooth Newt efts recorded at site P1, July 2025.

4.1.12. Site C1 – Gorteennamuck Stream, Gorteennamuck

Site C1 was located on the upper reaches of the Gorteennamuck Stream (15G39) at a local road and crossing of the Ballylehaun-Ballyring Underground Cabling. The stream had been historically straightened and realigned through a private garden into a small ornamental pond (FL8) which supported some standing water. However, the stream was dry at the time of survey with an absence of aquatic habitats or species. The pond supported some Water Lily (*Nuphar* sp.) and ornamental Rushes, which had also colonised the dry stream channel bed.

Site C1 was dry at the time of survey and was not of fisheries value given the ephemeral nature of the channel at this location. The stream had been diverted through a private garden pond, which featured some standing water and had some value for ornamental fish species (not observed).

Given the dry nature of the stream at this location, it was not possible to collect a biological water quality sample.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site C1 was of **Local Importance (Lower Value)** (Table 4.4).



Plate 4.20: Representative image of site C1 on the Gorteennamuck Stream, July 2025 (dry, ephemeral channel).

4.1.13. Site C2 – Gorteenahilla River, Ballygowney

Site C2 was located on the upper reaches of the Gorteenahilla River (15G08) at a local road and crossing of the Ballylehaun-Ballyring Underground Cabling. The upland eroding channel (FW1) flowed over moderate gradient and had been historically straightened along field boundaries but retained some good semi-natural characteristics and localised sinuosity near meanders. The river was 2m wide and 0.05-0.15m deep with a profile of slow flowing shallow riffle and glide. Pool was localised and shallow under tree roots at meanders. The small river evidently suffered from low summer flows. The substrata comprised mixed angular boulder, cobble and gravels that were moderately bedded and silted. Siltation increased in shallow pools were settlement of fines increased. The site did not support macrophytes. Larger substrata did support some *Rhynchostegium riparioides.* Filamentous algae cover was high (c. 30%) in open areas indicating eutrophication pressures. The riparian zone supported scrubby mature blackthorn, Hawthorn and Ash with Bramble. The site was bordered by extensive pastures (GA1).

Brown trout (n=11) was the only fish species recorded via electro-fishing at site C2. The site was a moderate quality nursery for Brown Trout. The presence of mixed riffle, glide and localised pool sequences with invertebrate prey resources and good riparian cover supported a low density of

juveniles. Spawning habitat was localised in deeper glide and pool tailings where mixed finer gravels persisted. Holding habitat was poor as supported by the dominance of 0+ fish. The site had limited suitability for European Eel given the upland characteristics with limited deeper pool habitat (none recorded). There was no suitability for Lamprey. There was poor suitability for White-clawed Crayfish given low summer flows and upland characteristics (none recorded). No Otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (Appendix B). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of Salmonids, the aquatic ecological evaluation of site C2 was of **Local Importance (Higher Value)** (Table 4.4).



Plate 4.21: Representative image of site C2 on the Gorteenahilla River, July 2025.

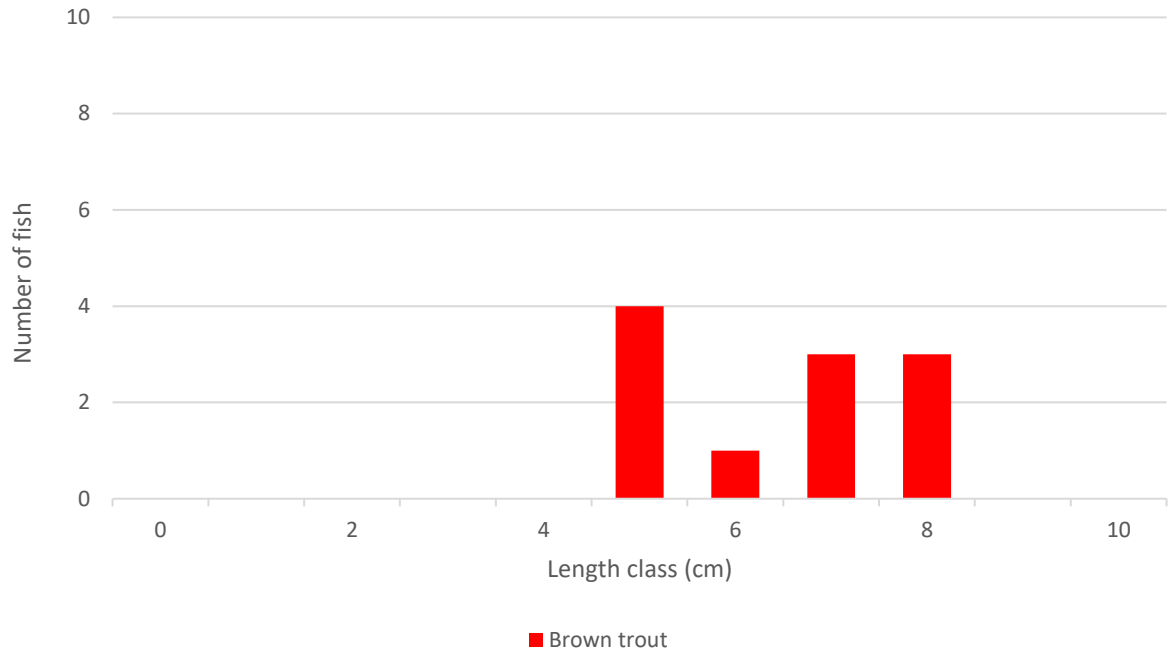


Figure 4.9: *Length frequency distribution recorded via electro-fishing at site C2, July 2025.*



Plate 4.22: Juvenile Brown Trout recorded at site C2 on the Gorteenahilla River, July 2025.

4.1.14. Site C3 – Ballyring Upper Stream, Ballyring Upper

Site C3 was located on the Ballyring Upper Stream (15B73) downstream of the Ballylehaun-Ballyring Underground Cabling. The small upland eroding stream (FW1) flowed over a steep gradient and had been historically realigned with bank reinforcement works upstream and downstream of the bridge crossing. The stream suffered from low summer flows at the time of survey with stagnant pools of water only (a regular feature of the watercourse; Triturus data). The stream was 1-1.5m wide was 0.05-0.15m deep with locally deeper pools. The substrata comprised mixed boulder, cobble and

gravels that were moderately bedded and heavily silted. Filamentous algae cover was high in open areas indicating eutrophication pressures with abundant floc in pools. The site supported some localised Watercress, brooklime and Fool's Watercress in open pool margins. Aquatic bryophytes were not recorded. The riparian zone supported mature, scrubby Blackthorn, Hawthorn, Hazel and Ash treelines with abundant Bramble. The site was bordered by sloping improved pasture (GA1).

Three-spined Stickleback (n=10) was the only fish species recorded via electro-fishing at site C3. With the exception of low densities of stickleback in stagnant pools, the site was not of significant fisheries value given poor/absent summer flows. There was no suitability for White-clawed Crayfish. No Otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (Appendix B). However, this rating was tentative given poor flows and the absence of suitable riffle areas for sampling (as per Toner *et al*., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site C3 was of **Local Importance (Lower Value)** (Table 4.4).



Plate 4.23: Representative image of site C3 on the Ballyring Upper Stream, July 2025.

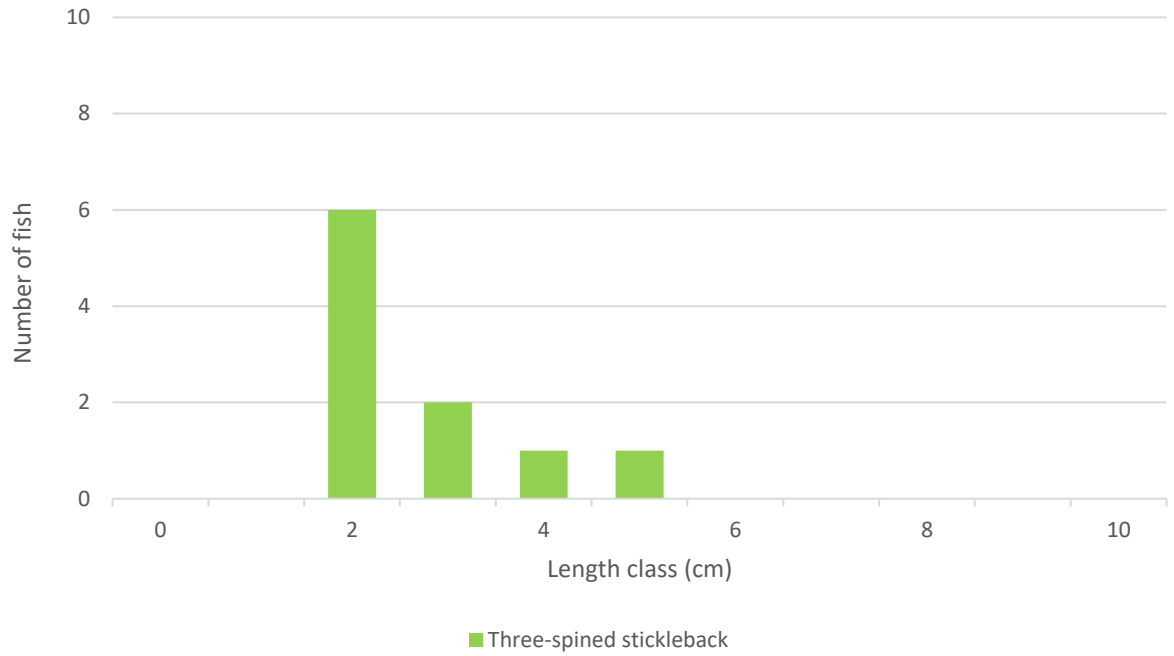


Figure 4.10: *Length frequency distribution recorded via electro-fishing at site C3, July 2025.*



Plate 4.24: Mixed cohort Three-spined Stickleback recorded at site C3 on the Ballyring Upper Stream, July 2025.

4.1.15. Site C4 – Lisdowney Stream, L1807 road crossing

Site C4 was located on the Lisdowney Stream (15L02) at the L1807 road. The upland eroding spate stream (FW1) flowed over a low to moderate gradient and was 2-4m wide (1.5m water width) with 2m high banks. The water was 0.1-0.3m deep. The channel had been historically deepened but demonstrated good instream recovery with riffle, glide and pool sequences despite low summer flows. The substrata comprised mixed boulder, cobble and gravels that suffered significant siltation and

enrichment (abundant floc). Bed calcification was evident. The site did not support macrophytes due to the heavily compacted bed and high shading, although instream calcified boulders supported occasional *Rhynchostegium riparioides*. The riparian zone supported mature Ash, Sycamore and Oak with dense Bramble and Ivy in open areas. The site was bordered by extensive pastures (GA1).

Brown trout (n=26) were the only fish species recorded via electro-fishing at site C4. Atlantic Salmon are known from the site (Triturus 2021 data) but were not recorded in the current survey. In spite of low summer flows, the site was a valuable Salmonid nursery with good densities of 0+ fish present. Good quality spawning habitat was present locally, although calcification and siltation reduced the capacity of the site. Holding opportunities were rare, reflecting the absence of resident adult Salmonids. The upland site was unsuitable for Lamprey, with no soft sediment nursery areas present. Despite some suitability for both European Eel (known from the watercourse) and White-clawed Crayfish (no records), neither was recorded, with limited refugia due to bed calcification. A regular Otter spraint site was recorded underneath the masonry arch bridge crossing and also on a large boulder immediately downstream of the bridge.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (Appendix B). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of Salmonids and utilisation by Otter, the aquatic ecological evaluation of site C4 was of **Local Importance (Higher Value)** (Table 4.4).



Plate 4.25: Representative image of site C4 on the Lisdowney Stream, July 2025.

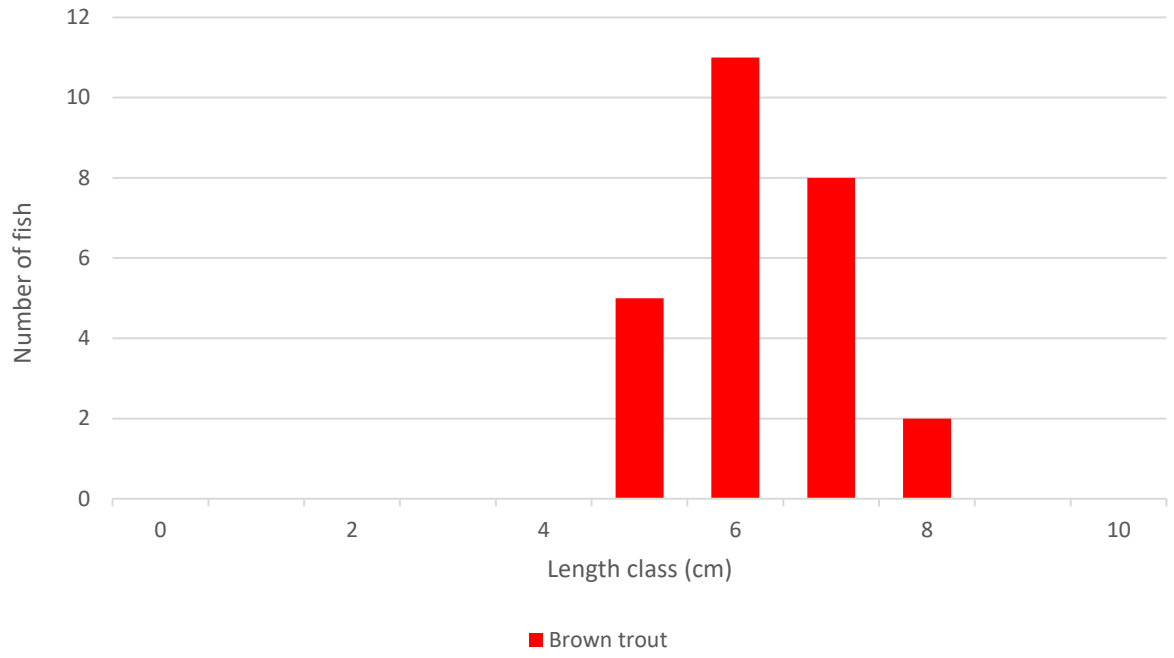


Figure 4.11: *Length frequency distribution recorded via electro-fishing at site C4, July 2025.*



Plate 4.26: Juvenile Brown Trout recorded at site C4 on the Lisdowney Stream, July 2025.

4.1.16. Site C5 – Ballyconra Stream, L1807 road crossing

Site C5 was located on the Ballyconra Stream (15B86) at the L1807 road.

The stream had been historically straightened and deepened and was 100% dry at the time of survey. The heavily modified U-shaped channel was 1.5m wide with a damp mud and stone base. In open areas, the channel supported occasional Fool's Watercress with encroachment from great Willowherb. Aquatic bryophytes were absent. The riparian areas supported mature treelines of Ash,

Crack Willow, grey Willow, Elder, Hawthorn and blackthorn with dense Bramble scrub. The site was bordered by heavily improved pasture (GA1) and a residential property (BL3, GA2).

Site C5 was not of fisheries value given the ephemeral and typically dry nature of the channel at this location.

Given the dry nature of the stream at this location, it was not possible to collect a biological water quality sample.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site C5 was of **Local Importance (Lower Value)** (Table 4.4).



Plate 4.27: Representative image of site C5 on the Ballyconra Stream, July 2025 (dry, ephemeral channel).

4.1.17. Site C6 – River Nore, Parksgrove

Site C6 was located on the River Nore (15N01) upstream of Ballyragget. The large lowland river (FW2) had been historically deepened and was 1.2-1.4m deep with 3m high banks. The flow profile was composed exclusively of deep depositional glide. The substrata comprised compacted boulder and cobble with localised areas of sands and silt. Significant eutrophication and siltation were evident. The site supported frequent linear stands of branched bur reed and Water Mint with rare river water dropwort (*Oenanthe fluviatilis*) and Common Clubrush. Larger boulders and cobble were heavily strewn with abundant *Fontinalis antipyretica*. The riparian areas supported intermittent and narrow treelines of mature Crack Willow, Grey Willow and Alder with herbaceous and scrubby herbaceous understories. The site was bordered by heavily improved pasture (GA1) and dry meadow areas (GS2).

Electro-fishing was not undertaken at site C6 given prohibitive depths and water volumes. The deep glide survey reach was of some moderate value to Salmonids with nursery and spawning areas present. However, the quality was impacted by siltation. Much improved Salmonid and Lamprey

nursery habitat was present c. 500m upstream near an island (pers. obs.). The deep section was of good value as a holding area for adult Salmonids, particularly given overhanging tree cover. The bed was too compacted to support good quality Lamprey nursery habitat albeit localised pockets of shallow silt existed in the margins near beds of Branched Bur-reed and likely supported low ammocoete densities. The Nore is also known to support European Eel in addition to a range of coarse fish species near the survey reach. There was moderate potential for White-clawed Crayfish although bed compaction and poorer hydromorphology reduced suitability. Furthermore, known historical outbreaks of plague have decimated much of the historical populations within the main channel. The survey area had good suitability for Otter albeit no signs were recorded.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (Appendix B). However, this rating was tentative given the absence of suitable riffle areas for sampling (as per Toner *et al*., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the location of the site within the River Barrow and River Nore SAC (002162) and the River Nore SPA (004233), the aquatic ecological evaluation of site C6 was of **International Importance** (Table 4.4).



Plate 4.28: Representative image of site C6 on the River Nore, July 2025.

4.2. White-clawed Crayfish survey

No White-clawed Crayfish were recorded via hand-searching or sweep netting of instream refugia at any of the aquatic survey sites in July 2025. Furthermore, inspection of Otter spraint/latrines at sites on the Coolnacrutta Stream, Nuenna River and Lisdowney Stream did not reveal the presence of Crayfish remains.

However, environmental DNA sampling of the River Goul and Nuenna River detected the species (**Table 4.1**).

4.3. eDNA sampling

Although not recorded through traditional methodologies, White-clawed Crayfish eDNA was detected at site A4 on the River Goul and site B6 on the Nuenna River (5 & 3 positive replicates out of 12, respectively; **Table 4.1; Appendix A**). These results were considered as evidence of the species' presence at and or upstream of the sampling locations.

In keeping with an absence of records for the respective watercourses, Freshwater Pearl Mussel were not detected in the samples from the River Goul or Nuenna River (0 positive replicates out of 12, respectively). No eDNA of Crayfish plague (an obligate pathogen of Crayfish) was detected in the samples.

Table 4.1: eDNA results in the vicinity of the proposed development, July 2025 (positive qPCR replicates out of 12 in parentheses).

Site	Watercourse	Freshwater pearl mussel	White-clawed Crayfish	Crayfish plague
A4	River Goul	Negative (0/12)	Positive (5/12)	Negative (0/12)
B6	Nuenna River	Negative (0/12)	Positive (3/12)	Negative (0/12)

4.3.1. Biological water quality (macro-invertebrates) & lacustrine macro-invertebrates

No rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples taken from a total of 14 no. wetted riverine sites or sweep samples from 1 no. pond site in July 2025 (**Appendix B**).

Sites A4 on the River Goul and B4 on the Gorteenahilla River achieved Q3-4 (moderate status) water quality (**Figure 4.12**). Despite the presence of the EPA group A Mayfly species *Ephemera danica* (A4) or *Rhithrogena semicolorata* (B4) these were only recorded in low numbers (<5% of total sample) and thus did not meet the qualifying criteria for good status as set out by Toner *et al*. (2005).

The remaining 12 no. sites on the Coolnacrutta Stream (A1, A2), River Goul (A3), Lismaine Stream (B1, B2, B3), Nuenna River (B5, B6), Gorteenahilla River (C2), Ballyring Upper Stream (C3), Lisdowney Stream (C4) and River Nore (C6) achieved **Q2-3 or Q3 (poor status**) based on an absence of group A species, low numbers of group B species and a dominance of group C species such as the Mayflies *Baetis rhodani* and *Seratella ignita* and Freshwater Shrimp (*Gammarus duebeni*) (**Appendix B**).

The pond site P1 sample was dominated by the Lake Olive (*Cloeon simile*), a low diversity of gastropod molluscs such as New Zealand Mud Snail (*Potamopyrgus antipodarum*), Water Beetles and Dragonflies (e.g. *Anax imperator*) (**Appendix B**).

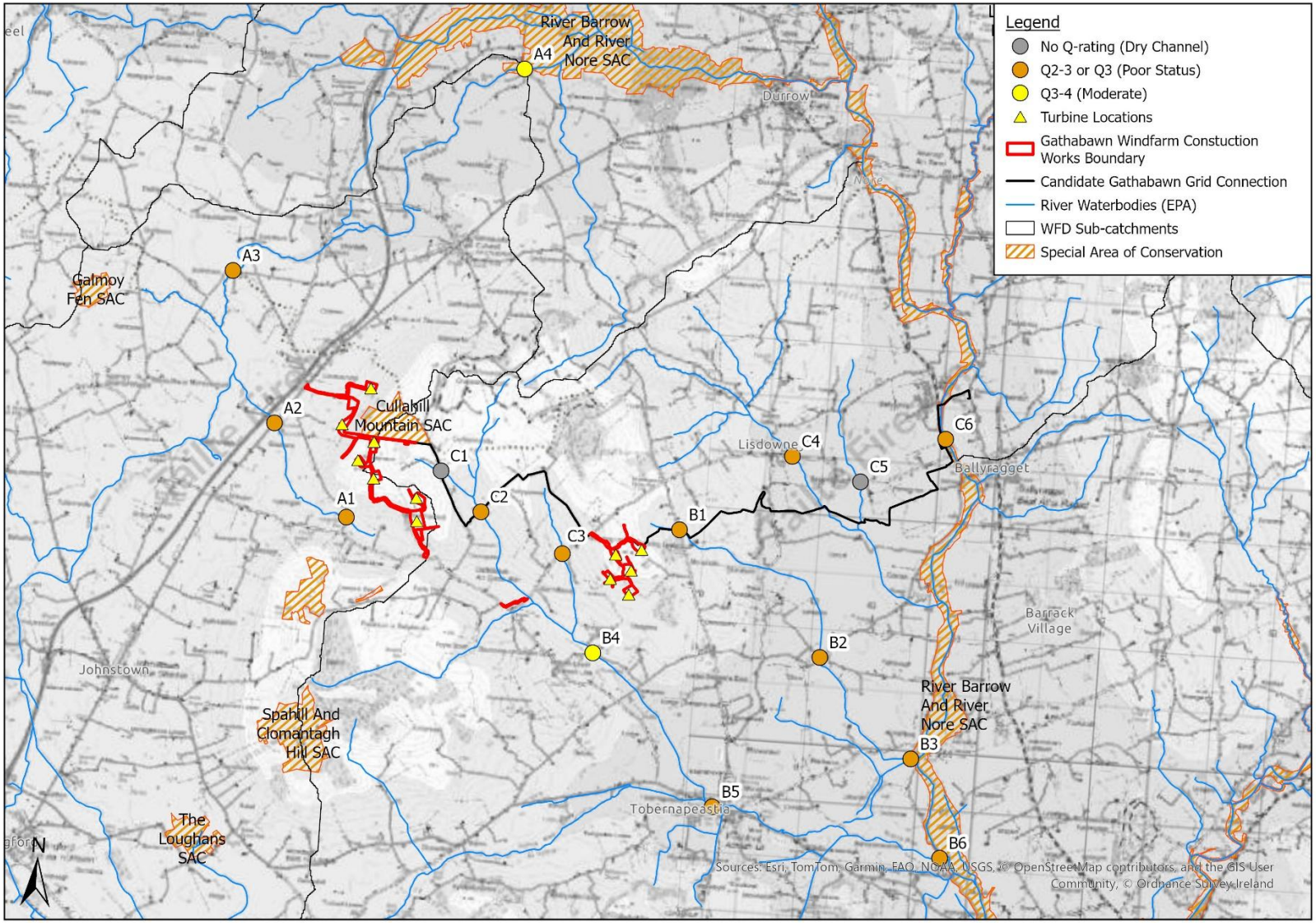


Figure 4.12: *Overview of the biological water quality status in the vicinity of the proposed development, July 2025.*

Table 4.2: *Relative abundance of fish species of higher conservation value recorded via electro-fishing in the vicinity of the proposed development, July 2025 (blank cell = none recorded).*

Site	Watercourse	Atlantic Salmon	Brown trout	Lamprey	European Eel	Other species
A1	Coolnacrutta Stream	No fish recorded				
A2	Coolnacrutta Stream	Low	Low	Low	Low	
A3	River Goul	Low	Medium			Minnow, Stone Loach
A4	River Goul	Low	Medium	Low	Low	Minnow, Stone Loach, three-spined stickleback
B1	Lismaine Stream	No fish recorded				
B2	Lismaine Stream					Three-spined Stickleback
B3	Lismaine Stream	Low	Low	Low		Minnow, Stone Loach, three-spined stickleback
B4	Gorteenahilla River	Medium	Low	Medium		Three-spined Stickleback
B5	Nuenna River	Medium	High			
B6	Nuenna River	Medium	Medium		Low	
P1	Pond	Fisheries appraisal only (not of fisheries value)				
C1	Gorteennamuck Stream	No fish recorded (dry channel)				
C2	Gorteenahilla River		Low			
C3	Ballyring Upper Stream					Three-spined Stickleback
C4	Lisdowney Stream		Medium			
C5	Ballyconra Stream	No fish recorded (dry channel)				
C6	River Nore	Fisheries appraisal only				

Table 4.3 *Fish species densities per m2 recorded at sites in the vicinity of the proposed development via electro-fishing in July 2025 (values in bold represent the highest densities recorded for each species, respectively)*

Site no.	Watercourse	CPUE (elapsed time)	Approx. area fished (m^2)	Atlantic Salmon	Brown trout	*Lampetra* sp.	European Eel	Stone loach	Three-spined stickleback	Minnow
A1	Coolnacrutta Stream	5	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A2	Coolnacrutta Stream	10	120	0.017	0.025	0.67 per m2	0.008	0.000	0.000	0.000
A3	River Goul	10	180	0.033	0.100	0.000	0.000	0.006	0.000	0.039
A4	River Goul	10	200	0.020	0.090	2 per m2	0.005	0.010	0.015	0.020
B1	Lismaine Stream	5	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000
B2	Lismaine Stream	5	50	0.000	0.000	0.000	0.000	0.000	0.120	0.000
B3	Lismaine Stream	10	150	0.007	0.033	4 per m2	0.000	0.027	0.013	0.027
B4	Gorteenahilla River	10	140	0.114	0.050	7 per m2	0.000	0.000	0.014	0.000
B5	Nuenna River	10	220	0.050	0.191	0.000	0.000	0.000	0.000	0.000
B6	Nuenna River	10	210	0.129	0.090	0.000	0.005	0.000	0.000	0.000
P1*	Pond	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C1	Gorteennamuck Stream	5	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C2	Gorteenahilla River	10	150	0.000	0.073	0.000	0.000	0.000	0.000	0.000
C3	Ballyring Upper Stream	5	100	0.000	0.000	0.000	0.000	0.000	0.100	0.000
C4	Lisdowney Stream	10	200	0.000	0.130	0.000	0.000	0.000	0.000	0.000
C5	Ballyconra Stream	n/a	n/a - dry channel	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C6*	River Nore	n/a	n/a - too deep	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table 4.4 Summary of aquatic species and habitats of higher conservation value recorded in the vicinity of the proposed developments, July 2025.

Site	Watercourse	White-clawed Crayfish	Otter signs[2]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
A1	Coolnacrutta Stream	None recorded	None recorded	Not present	None recorded	None recorded	None recorded
A2	Coolnacrutta Stream	None recorded	1 no. spraint site	Not present	None recorded	None recorded	Atlantic Salmon, *Lampetra* sp., European Eel
A3	River Goul	None recorded	None recorded	Not present	None recorded	None recorded	Atlantic Salmon
A4	River Goul	Detected via eDNA	None recorded	Not present	None recorded	None recorded	Atlantic Salmon, *Lampetra* sp., European Eel
B1	Lismaine Stream	None recorded	None recorded	Not present	None recorded	None recorded	None recorded
B2	Lismaine Stream	None recorded	None recorded	Not present	None recorded	None recorded	None recorded
B3	Lismaine Stream	None recorded	None recorded	Not present	None recorded	None recorded	Atlantic Salmon, *Lampetra* sp.
B4	Gorteenahilla River	None recorded	None recorded	Not present	None recorded	None recorded	Atlantic Salmon, *Lampetra* sp.
B5	Nuenna River	None recorded	None recorded	Not present	None recorded	None recorded	Atlantic Salmon
B6	Nuenna River	Detected via eDNA	Latrine recorded	Not present	None recorded	None recorded	Atlantic Salmon, European Eel
P1	Pond	None recorded	None recorded	Not present	None recorded	None recorded	Smooth Newt
C1	Gorteennamuck Stream	None recorded	None recorded	Not present	None recorded	None recorded	None recorded

[2] *Otter signs within 150m of the survey site*

Site	Watercourse	White-clawed Crayfish	Otter signs[2]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
C2	Gorteenahilla River	None recorded	None recorded	Not present	None recorded	None recorded	None recorded
C3	Ballyring Upper Stream	None recorded	None recorded	Not present	None recorded	None recorded	None recorded
C4	Lisdowney Stream	None recorded	2 no. spraint sites	None recorded	None recorded	None recorded	None recorded
C5	Ballyconra Stream	None recorded	None recorded	Not present	None recorded	None recorded	None recorded
C6	River Nore	None recorded	None recorded	Not present	None recorded	None recorded	Atlantic Salmon, *Lampetra* sp., European Eel & Otter all known from area

Conservation value: White-clawed Crayfish, Eurasian Otter, Atlantic Salmon & Lamprey are listed under Annex II and Annex V of the Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC) ('EU Habitats Directive'). White-clawed Crayfish, Otter and Smooth Newt are protected under the Irish Wildlife Acts 1976-2023. Atlantic Salmon are also protected under the Wild Salmon and Sea Trout Tagging Scheme (Amendment) Regulations. European Eel is 'critically endangered' according to most recent ICUN red list (Pike *et al*., 2020) and listed as 'critically engendered' in Ireland (King *et al*., 2011).

Table 4.5 Aquatic ecological evaluation summary of the survey sites according to NRA (2009) criteria.

Site	Watercourse	EPA code	Evaluation of importance	Rationale summary
A1	Coolnacrutta Stream	15C50	Local importance (lower value)	No aquatic species or habitats of high conservation value
A2	Coolnacrutta Stream	15C50	Local importance (higher value)	Atlantic Salmon, Brown Trout, Lamprey & European Eel recorded; site utilised by Otter
A3	River Goul	15G02	Local importance (higher value)	Atlantic Salmon & Brown Trout recorded
A4	River Goul	15G02	Local importance (higher value)	Atlantic Salmon, Brown Trout, Lamprey & European Eel recorded
B1	Lismaine Stream	15L16	Local importance (lower value)	No aquatic species or habitats of high conservation value
B2	Lismaine Stream	15L16	Local importance (lower value)	No aquatic species or habitats of high conservation value
B3	Lismaine Stream	15L16	Local importance (higher value)	Atlantic Salmon, Brown Trout & Lamprey recorded
B4	Gorteenahilla River	15G08	Local importance (higher value)	Atlantic Salmon, Brown Trout & Lamprey recorded
B5	Nuenna River	15N02	Local importance (higher value)	Atlantic Salmon & Brown Trout recorded
B6	Nuenna River	15N02	International importance	Located within the River Barrow and River Nore SAC (002162) and the River Nore SPA (004233)
P1	Pond	n/a	Local importance (higher value)	Smooth Newt recorded
C1	Gorteennamuck Stream	15G39	Local importance (lower value)	No aquatic species or habitats of high conservation value (dry, ephemeral channel)
C2	Gorteenahilla River	15G08	Local importance (higher value)	Brown trout recorded
C3	Ballyring Upper Stream	15B73	Local importance (lower value)	No aquatic species or habitats of high conservation value
C4	Lisdowney Stream	15L02	Local importance (higher value)	Brown trout recorded, site utilised by Otter
C5	Ballyconra Stream	15B86	Local importance (lower value)	No aquatic species or habitats of high conservation value (dry, ephemeral channel)
C6	River Nore	15N01	International importance	Located within the River Barrow and River Nore SAC (002162) and the River Nore SPA (004233)

5. DISCUSSION

The watercourses surveyed in the vicinity of the proposed Gathabawn Windfarm development were typically small upland and lowland channels which had been historically straightened and or deepened. Whilst good instream recovery was evident across most modified survey sites, siltation and eutrophication pressures were significant and had impacted aquatic habitats and resulted in a reduction of biological water quality. Low summer flows, very much characteristic of this region, further affected the quality of aquatic habitats and were evidently an issue for fish populations on several watercourses in the vicinity of the development with a total of 4 no. sites not supporting resident fish at the time of survey. Intermittent flows result in degradated fisheries habitat, particularly due to high thermal stress (O'Briain *et al*., 2020, 2019, 2017) and agricultural (siltation and eutrophication) pressures (Kelly-Quinn *et al*., 2020; O'Callaghan *et al*., 2019; Davis *et al*., 2018; Conroy *et al*., 2016). The Nore catchment features a relatively high number of instream barriers (Atkinson *et al*., 2018; Sullivan, 2007), particularly for non-salmonid species (Gargan *et al*., 2011; IFI National Barriers dataset) and this also influenced fish distributions. Pond site P1 was not of fisheries value given its shallow, isolated nature. Nearly half of the riverine survey sites were of low fisheries and aquatic value and were evaluated as **Local Importance (Lower Value)** given an absence of aquatic species or habitats of high conservation value (**Table 4.4**). A number of sites were dry, ephemeral channels namely the Gorteennamuck Stream (C1) and Ballyconra Stream (C5).

Nevertheless, a range of high conservation value species were recorded during the surveys including Annex II Atlantic Salmon, Lamprey and Otter in addition to Red-listed European Eel. The presence of one or more of these fish species resulted in most sites being evaluated **as Local Importance (Higher Value)** in terms of their aquatic ecology (**Table 4.4**). Site B6 on the Nuenna River and C6 on the River Nore were of **International Importance** given their locations within the River Barrow and River Nore SAC (002162) and the River Nore SPA (004233) sites. Pond site P1 supported a Smooth Newt population, a species protected under the Wildlife Acts 1976-2023. White-clawed Crayfish were detected via eDNA sampling both the River Goul and Nuenna River.

No rare or protected macrophytes/aquatic bryophytes, rare or protected macro-invertebrates, Otter breeding/resting areas or aquatic invasive species were recorded during the current survey. Broadly speaking, the highest value watercourses in terms of aquatic ecology within vicinity of the proposed development were the Coolnacrutta Stream, River Goul, Gorteenahilla River, Nuenna River and River Nore.

5.1. Fisheries

A typical diversity of fish for the surveyed sub-catchments (Triturus 2021-2024 data; Gordon *et al*., 2021; Matson *et al*., 2018; Kelly *et al*., 2014) was recorded, with Atlantic Salmon, Brown Trout, Lamprey, European Eel, Minnow, Stone Loach and Three-spined Stickleback captured in July 2025 (**Table 4.2**). A total of 4 no. sites did not support resident fish at the time of survey, primarily given low summer flows and or an absence of aquatic habitats.

Salmonid populations were widespread in the survey area although were absent from the upper reaches of several watercourses such as the Coolnacrutta and Lismaine Streams (which supported salmonids further downstream). Atlantic Salmon were recorded from 7 no. sites on the Coolnacrutta Stream (A2), River Goul (A3, A4), Lismaine Stream (B3), Gorteenahilla River (B4) and the Nuenna River

(B5, B6). Brown trout were also present at these sites as well as sites C2 on the Gorteenahilla River and C4 on the Lisdowney Stream, but are also known from the River Nore in the vicinity of the candidate grid connection route crossing (Site C6 too deep for electro-fishing) and the upper reaches of the Lisdowney Stream (Triturus data). Densities were typically low to medium, reflecting the significant water quality and hydromorphological impacts throughout the survey area. Brown Trout had a similar distribution being recorded from these above sites in addition to sites C2 on the Gorteenahilla River and C4 on the Lisdowney Stream. Salmon parr were typically present only in low densities although moderate numbers were recorded from sites on the Nuenna River and its tributary the Gorteenahilla River (superior nurseries). The Nuenna River (sites B5, B6) also supported the highest numbers of Brown Trout recorded during the survey. Siltation of spawning habitat was especially noticeable throughout the survey area, with Hydromorphological impacts reducing habitat heterogeneity and the quality of available nursery areas.

Lamprey habitat was restricted in the survey area given the higher energy conditions at many sites which discourages the settlement of organic rich fines required for larval burial (Aronsuu & Virkkala, 2014; Goodwin *et al*., 2008; Gardiner, 2003) plus siltation, eutrophication and hydromorphological pressures. Given that *Lampetra* spp. require fine, clean gravels for spawning (Dawson *et al*., 2015; Rooney *et al*., 2013; Lasne *et al*., 2010; Kelly & King, 2001), siltation significantly impacted spawning opportunities in the survey area, with bed calcification and eutrophication also additional pressures. Channel gradients and instream barriers (both natural and anthropogenic) further restricted Lamprey populations given their poor ability to navigate even low head obstacles and higher flow velocities. However, *Lampetra* sp. ammocoetes were recorded in low to medium densities (0.67 to 7 per m^2) from a total of 4 no. sites on the Coolnacrutta Stream (A2), River Goul (A4), Lismaine Stream (B3) and Gorteenahilla River (B4). Sites B3 and B4 supported higher ammocoete densities given the abundance of suitable soft sediment accumulations not typically encountered elsewhere (invariably flocculent and too shallow for larval burial).

European Eel is Red-listed in Ireland (King *et al*., 2011) and are classed as 'critically endangered' on a global scale (Pike *et al*., 2020). Despite widespread suitability, European Eel were only recorded in low numbers at 3 no. sites on the Coolnacrutta Stream (A1), River Goul (A4) and Nuenna River (B6) (**Table 3.1, 3.2**). Sites beyond the scope of electro-fishing on the River Nore (C6) also provided good quality eel habitat and likely supported the species. The low eel numbers and absence from many physically suitable sites likely reflects the high number of barriers to fish passage present in the Nore catchments, as well as widespread low summer flow conditions which influence and restrict fish distribution. Eel penetration into many Nore tributaries is low (Gargan *et al*., 2011), primarily due to the high number of aforementioned instream barriers within the catchment. As eel occurrence decreases significantly with increasing distance from the sea (Degerman *et al*., 2019), the paucity of eel observed in the survey sub-catchments can be further explained by the distance between the survey area and marine habitats (Matondo *et al*., 2021; Chadwick *et al*., 2007) (c. 90km nearest instream distance).

5.2. Water quality & macro-invertebrates

Whilst no live White-clawed Crayfish were recorded during the targeted surveys, the species was detected via eDNA sampling at site A4 on the River Goul and site B6 on the Nuenna River (**Table 4.1; Appendix A**). Although both historical and contemporary Crayfish records are available for the River Goul, a tributary of the River Erkina (**Figure 3.1**), none are available for the Nuenna River. Our results indicate a previously unrecorded Crayfish population within this highly alkaline river system that may be of considerable conservation value given the decline of the species in the downstream connecting River Nore.

An outbreak of the highly infectious Crayfish plague- a pathogen which causes mass mortality in White-clawed Crayfish populations - was confirmed on the River Nore in Kilkenny in 2019 and the pathogen has likely impacted populations throughout the Nore catchment. Environmental DNA monitoring as part of the National Crayfish Plague Surveillance Programme has since detected and confirmed the spread of Crayfish plague in the wider Nore catchment (Swords *et al*., 2022) although none was recorded in the current survey (**Table 4.1; Appendix A**). Crayfish plague is listed at one of the world's 100 worst invasive species (GISD, 2025).

5.3. Macro-invertebrates & biological water quality

No rare or protected macro-invertebrate species (according to national red lists) were recorded in the samples taken from a total of 14 no. wetted riverine sites or 1 no. pond site in July 2025 (**Appendix B**). The samples were typically dominated by pollution-tolerant taxa common to Irish rivers impacted by siltation, eutrophication and hydromorphological pressures. Only two sites (A4 & B4) were found to support any EPA group A macro-invertebrate species (i.e. most pollution sensitive).

Although not protected, the nationally uncommon lesser water boatman species *Corixa iberica* was recorded in low numbers from pond site P1. This species is highly localised in Scotland and Ireland as well as the Iberian Peninsula (Huxley, 2003) but its close similarity to (and possible hybridisation with) the widespread *Corixa punctata* (Angus, 2006) may have led to misidentification and under recording.

All riverine sites sampled failed to meet the target good status (≥Q4) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and the Water Framework Directive (2000/60/EC) (**Figure 4.12**). The biological water quality of the survey area was unsatisfactory (i.e. ≤Q3-4) and typically of poor status (Q2-3 or Q3) with significant siltation and hydromorphological impacts evidently contributing to a reduction in water quality, in addition to eutrophication pressures. Agriculture is known to be the major water quality pressure within the wider survey area (EPA, 2024 & other EPA data) and this was supported by observations made during the aquatic surveys.

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Appendix to the Screening for Appropriate Assessment Report

Appendix E

A13.6: Bird Survey Data

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A13.6.1 Survey Efforts

Table 1: Winter Transects Efforts 2022-2023

Date	Observer	Transect Number	Cloud	Rain	Wind Speed	Visibility	Start Time	Finish Time
14/12/2022	KME	1	1/8	Dry	F1	1	09:50	10:20
17/01/2023	DMC	1	1/8	Dry	F1	1	11:15	11:35
17/01/2023	SID	1	3/8	Dry	F1	1	15:35	16:10
23/02/2023	BOC	1	1/8	Dry	F2	1	15:45	16:35
15/12/2022	KME	2	1/8	Dry	F1	1	14:26	14:56
17/01/2023	DMC	2	1/8	Dry	F1	1	11:58	12:12
20/01/2023	HM	2	5/8	Dry	F1	2	08:44	09:40
27/02/2023	BOC	2	3/8	Dry	F3	1	11:00	11:45
02/11/2022	KME	3	3/8	3	F3	2	12:10	14:40
07/12/2022	DMC	3	1/8	Dry	F1	1	14:45	15:02
17/01/2023	DMC	3	1/8	Dry	F1	1	12:53	13:07
20/01/2023	HM	3	5/8	Dry	F1	2	08:44	09:40
17/01/2023	DMC	4	1/8	Dry	F1	1	13:07	13:24
17/01/2023	SID	4	3/8	Dry	F1	1	04:03	16:40
18/01/2023	HM	4	5/8	Dry	F2	2	09:15	10:00
23/02/2023	BOC	4	1/8	Dry	F2	1	11:00	11:55
17/01/2023	HM	5	2 /8	Dry	F1	5	09:28	10:30
13/02/2023	KME	5	3/8	Dry	F2	1	07:26	07:56
23/02/2023	BOC	5	1/8	Dry	F2	1	12:15	13:10
20/01/2023	HM	6	5/8	Dry	F1	2	09:43	10:38
16/02/2023	KME	6	3/8	Dry	F1	1	13:38	14:08
27/02/2023	BOC	6	3/8	Dry	F2	1	11:50	12:30
07/03/2023	KME	6	6/8	None	F2	16	16:40	17:10
03/11/2022	KME	7	3/8	Drizzle	F1	1	11:55	14:25
03/01/2023	KME	7	3/8	Dry	F2	1	14:26	14:56
18/01/2023	KME	7	3/8	Dry	F3	1	15:02	15:32
17/02/2023	KME	7	3/8	Dry	F2	1	07:12	07:42
04/01/2023	KME	8	3/8	Dry	F1	1	15:36	16:06
19/01/2023	KME	8	1/8	Dry	F1	1	14:27	14:57
26/02/2023	BOC	8	3/8	Dry	F3	1	11:40	12:30
27/02/2023	KME	8	1/8	Dry	F1	1	12:00	12:30

Date	Observer	Transect Number	Cloud	Rain	Wind Speed	Visibility	Start Time	Finish Time
17/01/2023	KME	9	1/8	Dry	F1	1	15:17	15:47
20/01/2023	HM	9	5/8	Dry	F1	2	11:30	12:15
20/01/2023	HM	9	5/8	Dry	F1	2	11:30	12:15
27/02/2023	KME	9	1/8	Dry	F1	1	12:44	13:14

Table 2: Winter Transects Efforts 2025-2026

Date	Transect Number	Observer	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
17/11/2025	1	SS	15:25	15:50	1500	None	2/8	32	F1	NNW	7
24/11/2025	1	KME	14:38	15:03	1500	None	5/8	16	F3	NW	8
17/12/2025	1	KME	12:01	12:26	1500	Light rain	8/8	2	F3	SSW	12
25/02/2026	1	KME	16:06	16:31	1500	None	7/8	16	F2	SSW	13
26/11/2025	2	KME	10:16	10:41	1500	Light rain	8/8	11	F3	S	10
17/12/2025	2	CMCK	15:42	16:12	1800	Occasional showers	8/8	5	F3	SSW	9
14/01/2026	2	KME	12:29	12:54	1500	Moderate rain	8/8	3	F3	S	7
11/02/2026	2	SS	16:00	16:30	1800	Drizzle	8/8	17	F1	SSW	9
18/11/2025	3	SS	15:04	15:46	2520	None	5/8	28	F2	WNW	6
16/12/2025	3	CMCK	15:33	16:00	1620	None	0/8	10	F1	SSW	6
22/01/2026	3	CMCK	13:42	14:12	1800	None	7/8	10	F1	SE	6
20/02/2026	3	SS	16:20	16:50	1800	None	7/8	27	F2	W	10
12/11/2025	4	KME	13:50	15:10	4800	None	8/8	8	F2	N	11
11/12/2025	4	CMCK	15:45	16:15	1800	Light rain	8/8	2	F3	S	11
28/01/2026	4	CF	08:24	08:50	1560	None	7/8	18	F4	SE	5
13/02/2026	4	SS	15:33	16:00	1620	None	8/8	31	F3	N	5
07/11/2025	5	KME	14:54	15:19	1500	Light rain	8/8	9	F3	SE	11
18/12/2025	5	SS	08:51	09:20	1740	None	7/8	16	F1	S	11
29/01/2026	5	CF	08:31	09:00	1740	None	7/8	15	F4	SE	6
09/02/2026	5	SS	15:30	16:00	1800	None	8/8	17	F1	ESE	8

Table 3: Breeding Transects Survey Efforts.

Date	Transect Number	Observer	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
09/04/2025	2	SS	08:10	08:50	1800	None	0/8	15	F1	NNE	6
07/05/2025	1	CMCK	07:30	08:00	1800	None	5/8	10	F1	NW	4
07/05/2025	3	CMCK	08:30	09:00	1800	None	7/8	10	F1	NW	10
20/05/2025	3	KME	05:56	06:21	1500	None	8/8	11	F1	SE	8
20/05/2025	4	CMCK	06:45	07:20	2100	None	7/8	5	F1	ESE	8
20/05/2025	5	CMCK	07:40	08:15	2100	Light rain	7/8	5	F1	ESE	8
21/05/2025	4	CMCK	06:43	07:15	1920	Drizzle	8/8	2	F1	NNW	8
21/05/2025	5	CMCK	07:40	08:15	2100	Drizzle	8/8	2	F1	NNW	8
28/05/2025	1	KME	04:45	05:10	1500	None	2/8	16	F1	W	10
28/05/2025	2	KME	05:28	05:53	1500	None	2/8	16	F1	W	10
22/04/2026	1	SS	08:45	08:15	1800	None	6/8	27	F2	E	8
23/04/2026	2	SS	08:30	09:11	2460	None	4/8	27	F3	ESE	11
28/04/2026	3	SS	08:29	09:00	1860	None	0/8	21	F1	NNE	9
29/04/2026	4	SS	08:08	08:30	1320	None	1/8	24	F1	NE	8
29/04/2026	5	KME	08:18	08:43	1500	None	0/8	12	F1	NE	6
20/05/2026	1	KME	07:24	07:49	1500	None	5/8	11	F3	SW	11
21/05/2026	3	KME	07:10	07:35	1500	None	8/8	6	F2	S	13
04/06/2026	4	SS	07:45	08:05	1500	None	8/8	18	F4	W	12
16/06/2026	2	CMCK	06:52	07:22	1800	Drizzle	8/8	10	F2	SW	10
17/06/2026	5	CMCK	07:00	07:35	2100	None	6/8	15	F1	SW	12

Table 4: Breeding Barn Owl Survey Efforts.

Survey	Date	Observer	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
Suitability	08/04/2025	SS	08:00	14:30	23400	None	3/8	14	F1	E	5
Activity	25/06/2025	OC	21:28	22:58	5400	None	8/8	10	F2	S	16
Activity	13/08/2025	SS	20:30	22:00	5400	None	3/8	20	F2	S	20
Activity	27/08/2025	AH	19:59	21:54	6900	None	4/8	20	F4	SE	14
Suitability	21/04/2026	SS	10:20	15:20	18000	Occasional showers	8/8	28	F2	E	10
Activity	29/06/2026	KME	21:28	22:58	5400	None	7/8	12	F2	S	14
Activity	14/07/2026	MVA and CMCK	21:17	22:47	5400	None	1/8	5	F1	E	21
Activity	26/08/2026	CB	20:00	21:30	5400	none	1/8	7	F2	ESE	18

Table 5: Breeding Kestrel Survey Efforts.

Survey	Date	Observer	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
Suitability	08/04/2025	SS	08:00	14:30	23400	None	3/8	14	F1	E	5
Activity	21/05/2025	SS	11:30	17:55	23100	None	0/8	15	F2	N	16
Activity	25/06/2025	JOC	12:50	14:50	7200	None	6/8	10	F2	S	16
Activity	10/07/2025	PB	09:15	11:15	7200	None	2/8	20	F1	E	19
Activity	10/07/2025	PB	11:30	13:00	5400	None	2/8	20	F1	ENE	24
Activity	10/07/2025	PB	13:15	15:15	7200	None	2/8	20	F1	SE	26
Suitability	21/04/2026	SS	10:20	15:20	18000	Occasional showers	8/8	28	F2	E	10
Activity	11/05/2026	SS	14:20	16:20	7200	Occasional showers	8/8	28	F2	N	13
Activity	17/06/2026	SS	10:20	12:20	7200	None	5/8	27	F2	SW	17
Activity	17/06/2026	SS	12:22	14:22	7200	None	5/8	27	F2	SW	17
Activity	28/07/2026	KME	12:25	13:55	5400	None	5/8	16	F3	SSW	23
Activity	28/07/2026	KME	14:00	15:30	5400	None	5/8	16	F3	SSW	23
Activity	28/07/2026	KME	15:39	17:09	5400	None	5/8	16	F3	SSW	23

Table 6: Breeding Peregrine Survey Efforts.

Survey	Date	Observer	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
Suitability	08/04/2025	SS	08:00	14:30	23400	None	3/8	14	F1	E	5
Activity	07/05/2025	JOC	09:40	11:40	7200	None	1/8	10	F1	E	12
Activity	07/05/2025	JOC	11:50	13:50	7200	None	2/8	10	F1	E	15
Activity	07/05/2025	JOC	14:05	16:05	7200	None	6/8	10	F1	E	16
Activity	21/05/2025	SS	11:30	17:55	23100	None	0/8	15	F2	N	16
Activity	25/06/2025	JOC	09:30	11:00	5400	None	6/8	10	F2	S	16
Activity	25/06/2025	JOC	11:10	12:40	4800	None	6/8	10	F2	S	16
Suitability	21/04/2026	SS	10:20	15:20	18000	Occasional showers	8/8	28	F2	E	10
Activity	11/05/2026	SS	12:50	14:15	5100	Occasional showers	8/8	28	F2	N	13
Activity	17/06/2026	SS	09:11	09:35	1440	None	5/8	27	F2	SW	17
Activity	17/06/2026	SS	09:45	10:17	1920	None	5/8	27	F2	SW	17
Activity	17/06/2026	SS	10:20	12:20	7200	None	5/8	27	F2	SW	17
Activity	17/06/2026	SS	12:22	14:22	7200	None	5/8	27	F2	SW	17

Table 7: Hen Harrier Roost Survey Efforts.

Date	Observer	Start Time	End Time	Sunrise/Sunset	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
26/10/2022	KME	08:00	11:00	08:10	10800	Dry	6/8	2	F2	SW	12
10/11/2022	KME	13:45	16:45	16:41	10800	Dry	5/8	14	F2	SW	12
05/01/2023	KME	07:56	10:56	08:53	10800	Dry	7/8	14	F3	S	10
17/01/2023	HM	15:50	17.:20	16:20	5400	Dry	2/8	2	F1	NE	1
15/02/2023	KME	17:10	18:40	17:40	5400	Dry	5/8	16	F2	SW	9
21/03/2023	KME	18:13	19:43	18:43	5400	Occasional showers	7/8	11	F3	S	9
06/10/2025	KME SS	18:24	19:54	5400	18:54	None	6/8	16	F3	SSW	15
26/11/2025	CF & KP	15:40	17:10	5400	16:22	None	8/8	5	F3	SW	12
17/12/2025	KME	15:44	17:14	5400	16:14	Occasional showers	8/8	12	F3	S	10
26/01/2026	KME	16:33	18:03	5400	17:03	None	8/8	6	F2	SE	8
25/02/2026	KME SS	17:29	19:01	5400	18:01	Occasional showers	5/8	16	F2	SSW	12
09/03/2026	KME	17:52	19:22	5400	18:22	None	3/8	16	F1	SW	11

Table 8: Breeding Woodcock Survey Efforts.

Date	Observer	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
06/05/2025	JOC	20:36	22:06	5400	None	1/8	5	F1	E	11
20/05/2025	SS	20:15	21:30	4500	Drizzle	8/8	10	F2	S	12
23/06/2025	JOC	21:28	22:58	5400	None	8/8	5	F3	SW	16
14/05/2026	SS & DP	21:04	22:19	4500	None	2/8	27	2	NNW	9
28/05/2026	KME	21:25	22:40	4500	None	5/8	16	F3	SSW	16

Table 9: Kingfisher Survey Efforts.

Date	Observer	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
23/04/2025	KME & JOC	14:40	17:40	10800	None	8/8	16	F1	NE	12
28/04/2026	KME	09:00	14:30	19800	None	0/8	16	F2	ENE	14
21/05/2026	SS KP	10:30	14:30	14400	None	8/8	12	F2	SSW	15

Table 10: Nore Waterbirds VP Survey Efforts.

Date	Observer	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
09/02/2026	KME	15:00	18:00	10800	None	8/8	12	F3	ESE	9
10/02/2026	KME	07:24	10:24	10800	Occasional showers	8/8	11	F1	ESE	7
02/03/2026	SS	15:40	18:40	10800	None	5/8	24	F2	W	8
03/03/2026	SS	06:40	09:40	10800	None	2/8	21	F2	NNE	1
09/03/2026	SS	15:52	18:52	10800	None	2/8	17	F2	SW	8
10/03/2026	SS	06:25	09:25	10800	Occasional showers	8/8	13	F2	S	8
19/03/2026	SS	16:10	19:10	10800	None	4/8	28	F1	SE	16
20/03/2026	SS	06:00	09:00	10800	None	6/8	25	F1	SSE	4
13/04/2026	SS	17:55	20:55	10800	None	4/8	23	F2	S	10
14/04/2026	SS	06:03	09:03	10800	Light rain	8/8	12	F2	SE	9
21/04/2026	KME	18:09	21:09	10800	None	2/8	16	F3	E	11
22/04/2026	KME	05:45	08:45	10800	None	4/8	14	F3	ENE	6

Table 11: I-WeBS Winter 2022-2023 Survey Efforts.

Date	Observer	Surveyor Location (ITM)	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
25/10/2022	KME	638167, 666023	8:00	13:30	19800	Dry	4/8	10	F2	S	13
		638167, 666023									
		638167, 666023									
		639629, 668426									
		639528, 669618									
		644394, 673085									
26/10/2022	KME	638167, 666023	11:30	14:00	9000	Dry	5/8	10	F2	SW	12
		638167, 666023									
		638175, 667375									
		639629, 668426									
		639528, 669618									
		644394, 673085									
08/11/2022	KME	634635, 675175	8:00	10:45	9900	Occasional showers	5/8	12	F2	S	8
		632843, 671351									
		644394, 673085									

Date	Observer	Surveyor Location (ITM)	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
		644394, 673085									
		638164, 666023									
10/11/2022	KME	634635, 675175	10:20	12:20	7200	Occasional showers	5/8	14	F2	S	8
		632843, 671351									
		644394, 673085									
		644394, 673085									
05/01/2023	KME	638159, 666027	11:26	13:56	9000	None	5/8	14	F3	S	11
		639636, 668426									
		644394, 673085									
		632853, 671349									
		635190, 675831									
17/01/2023	HM	640617, 664678	11:00	14:00	10800	Dry	8/8	2	F1	SW	1
		638186, 667376									
		634424, 674906									
		632980, 674047									
		633059, 674160									
17/01/2023	DMC	628338, 670759	13:50	15:45	6900	None	1/8	16	F2	W	2
		638147, 666024									
		641491, 664546									
		643962, 669435									
		644627, 670616									
20/01/2023	HM	638165, 667370	13:42	15:40	7080	Dry	8/8	2	F1	SW	4
		640633, 664911									
		642197, 676267									
		634436, 674904									
		632987, 674041									
		633054, 674156									
15/02/2023	KME	638159, 666027	12:22	16:52	16200	None	3/8	16	F2	SSW	10
		639636, 668426									
		644394, 673085									
		635190, 675831									
		632853, 671349									
		628332, 670773									
27/02/2023	KME	632853, 671349	10:00	11:43	6180	None	7/8	16	F1	E	4
		628332, 670773									

Date	Observer	Surveyor Location (ITM)	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
		635190, 675831									
		644394, 673085									
		639636, 668426									
		638159, 666027									
27/02/2023	BOC	644079, 669728	13:05	15:45	9600	None	5/8	>20	F3	E	8
		644383, 670930									
21/03/2023	KME	632853, 671349	13:33	18:03	16200	Occasional showers	6/8	12	F3	S	11
		628332, 670773									
		638159, 666027									
		639636, 668426									
		635190, 675831									

Table 12: I-WeBS Winter 2025-2026 Survey Efforts.

Date	Observer	Surveyor Location (ITM)	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
07/10/2025	KME	634583.78, 675188.75	09:50	15:20	19800	None	8/8	16	F2	SSW	14
		628206.78, 670902.37									
		638139.53, 666022.01									
		641997.90, 667430.54									
		639688.69, 668362.29									
		632768.23, 671341.62									
		639536.98, 669605.76									
		641122.22, 669039.93									
		642117.32, 667579.40									
		642944.80, 665991.74									
		640902.83, 664830.53									
		640294.02, 664979.06									
		637889.93, 664787.23									
		638980.04, 666780.11									
		637529.55, 669055.82									
		636720.33, 675445.87									
29/10/2025	KME	634564.20, 675206.55	10:18	15:48	19800	None	3/8	16	F2	SSW	7
		634365.24, 674892.58									
		632757.92, 671329.90									

Date	Observer	Surveyor Location (ITM)	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
		632267.69, 671117.23									
		628202.86, 670894.47									
		634626.16, 664905.83									
		638137.60, 666020.58									
		638981.94, 666779.72									
		639688.24, 668355.97									
		641983.91, 667425.73									
		642120.57, 667581.66									
		636730.65, 667963.17									
		635943.09, 674895.63									
06/11/2025	KME	628219.83, 670911.63	10:25	15:55	19800	None	4/8	14	F2	SSE	14
		632275.37, 671116.21									
		632742.10, 671333.94									
		633755.41, 669418.27									
		637023.45, 668248.83									
		638139.74, 666017.62									
		639687.71, 668350.00									
		642002.49, 667433.12									
		642121.71, 667583.31									
		636076.62, 669685.80									
		636353.11, 675199.86									
26/11/2025	KME	632733.18, 671213.47	11:00	15:30	16200	Light rain	8/8	11	F3	SSW	11
		632391.84, 670965.77									
		628190.05, 670898.12									
		638137.86, 666031.57									
		638824.78, 665079.77									
		640297.56, 664968.48									
		640530.76, 664841.01									
		640642.24, 664879.18									
		642036.32, 667455.23									
		642121.43, 667577.11									
		639681.03, 668351.22									
		639536.63, 669606.80									
		636474.44, 675271.32									
02/12/2025	SS	638994.61, 666784.22	08:30	11:30	10800	None	5/8	25	F1	SSW	8

Date	Observer	Surveyor Location (ITM)	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
		638149.92, 666051.12									
		640275.46, 664978.60									
		640652.83, 664774.80									
		642133.55, 667569.52									
		641942.47, 667469.29									
		643780.06, 669325.51									
		641025.73, 671313.99									
		632986.15, 674019.56									
		631801.28, 674071.78									
		630560.48, 670377.38									
17/12/2025	SS	643142.48, 670724.87	10:10	13:30	12000	None	7/8	16	F1	S	11
		641453.09, 671066.01									
		641886.81, 667494.68									
		641437.36, 664518.06									
		640908.59, 664823.14									
		640639.19, 664898.97									
		640329.44, 664993.49									
		638167.72, 666021.20									
		630847.22, 668435.91									
		632703.58, 671194.08									
		633777.08, 669486.35									
		636731.98, 667975.62									
		636982.97, 668279.90									
		637511.48, 669040.55									
		639503.76, 669693.60									
		639683.11, 668329.61									
		631790.28, 674066.24									
		634295.28, 674851.43									
15/01/2026	SS	643837.12, 665900.89	10:30	14:00	12600	None	2/8	23	F1	SSE	4
		640658.09, 664644.87									
		641931.35, 667695.12									
		642150.13, 667569.56									
		640638.91, 664899.46									
		638201.62, 666011.69									
		637011.01, 668235.27									

Date	Observer	Surveyor Location (ITM)	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
		640556.58, 671880.38									
		633742.10, 669463.98									
		630576.88, 670327.42									
		630565.96, 670348.27									
		631525.46, 673545.53									
		632982.22, 673940.54									
29/01/2026	SS	642508.37, 667896.30	11:00	15:00	14400	None	8/8	13	F1	SE	7
		642153.51, 667561.37									
		639698.92, 668376.69									
		636734.87, 667941.21									
		638166.62, 665991.40									
		628217.91, 670850.38									
		630584.63, 670319.03									
		630974.76, 672910.39									
		631795.37, 674049.42									
		634316.56, 674879.91									
		637403.91, 672458.83									
		638155.89, 672268.60									
		640552.87, 671876.59									
		640303.91, 664967.21									
09/02/2026	SS	643823.58, 669382.55	13:30	17:30	14400	Light rain	8/8	15	F1	E	8
		630574.63, 670309.86									
		628182.58, 670893.04									
		638144.07, 666005.19									
		639748.24, 668304.41									
		641923.94, 667699.51									
		642621.04, 670656.62									
		641050.54, 673301.32									
		638168.13, 673316.49									
		631818.43, 674096.41									
		635329.88, 670374.20									
		636726.65, 667988.85									
		640326.83, 664958.63									
26/02/2026	KME	639709.30, 668367.26	11:23	14:53	12600	None	8/8	16	F4	S	9
		638137.95, 666021.36									

Date	Observer	Surveyor Location (ITM)	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
		641941.46, 667497.89									
		628192.01, 670901.96									
		636388.28, 675231.17									
12/03/2026	KME	632694.87, 671331.59	09:40	14:40	18000	Heavy rain	8/8	8	F5	SW	10
		628200.91, 670900.49									
		638139.46, 666027.91									
		641955.79, 667508.05									
		639721.74, 668374.86									
		639534.16, 669613.59									
		641036.65, 671339.63									
		638376.35, 672509.63									
		637418.56, 672440.47									
		636732.66, 667966.96									
		633748.32, 669414.52									
		636244.02, 675134.08									
25/03/2026	SS	641591.98, 664464.29	06:20	12:00	18000	None	4/8	20	F2	WNW	4
		640375.57, 664881.68									
		642128.46, 667517.22									
		642102.46, 667586.26									
		641096.51, 669021.32									
		641037.93, 671282.48									
		632966.32, 673885.55									
		631479.01, 673564.19									
		630580.87, 670305.61									
		628200.75, 670888.51									
		639053.14, 666817.53									
		638138.39, 666010.30									

Table 13: VP Winter 2022-2023 Survey Efforts.

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
14/10/2022	KME	1	08:10	14:40	21600	None	5/8	10	F3	S	13
02/11/2022	KME	1	08:40	11:40	10800	Occasional showers	8/8	8	F3	S	11
14/12/2022	KME	1	10:31	17:01	21600	None	2/8	16	F2	N	-2
16/01/2023	KME	1	07:45	14:15	21600	None	1/8	16	F1	NW	-2
16/02/2023	KME	1	07:05	13:35	21600	None	6/8	>12	F1	W	5
21/02/2023	BOC	1	07:12	07:12	10800	None	6/8	>20	F4	SW	6
30/05/2023	KME	1	08:16	14:46	21600	None	1/8	16	F1	NE	10
12/10/2022	KME	2	10:02	16:42	21600	None	8/8	10	F3	SW	14
03/11/2022	KME	2	08:25	11:25	10800	None	6/8	16	F2	SE	7
15/12/2022	KME	2	07:50	14:20	21600	None	3/8	16	F2	N	-3
17/01/2023	KME	2	08:21	14:51	21600	None	2/8	12	F1	NW	-4
21/02/2023	BOC	2	00:00	00:00	10800	None	7/8	>20	F4	SW	9
07/03/2023	KME	2	09:40	16:10	21600	None	4/8	16	F2	N	2
23/03/2023	KME	2	09:31	16:01	21600	Occasional showers	6/8	12	F4	SSW	12
06/10/2022	EM	3	09:15	15:45	21600	Occasional showers	7/8	10	F3	SW	13
04/11/2022	KME	3	08:22	14:52	21600	None	7/8	13	F2	SW	9
07/12/2022	DMC	3	08:06	14:36	21600	None	1/8	16	F1	N	0
18/01/2023	KME	3	08:18	14:48	21600	None	4/8	16	F3	NW	0
17/02/2023	KME	3	08:00	14:30	21600	None	7/8	>16	F3	W	11
24/03/2023	KME	3	08:17	14:47	21600	Occasional showers	7/8	16	F4	SSW	9
11/04/2023	KME	3	11:24	14:24	10800	Occasional showers	8/8	12	F2	SSE	7
12/04/2023	KME	3	07:56	10:56	10800	Occasional showers	8/8	12	F2	WNW	3
19/10/2022	KME	4	09:26	15:56	21600	None	7/8	8	F3	E	13
17/01/2023	SID	4	12:20	17:00	16200	None	1/8	16	F1	WSW	-1
19/01/2023	KME	4	07:52	14:22	21600	None	2/8	16	F1	WNW	1
23/02/2023	BOC	4	09:36	09:36	10800	None	6/8	>20	F3	SW	6
24/02/2023	BOC	4	02:24	02:24	10800	Occasional showers	7/8	>20	F4	NE	10
26/02/2023	BOC	4	10:48	10:48	10800	None	6/8	>20	F4	E	7

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
02/03/2023	KME	4	10:28	16:58	21600	None	5/8	16	F1	ENE	7
30/03/2023	MGW	4	10:10	13:10	10800	Light	4/8	14	F4	SW	11
30/03/2023	MGW	4	13:40	16:40	10800	Light	1/8	16	F4	SW	13
20/01/2023	SID	5	08:45	15:15	21600	None	7/8	14	F1	SE	-2
13/10/2022	KME	5	07:59	14:39	21600	None	3/8	8	F3	SW	13
05/12/2022	KME	5	10:15	16:45	21600	Occasional showers	6/8	15	F2	NW	6
16/01/2023	HM	5	11:00	14:00	10800	Dry	1/8	2	F1	SW	0
16/01/2023	HM	5	14:30	17:00	9000	Dry	4/8	2	F1	SW	2
17/01/2023	HM	5	14:06	15:06	3600	Dry	8/8	2	F1	SW	2
13/02/2023	KME	5	08:21	14:51	21600	None	5/8	12	F2	SE	7
24/03/2023	MGW	5	09:10	12:10	10800	Light	7/8	16	F4	SW	10
24/03/2023	MGW	5	12:40	15:40	10800	Light	7/8	16	F5	SW	12
20/10/2022	KME	6	08:00	14:30	21600	None	8/8	6	F2	SE	12
06/12/2022	KME	6	07:30	14:00	21600	None	3/8	16	F2	N	5
03/01/2023	KME	6	07:45	14:15	21600	Occasional showers	8/8	>11	F2	SSE	8
18/01/2023	HM	6	11:10	14:10	10800	Dry	4/8	2	F1	SW	1
18/01/2023	HM	6	14:40	16:40	7200	Dry	4/8	2	F1	SW	1
19/01/2023	SID	6	09:30	16:00	21600	None	1/8	16	F1	WNW	-2
19/01/2023	SID	6	16:00	17:00	3600	None	3/8	16	F1	WNW	-2
19/04/2023	KME	6	07:45	14:15	21600	None	1/8	14	F1	ENE	6
18/10/2022	KME	7	08:15	14:45	21600	None	1/8	5	F3	SE	12
07/11/2022	KME	7	10:32	17:02	21600	Drizzle/rain	7/8	11	F3	SW	10
04/01/2023	KME	7	09:14	15:16	21600	None	6/8	>11	F2	WSW	11
18/01/2023	SID	7	09:00	15:30	21600	None	1/8	16	F1	WNW	1
19/01/2023	HM	7	10:55	13:55	10800	Dry	3/8	2	F1	SW	1
19/01/2023	HM	7	14:25	17:25	10800	Dry	3/8	2	F1	SW	4
11/04/2023	KME	7	07:52	10:52	10800	Occasional showers	8/8	12	F2	SE	6
12/04/2023	KME	7	11:26	14:26	10800	Occasional showers	8/8	12	F2	WNW	5

Table 14: VP Breeding 2025 Survey Efforts.

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
07/04/2025	SS	1	07:15	10:15	10800	None	0/8	8	F1	ENE	1
09/04/2025	SS	1	09:25	12:25	10800	None	0/8	15	F1	NNE	17
20/05/2025	SS	1	17:00	20:00	10800	None	8/8	10	F2	S	14
09/06/2025	SS	1	15:30	18:30	10800	Occasional showers	8/8	10	F3	SSW	11
26/06/2025	DP	1	14:30	16:30	7200	None	6/8	20	F4	SW	17
09/07/2025	SS	1	16:30	19:30	10800	None	0/8	20	F2	W	23
09/07/2025	SS	1	20:00	21:00	3600	None	0/8	20	F2	W	22
21/07/2025	AH	1	13:30	15:30	7200	None	7/8	20	F4	NW	17
21/07/2025	AH	1	16:00	17:00	3600	None	7/8	20	F4	NW	17
24/07/2025	AH	1	10:00	12:00	7200	None	3/8	5	F2	NNW	15
24/07/2025	AH	1	12:30	13:30	3600	None	4/8	6	F2	NNW	17
13/08/2025	SS	1	16:20	18:20	7200	None	6/8	20	F2	SSW	25
04/09/2025	KME	1	07:44	09:44	7200	Occasional showers	5/8	16	F1	WSW	9
04/09/2025	KME	1	10:14	12:14	7200	None	4/8	16	F1	WSW	15
10/09/2025	KME	1	09:05	11:05	7200	Light rain	8/8	12	F1	S	13
10/09/2025	KME	1	11:35	13:35	7200	Occasional showers	5/8	16	F3	S	13
11/09/2025	KME	1	10:42	12:42	7200	Occasional showers	6/8	16	F4	WSW	13
25/04/2025	JOC	2	09:45	11:45	7200	Occasional showers	8/8	5	F3	SE	11
25/04/2025	JOC	2	12:15	14:15	7200	Occasional showers	8/8	5	F3	SE	12
07/05/2025	CMCK	2	09:30	11:30	7200	None	6/8	15	F1	NW	11
07/05/2025	CMCK	2	12:00	14:00	7200	None	4/8	15	F1	NW	14
09/06/2025	SS	2	18:45	19:45	3600	Occasional showers	8/8	7	F3	SW	16
10/06/2025	SS	2	19:05	20:05	3600	None	8/8	15	F2	SW	18
07/07/2025	KME	2	11:07	13:07	7200	None	3/8	16	F3	NW	17
08/07/2025	SS	2	10:15	13:15	10800	Drizzle	8/8	3	F2	SW	16
11/07/2025	PB	2	08:50	11:50	10800	None	2/8	20	F1	SSE	19
17/07/2025	AH	2	13:50	14:50	3600	Moderate rain	8/8	3	F3	SSE	17

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
22/07/2025	AH	2	11:00	13:00	7200	None	8/8	20	F3	WNW	16
22/07/2025	AH	2	13:30	15:30	7200	None	8/8	20	F3	WNW	16
05/08/2025	KME	2	07:26	10:26	10800	None	3/8	16	F2	W	14
12/08/2025	SS	2	17:15	20:15	10800	None	0/8	20	F2	SE	28
13/08/2025	SS	2	18:30	19:30	3600	None	5/8	20	F2	SSW	22
11/09/2025	CMCK	2	12:00	14:00	7200	Occasional showers	7/8	5	F4	WSW	13
12/09/2025	KME	2	09:50	11:50	7200	None	4/8	16	F3	SW	12
12/09/2025	KME	2	12:20	14:20	7200	None	6/8	16	F3	SW	14
10/06/2025	KME	3	16:45	19:45	10800	None	6/8	16	F1	SSW	18
26/06/2025	JOC	3	09:45	12:45	10800	None	5/8	10	F3	W	14
26/06/2025	JOC	3	13:15	16:15	10800	None	7/8	10	F3	SW	16
27/06/2025	JOC	3	09:50	12:50	10800	None	7/8	10	F3	S	17
07/07/2025	PB	3	10:00	12:00	7200	None	6/8	20	F2	NNW	15
07/07/2025	PB	3	12:15	14:15	7200	None	5/8	20	F2	NNW	17
08/07/2025	SS	3	14:30	16:30	7200	None	8/8	15	F2	W	19
22/07/2025	SS	3	18:15	20:15	7200	None	8/8	10	F2	WNW	17
23/07/2025	AH	3	12:00	15:00	10800	None	8/8	20	F3	NW	17
23/07/2025	AH	3	15:30	16:30	3600	None	8/8	20	F3	NW	17
26/08/2025	AH	3	15:30	18:30	10800	Occasional showers	5/8	20	F4	SE	18
04/09/2025	CMCK	3	11:00	14:00	10800	Occasional showers	6/8	10	F3	WSW	14
01/10/2025	KME	3	08:29	11:29	10800	None	7/8	14	F2	S	14
01/10/2025	KME	3	11:59	12:59	3600	None	8/8	11	F3	S	16
06/10/2025	SS	3	14:30	16:30	7200	None	6/8	31	F2	SSW	14
15/05/2025	MVA	4	09:36	12:36	10800	None	0/8	5	F1	ENE	16
15/05/2025	MVA	4	13:06	16:06	10800	None	0/8	5	F1	ENE	20
20/06/2025	KME	4	08:50	10:50	7200	None	3/8	16	F2	ESE	20
20/06/2025	KME	4	11:20	14:20	10800	None	3/8	16	F2	ESE	24
20/06/2025	KME	4	14:50	15:50	3600	None	2/8	16	F2	ESE	25
11/07/2025	PB	4	12:20	14:20	7200	None	1/8	20	F1	S	26
14/07/2025	SS	4	14:00	15:30	5400	Occasional showers	5/8	10	F3	SSW	15
15/07/2025	SS	4	09:30	12:00	9000	Moderate rain	8/8	4	F4	SW	13

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
21/07/2025	SS	4	17:05	20:05	10800	Occasional showers	8/8	12	F3	WNW	18
28/07/2025	KME	4	08:04	11:04	10800	Occasional showers	8/8	16	F2	WNW	15
05/08/2025	KME	4	10:56	13:56	10800	None	2/8	16	F2	W	17
21/08/2025	KME	4	08:48	09:48	3600	None	5/8	16	F1	NNE	14
21/08/2025	KME	4	09:48	10:48	3600	None	5/8	16	F1	NNE	14
21/08/2025	KME	4	11:18	13:18	7200	None	7/8	16	F2	NE	17
25/09/2025	KME	4	08:08	10:08	7200	None	6/8	16	F1	SE	9
02/10/2025	KME	4	08:10	11:10	10800	Drizzle	8/8	16	F3	S	14
08/05/2025	CMCK	5	17:30	20:30	10800	None	6/8	15	F1	SE	14
13/06/2025	KME	5	06:30	09:30	10800	None	6/8	12	F2	S	16
23/06/2025	KME	5	07:27	10:27	10800	None	7/8	16	F3	WSW	13
23/06/2025	KME	5	10:57	13:57	10800	None	5/8	16	F3	WSW	15
09/07/2025	PB	5	09:15	12:15	10800	None	7/8	20	F1	W	17
09/07/2025	PB	5	12:45	15:45	10800	None	3/8	20	F1	W	20
22/07/2025	SS	5	15:54	17:54	7200	Occasional showers	8/8	10	F2	W	19
23/07/2025	SS	5	16:00	19:00	10800	Occasional showers	8/8	6	F2	NNW	18
23/07/2025	SS	5	19:30	20:30	3600	Occasional showers	8/8	4	F2	NW	16
27/08/2025	AH	5	09:50	11:50	7200	Occasional showers	7/8	20	F4	WSW	14
27/08/2025	AH	5	12:20	14:20	7200	Occasional showers	7/8	20	F4	WSW	14
12/09/2025	CMCK	5	12:00	14:00	7200	Occasional showers	6/8	10	F3	WSW	13
24/09/2025	CMCK	5	10:15	12:15	7200	None	2/8	15	F1	SE	10
24/09/2025	CMCK	5	12:45	14:45	7200	None	5/8	15	F1	SE	16
25/09/2025	KME	5	10:38	12:38	7200	None	4/8	16	F2	SE	14
20/05/2025	CMCK	6	08:53	11:53	10800	Occasional showers	8/8	5	F2	ESE	9
21/05/2025	CMCK	6	09:00	12:00	10800	Drizzle	8/8	2	F1	NNW	9
01/07/2025	SS	6	10:00	13:00	10800	Occasional showers	8/8	10	F2	N	15

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
01/07/2025	SS	6	13:30	16:30	10800	Occasional showers	8/8	10	F2	N	16
08/07/2025	PB	6	09:00	12:00	10800	None	8/8	10	F1	SW	14
08/07/2025	PB	6	12:30	15:30	10800	Drizzle	8/8	10	F1	WNW	17
15/07/2025	AH	6	10:50	15:30	16800	None	8/8	20	F5	SW	15
15/07/2025	AH	6	11:00	13:00	7200	None	8/8	20	F5	SW	15
15/07/2025	AH	6	13:30	15:30	7200	None	8/8	20	F5	SW	15
26/08/2025	KME	6	08:30	10:30	7200	None	4/8	11	F2	S	16
28/08/2025	AH	6	10:50	13:50	10800	Occasional showers	7/8	15	F4	SE	14
28/08/2025	AH	6	14:20	15:20	10800	Occasional showers	7/8	15	F4	SE	14
29/09/2025	CMCK	6	15:18	17:18	7200	None	7/8	10	F2	SSW	15
30/09/2025	CMCK	6	10:00	12:00	7200	None	7/8	10	F1	S	12
30/09/2025	CMCK	6	12:30	14:30	7200	None	5/8	10	F1	S	17

Table 15: VP Winter 2025-2026 Survey Efforts.

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
16/10/2025	KME	1	08:31	11:31	10800	None	8/8	11	F1	NNE	9
16/10/2025	KME	1	12:01	15:01	10800	None	8/8	16	F2	SSW	14
27/11/2025	KME	1	09:34	12:34	10800	None	3/8	16	F3	SSW	13
27/11/2025	KME	1	13:04	14:04	3600	Occasional showers	7/8	16	F3	SSW	14
27/11/2025	KME	1	14:23	16:23	7200	None	3/8	16	F3	SSW	14
16/12/2025	CMCK	1	10:40	12:40	7200	None	0/8	10	F1	SSW	0
18/12/2025	SS	1	10:30	12:30	7200	Drizzle	8/8	23	F2	S	9
13/01/2026	SS	1	10:50	12:50	7200	None	1/8	37	F1	WNW	5
20/01/2026	CMCK	1	11:35	13:35	7200	Occasional showers	7/8	10	F4	SE	6
20/01/2026	CMCK	1	14:05	16:05	7200	None	6/8	10	F4	SE	8
30/01/2026	CF	1	08:30	10:30	7200	None	7/8	8	F3	SSE	6
26/02/2026	KME	1	09:23	11:23	7200	Light rain	8/8	8	F4	S	9
27/02/2026	KME	1	09:37	11:37	7200	None	3/8	16	F2	NNW	9

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
27/02/2026	KME	1	12:07	14:07	7200	None	7/8	16	F2	NNW	10
09/03/2026	SS	1	13:24	15:24	7200	None	8/8	13	F2	SW	10
13/03/2026	KME	1	08:46	11:46	10800	Occasional showers	6/8	16	F4	WSW	4
13/03/2026	KME	1	12:16	13:16	3600	Occasional showers	8/8	16	F4	SW	6
09/10/2025	KME	2	09:14	12:14	10800	None	8/8	16	F2	W	13
09/10/2025	KME	2	12:44	15:44	10800	None	8/8	16	F2	W	13
12/11/2025	KME	2	09:12	11:12	7200	None	8/8	4	F1	N	6
12/11/2025	KME	2	11:42	13:42	7200	None	7/8	5	F1	ENE	8
18/11/2025	SS	2	10:10	12:10	7200	None	2/8	28	F2	W	7
16/12/2025	CMCK	2	13:15	15:15	7200	None	0/8	10	F1	SSW	6
08/01/2026	SS	2	10:15	12:15	7200	None	8/8	17	F1	N	4
08/01/2026	SS	2	12:45	14:45	7200	None	8/8	16	F1	NE	4
14/01/2026	KME	2	10:03	12:03	7200	Occasional showers	8/8	11	F3	S	6
27/01/2026	CMCK	2	10:55	12:55	7200	Occasional showers	3/8	15	F4	SE	8
27/01/2026	CMCK	2	13:25	15:25	7200	Occasional showers	8/8	5	F4	SE	8
11/02/2026	SS	2	09:00	12:00	10800	Light rain	8/8	19	F1	SSW	8
11/02/2026	SS	2	12:30	15:30	10800	None	8/8	15	F1	SSW	10
05/03/2026	SS	2	10:00	12:00	7200	Moderate rain	8/8	6	F3	WNW	9
19/03/2026	SS	2	11:00	14:00	10800	None	0/8	27	F1	ENE	15
19/03/2026	SS	2	14:30	15:30	3600	None	1/8	28	F1	ESE	16
07/10/2025	SS	3	14:20	16:20	7200	None	8/8	31	F2	SW	14
09/10/2025	SS	3	11:50	13:50	7200	None	8/8	27	F2	SW	15
20/10/2025	SS	3	14:55	16:55	7200	None	6/8	22	F1	NW	13
07/11/2025	KME	3	10:00	13:00	10800	Light rain	8/8	9	F2	SE	12
07/11/2025	KME	3	13:30	14:30	3600	Moderate rain	8/8	8	F3	SE	11
18/11/2025	SS	3	12:40	14:40	7200	None	2/8	28	F2	W	7
04/12/2025	SS	3	11:09	13:09	7200	None	1/8	28	F1	WSW	6
11/12/2025	CMCK	3	11:00	13:00	7200	Drizzle	8/8	2	F3	S	11
11/12/2025	CMCK	3	13:30	15:30	7200	Light rain	8/8	3	F3	S	12

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
17/12/2025	KME	3	13:16	15:16	7200	Occasional showers	8/8	6	F3	S	12
14/01/2026	KME	3	13:19	15:19	7200	Moderate rain	8/8	6	F3	S	6
22/01/2026	CMCK	3	11:28	13:28	7200	None	5/8	10	F1	WSW	5
10/02/2026	SS	3	10:00	13:00	10800	Light rain	8/8	10	F1	SE	8
10/02/2026	SS	3	13:30	16:30	10800	None	8/8	10	F1	SE	8
11/03/2026	SS	3	09:35	12:35	10800	None	6/8	27	F3	W	8
11/03/2026	SS	3	13:05	16:05	10800	None	4/8	21	F3	W	10
04/11/2025	KME	4	09:30	12:30	10800	Occasional showers	8/8	11	F3	S	14
04/11/2025	KME	4	13:00	16:00	10800	Occasional showers	8/8	12	F2	S	14
13/11/2025	KME	4	08:34	11:34	10800	None	4/8	11	F1	S	9
13/11/2025	KME	4	12:04	15:04	10800	None	6/8	16	F1	SSE	13
04/12/2025	SS	4	13:16	15:16	7200	None	1/8	29	F1	WSW	6
02/01/2026	SS	4	11:36	13:36	7200	None	2/8	36	F1	NW	3
02/01/2026	SS	4	14:07	16:07	7200	None	2/8	36	F1	NW	4
29/01/2026	CF	4	09:20	12:20	10800	Light rain	8/8	10	F4	SE	7
29/01/2026	CF	4	12:50	15:50	10800	None	8/8	15	F4	SE	8
13/02/2026	SS	4	12:00	15:00	10800	None	8/8	31	F1	NNE	4
24/02/2026	KME	4	10:25	13:25	10800	None	8/8	16	F2	S	11
10/03/2026	SS	4	09:55	12:55	10800	Occasional showers	8/8	15	F3	S	9
20/03/2026	SS	4	09:30	12:30	10800	None	6/8	26	F1	SSE	11
09/10/2025	SS	5	10:20	12:20	7200	None	8/8	27	F2	WNW	13
20/10/2025	KME	5	13:50	15:50	7200	None	6/8	16	F3	NW	12
31/10/2025	KME	5	07:58	09:58	7200	Moderate rain	8/8	8	F3	S	8
18/11/2025	KME	5	09:10	12:10	10800	None	2/8	16	F2	WSW	5
18/11/2025	KME	5	13:09	16:09	10800	None	8/8	16	F2	ENE	11
17/12/2025	CMCK	5	10:45	12:45	7200	Occasional showers	8/8	5	F4	SSW	9
17/12/2025	CMCK	5	13:15	15:15	7200	Occasional showers	8/8	2	F4	SSW	9
14/01/2026	SS	5	12:07	14:07	7200	Drizzle	8/8	19	F2	S	6

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
27/01/2026	CF	5	10:40	12:40	7200	None	6/8	20	F4	SE	7
30/01/2026	CF	5	11:00	13:00	7200	None	4/8	18	F3	SSE	8
03/02/2026	Ss	5	10:30	12:30	7200	Drizzle	8/8	15	F2	E	6
20/02/2026	SS	5	13:00	16:00	10800	Light rain	8/8	23	F2	W	10
25/02/2026	KME	5	13:01	16:01	10800	None	8/8	16	F2	SSW	13
13/03/2026	SS	5	10:15	13:15	10800	Occasional showers	8/8	22	F3	WSW	5
13/03/2026	SS	5	13:45	16:45	10800	Occasional showers	8/8	14	F3	W	6
10/10/2025	SS	6	10:30	12:30	7200	None	8/8	29	F1	W	10
10/10/2025	SS	6	13:00	15:00	7200	None	8/8	29	F1	WNW	13
17/10/2025	KME	6	08:25	10:25	7200	None	7/8	16	F2	E	10
17/11/2025	SS	6	10:45	13:45	10800	None	0/8	32	F1	NNE	6
17/11/2025	SS	6	14:15	15:15	3600	None	0/8	29	F1	N	8
24/11/2025	KME	6	12:13	14:13	7200	None	3/8	16	F3	NNW	8
01/12/2025	SS	6	10:00	12:00	7200	None	8/8	18	F1	SE	8
01/12/2025	SS	6	12:30	14:30	7200	None	7/8	17	F1	SSE	9
14/01/2026	SS	6	10:00	12:00	7200	None	8/8	19	F2	S	6
28/01/2026	CF	6	09:16	12:16	10800	None	5/8	20	F4	SE	7
28/01/2026	CF	6	12:46	15:46	10800	Drizzle	5/8	20	F4	SE	8
03/02/2026	SS	6	12:45	14:45	7200	Light rain	8/8	15	F2	E	6
25/02/2026	SS	6	12:30	14:30	7200	Occasional showers	8/8	23	F1	SSW	12
25/02/2026	SS	6	15:00	17:00	7200	None	8/8	24	F1	SSW	13
04/03/2026	SS	6	09:45	12:45	10800	None	8/8	15	F3	SSE	10
04/03/2026	SS	6	13:15	16:15	10800	None	8/8	22	F3	SSE	11

Table 16: VP Breeding 2026 Survey Efforts.

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
22/04/2026	KME	1	09:51	12:51	10800	None	4/8	16	F4	E	10
30/04/2026	SS	1	08:45	11:45	10800	Occasional showers	8/8	26	F2	E	11
20/05/2026	KME	1	08:03	10:03	7200	Occasional showers	8/8	9	F3	SW	12
26/05/2026	CF	1	09:12	11:12	7200	None	0/8	20	F1	ENE	22
26/05/2026	CF	1	11:42	13:12	5400	None	0/8	20	F1	ENE	27
26/05/2026	CF	1	13:25	13:55	1800	None	0/8	20	F1	ENE	28
08/06/2026	KME	1	14:57	16:57	7200	Occasional showers	5/8	12	F2	WSW	15
25/06/2026	MVA	1	14:30	16:30	7200	None	5/8	5	F2	SE	30
25/06/2026	MVA	1	17:00	19:00	7200	None	5/8	5	F2	SE	30
29/06/2026	MVA	1	18:00	20:00	7200	Occasional showers	8/8	5	F2	S	15
02/07/2026	KME	1	08:47	11:47	10800	None	5/8	16	F2	WNW	14
02/07/2026	KME	1	12:17	13:17	3600	None	4/8	16	F2	W	16
14/08/2026	SS	1	07:32	09:32	7200	Light rain	8/8	20	F3	NW	17
17/08/2026	SS	1	14:25	16:25	7200	None	7/8	35	F1	W	22
21/08/2026	CMCK	1	05:50	07:50	7200	None	7/8	5	F2	NW	8
21/08/2026	CMCK	1	08:20	10:20	7200	None	7/8	5	F2	NW	10
24/08/2026	CMCK	1	16:36	18:36	7200	None	6/8	10	F3	SE	21
24/08/2026	CMCK	1	19:06	21:06	7200	None	8/8	10	F2	SE	19
22/04/2026	SS	2	09:40	12:40	10800	None	3/8	27	F3	E	9
22/04/2026	SS	2	13:10	16:10	10800	None	8/8	27	F3	ESE	12
13/05/2026	SS	2	17:24	20:24	10800	Occasional showers	4/8	17	F3	NW	11
18/05/2026	SS	2	16:58	19:58	10800	Light rain	8/8	8	F2	SSE	10
03/06/2026	SS	2	10:20	12:20	7200	None	8/8	17	F3	WSW	16
08/06/2026	SS	2	11:30	13:30	7200	Occasional showers	7/8	18	F1	WSW	14
22/06/2026	CMCK	2	13:30	15:30	7200	None	7/8	15	F2	ENE	22
08/07/2026	SS	2	11:40	13:40	7200	None	2/8	24	F2	S	23
23/07/2026	KME	2	12:43	14:43	7200	None	8/8	12	F1	N	23
06/08/2026	MVA	2	18:00	20:00	7200	None	7/8	5	F2	WNW	18
14/08/2026	MVA	2	13:15	15:15	7200	None	5/8	10	F2	NW	21

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
20/08/2026	SS	2	05:45	07:45	7200	Drizzle	8/8	21	F2	NW	12
20/08/2026	SS	2	08:15	10:15	7200	Drizzle	6/8	13	F2	NNW	14
25/08/2026	CMCK	2	16:34	18:34	7200	Light rain	8/8	2	F2	ESE	18
25/08/2026	CMCK	2	19:04	21:04	7200	Moderate rain	8/8	2	F2	ESE	16
26/08/2026	CD	2	05:50	07:50	7200	None	8/8	5	F1	SE	8
23/04/2026	SS	3	09:50	12:50	10800	None	3/8	27	F3	ESE	12
23/04/2026	SS	3	13:20	16:20	10800	None	3/8	27	F3	ESE	16
30/04/2026	KME	3	09:58	12:58	10800	Occasional showers	8/8	14	F2	E	13
19/05/2026	SS	3	18:00	19:45	6300	Occasional showers	8/8	16	F2	SW	12
27/05/2026	KS	3	09:25	10:40	4500	None	0/8	16	F1	NE	20
10/06/2026	SS	3	10:20	13:20	10800	None	5/8	18	F2	W	12
10/06/2026	SS	3	13:50	14:50	3600	None	5/8	18	F2	W	12
16/06/2026	CMCK	3	08:00	10:00	7200	Occasional showers	8/8	10	F1	SW	13
14/07/2026	MVA	3	18:00	20:00	7200	None	1/8	10	F2	E	28
15/07/2026	CMCK	3	13:15	15:15	7200	None	2/8	20	F2	E	26
15/07/2026	CMCK	3	15:45	17:45	7200	None	3/8	20	F2	E	25
10/08/2026	MVA	3	17:06	19:06	7200	None	5/8	5	F1	SE	20
10/08/2026	MVA	3	19:36	21:36	7200	None	2/8	5	F1	SE	18
14/08/2026	MVA	3	10:45	12:45	7200	None	4/8	10	F2	NW	19
14/08/2026	SS	3	05:28	07:28	7200	None	8/8	18	F2	WNW	17
27/08/2026	KME	3	06:02	09:02	10800	None	4/8	12	F1	NE	14
27/08/2026	KME	3	09:32	10:32	3600	Drizzle	8/8	6	F2	ENE	16
27/04/2026	SS	4	13:00	16:00	10800	None	8/8	29	F1	N	15
27/04/2026	SS	4	16:30	19:30	10800	None	8/8	29	F1	N	12
20/05/2026	SS	4	10:40	13:40	10800	Occasional showers	7/8	20	F3	WSW	15
03/06/2026	KME	4	09:45	12:45	10800	Occasional showers	7/8	16	F4	W	16
12/06/2026	SS	4	07:00	10:00	10800	Occasional showers	5/8	20	F3	W	16
24/06/2026	KME	4	12:01	15:01	10800	None	1/8	12	F1	E	23
17/07/2026	MVA	4	12:00	14:00	7200	None	1/8	26	F1	NNW	26

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
17/07/2026	MVA	4	14:30	16:30	7200	None	2/8	27	F1	NNW	27
21/07/2026	CMCK	4	19:00	21:00	7200	None	8/8	20	F2	N	20
10/08/2026	MVA	4	15:45	17:45	7200	None	6/8	36	F1	SE	22
13/08/2026	MVA	4	17:00	19:00	7200	None	7/8	10	F2	SW	27
13/08/2026	MVA	4	19:30	21:30	7200	None	5/8	10	F2	SW	24
19/08/2026	CMCK	4	14:40	16:40	7200	Occasional showers	5/8	10	F3	W	17
26/08/2026	CD	4	13:00	16:00	10800	None	3/8	20	F3	N	20
26/08/2026	CD	4	17:25	16:25	3600	Light rain	7/8	15	F4	NE	17
29/04/2026	SS	5	08:55	11:55	10800	None	1/8	24	F3	NE	8
29/04/2026	SS	5	12:25	15:25	10800	None	0/8	28	F3	NE	15
15/05/2026	SS	5	10:45	13:45	10800	Occasional showers	8/8	21	F2	NNW	9
15/05/2026	SS	5	14:15	15:15	3600	Occasional showers	8/8	21	F2	NNW	9
20/05/2026	SS	5	13:51	15:51	7200	Occasional showers	8/8	19	F2	SW	15
04/06/2026	SS	5	08:30	10:30	7200	None	8/8	18	F3	W	12
04/06/2026	SS	5	11:00	13:00	7200	None	6/8	19	F3	WNW	14
05/06/2026	KME	5	09:14	11:14	7200	None	4/8	16	F2	SSW	12
14/07/2026	CMCK	5	18:45	20:45	7200	None	0/8	15	F3	E	23
22/07/2026	CMCK	5	13:05	15:05	7200	None	3/8	15	F2	NNW	19
22/07/2026	CMCK	5	15:35	17:35	7200	None	3/8	15	F3	NNW	21
10/08/2026	SS	5	17:55	19:55	7200	None	3/8	35	F1	SE	22
17/08/2026	CMCK	5	12:10	14:10	7200	Occasional showers	6/8	10	F3	W	17
17/08/2026	CMCK	5	16:50	18:50	7200	None	8/8	10	F1	SW	21
17/08/2026	CMCK	5	19:21	21:21	7200	Occasional showers	8/8	10	F1	SW	19
19/08/2026	CMCK	5	12:10	14:10	7200	Occasional showers	6/8	10	F3	W	17
26/08/2026	DMC	5	06:00	08:00	7200	None	8/8	3	F2	NE	15
26/08/2026	DMC	5	08:30	10:30	7200	Drizzle	8/8	3	F2	NE	17
29/04/2026	KME	6	08:57	11:57	10800	None	0/8	12	F2	NE	8
29/04/2026	KME	6	12:31	15:31	10800	None	0/8	12	F3	ENE	16
27/05/2026	KME	6	07:22	09:22	7200	None	0/8	14	F1	NE	15

Date	Observer	VP Number	Start Time	End Time	Duration of Survey (sec)	Rain	Cloud	Visibility (km)	Wind Speed	Wind Direction	Temperature
28/05/2026	KME	6	16:37	19:37	10800	None	8/8	16	F3	SSW	17
28/05/2026	KME	6	20:07	21:07	3600	None	6/8	16	F3	SSW	16
09/06/2026	SS	6	10:50	12:20	5400	Occasional showers	8/8	17	F2	W	13
09/06/2026	SS	6	12:50	14:50	7200	None	4/8	17	F2	W	14
17/06/2026	CMCK	6	08:13	10:13	7200	None	6/8	15	F1	SW	15
17/06/2026	CMCK	6	10:43	11:13	1800	None	5/8	15	F1	SW	15
15/07/2026	MVA	6	13:40	15:40	7200	None	4/8	10	F2	ESE	25
15/07/2026	MVA	6	16:10	18:10	7200	None	3/8	10	F2	ESE	27
21/07/2026	DP	6	18:25	20:25	7200	None	6/8	20	F3	N	17
11/08/2026	SS	6	17:05	19:05	7200	None	6/8	33	F1	S	24
11/08/2026	SS	6	19:35	21:35	7200	None	6/8	30	F1	SSE	21
13/08/2026	SS	6	17:00	19:00	7200	None	6/8	37	F1	WSW	27
17/08/2026	SS	6	12:15	14:15	7200	None	7/8	33	F2	W	20
24/08/2026	MVA	6	06:00	08:00	7200	None	0/8	5	F1	E	8
24/08/2026	MVA	6	08:30	10:30	7200	None	1/8	5	F1	E	13
26/08/2026	CD	4	13:00	16:00	10800	None	7/8	15	F1	SE	18
26/08/2026	CD	4	13:00	16:00	10800	None	3/8	20	F3	N	20
26/08/2026	CD	4	17:25	16:25	3600	Light rain	7/8	15	F4	NE	17
26/08/2026	CD	2	05:50	07:50	7200	None	8/8	5	F1	SE	8
24/08/2026	CMCK	1	16:36	18:36	7200	None	6/8	10	F3	SE	21
24/08/2026	CMCK	1	16:36	18:36	7200	None	6/8	10	F3	SE	21
24/08/2026	CMCK	1	19:06	21:06	7200	None	8/8	10	F2	SE	19
24/08/2026	CMCK	1	19:06	21:06	7200	None	8/8	10	F2	SE	19
25/08/2026	CMCK	2	16:34	18:34	7200	Light rain	8/8	2	F2	ESE	18
25/08/2026	CMCK	2	19:04	21:04	7200	Moderate rain	8/8	2	F2	ESE	16
27/08/2026	KME	3	06:02	09:02	10800	None	4/8	12	F1	NE	14
27/08/2026	KME	3	09:32	10:32	3600	Drizzle	8/8	6	F2	ENE	16

A13.6.2 Survey Results

Table 17: Winter Transects Results 2022-2023.

Species	November	December	January	February	March	Total
Blackbird	19	9	53	28	3	**112**
Blackcap	0	0	0	2	0	**2**
Blue Tit	6	5	27	11	2	**51**
Bullfinch	1	0	11	4	0	**16**
Buzzard	1	0	2	5	0	**8**
Chaffinch	11	5	7	29	1	**53**
Coal Tit	4	3	12	5	0	**24**
Collared Dove	2	2	3	0	0	**7**
Dunnock	2	2	2	7	0	**13**
Feral Pigeon	0	5	0	0	0	**5**
Fieldfare	0	0	7	41	0	**48**
Goldcrest	0	0	1	3	0	**4**
Goldfinch	2	0	7	3	0	**12**
Great Tit	3	4	8	20	3	**38**
Greenfinch	0	1	4	0	0	**5**
Hooded Crow	0	2	14	5	0	**21**
House Sparrow	3	2	5	14	5	**29**
Jackdaw	12	18	11	12	2	**55**
Jay	2	0	3	0	0	**5**
Kestrel	0	0	4	0	0	**4**
Lesser Black-backed Gull	0	0	2	0	0	**2**
Linnet	0	0	1	0	0	**1**
Long-tailed Tit	2	0	6	0	0	**8**
Magpie	9	3	8	4	0	**24**
Meadow Pipit	2	1	1	0	0	**4**
Mistle Thrush	0	0	4	5	0	**9**
Peregrine	0	1	0	0	0	**1**
Pied Wagtail	2	3	6	4	1	**16**
Raven	1	0	4	1	0	**6**
Redwing	0	31	101	28	0	**160**
Robin	7	9	20	35	5	**76**
Rook	50	23	96	62	3	**234**
Sedge Warbler	0	0	0	1	0	**1**

Species	November	December	January	February	March	Total
Siskin	0	2	0	3	0	**5**
Skylark	0	0	1	2	0	**3**
Snipe	0	1	1	0	0	**2**
Song Thrush	2	4	19	8	2	**35**
Starling	0	30	65	464	0	**559**
Stonechat	0	0	1	0	0	**1**
Tree Sparrow	2	9	12	2	0	**25**
Woodpigeon	7	4	17	18	1	**47**
Wren	8	9	24	33	4	**78**
Yellowhammer	0	2	1	2		**5**
Total	**164**	**191**	**572**	**863**	**32**	**1822**

Table 18: Breeding Transects Results 2025.

Species	April	May	Total
Blackbird	3	98	**101**
Blackcap	0	16	**16**
Blue Tit	1	20	**21**
Bullfinch	0	3	**3**
Chaffinch	4	72	**76**
Chiffchaff	2	16	**18**
Cuckoo	0	4	**4**
Dunnock	0	17	**17**
Goldcrest	0	3	**3**
Goldfinch	0	8	**8**
Great Tit	0	21	**21**
Greenfinch	3	0	**3**
Hooded Crow	27	52	**79**
House Martin	0	20	**20**
House Sparrow	0	30	**30**
Jackdaw	4	78	**82**
Linnet	1	3	**4**
Long-tailed Tit	0	2	**2**
Magpie	0	15	**15**
Meadow Pipit	1	5	**6**
Mistle Thrush	0	2	**2**

Species	April	May	Total
Pheasant	0	4	**4**
Pied Wagtail	0	5	**5**
Raven	2	9	**11**
Robin	6	46	**52**
Rook	6	105	**111**
Siskin	1	3	**4**
Skylark	10	18	**28**
Song Thrush	0	25	**25**
Starling	0	74	**74**
Stonechat	0	11	**11**
Swallow	1	33	**34**
Whitethroat	0	1	**1**
Willow Warbler	2	23	**25**
Woodpigeon	3	45	**48**
Wren	4	82	**86**
Total	**81**	**969**	**1050**

Table 19: Winter Transects Results 2025-2026.

Species	November	December	January	February	Total
Blackbird	13	23	28	3	**67**
Black-headed Gull	0	0	3	2	**5**
Blue Tit	9	5	5	1	**20**
Bullfinch	5	3	1	1	**10**
Buzzard	1	0	0	1	**2**
Chaffinch	12	2	19	1	**34**
Coal Tit	0	0	2	0	**2**
Dunnock	12	2	0	1	**15**
Fieldfare	0	0	0	30	**30**
Goldcrest	0	1	0	0	**1**
Goldfinch	1	1	0	0	**2**
Great Tit	9	3	3	0	**15**
Hooded Crow	14	9	1	8	**32**
House Sparrow	12	0	0	9	**21**
Jackdaw	12	7	3	0	**22**
Kestrel	0	0	0	1	**1**

Species	November	December	January	February	Total
Lesser Black-backed Gull	30	6	0	14	**50**
Linnet	18	0	0	50	**68**
Magpie	5	8	0	7	**20**
Meadow Pipit	6	3	7	1	**17**
Mistle Thrush	2	1	1	0	**4**
Pheasant	1	0	0	0	**1**
Pied Wagtail	4	3	3	1	**11**
Raven	2	2	4	1	**9**
Redwing	0	0	11	0	**11**
Robin	14	10	10	6	**40**
Rook	18	33	27	136	**214**
Snipe	0	0	2	0	**2**
Song Thrush	4	6	7	0	**17**
Starling	36	46	186	0	**268**
Stonechat	1	0	1	0	**2**
Woodpigeon	18	12	7	8	**45**
Wren	18	10	4	2	**34**
Total	**277**	**196**	**335**	**284**	**1092**

Table 20: Breeding Transect Results 2026.

Species	April	May	June	Total
Blackbird	14	8	34	**56**
Blackcap	3	2	5	**10**
Blue Tit	10	6	0	**16**
Bullfinch	1	0	2	**3**
Buzzard	2	0	1	**3**
Chaffinch	9	10	14	**33**
Chiffchaff	2	1	2	**5**
Cuckoo	1	3	0	**4**
Dunnock	6	7	5	**18**
Goldcrest	1	0	1	**2**
Goldfinch	1	0	0	**1**
Great Tit	5	8	2	**15**
Hooded Crow	4	0	18	**22**
House Martin	0	13	0	**13**

Species	April	May	June	Total
House Sparrow	0	4	0	**4**
Jackdaw	2	10	25	**37**
Lesser Black-backed Gull	0	0	1	**1**
Linnet	0	0	4	**4**
Long-tailed Tit	0	4	8	**12**
Magpie	5	0	2	**7**
Meadow Pipit	1	0	13	**14**
Pied Wagtail	0	2	0	**2**
Raven	2	0	4	**6**
Robin	9	6	5	**20**
Rook	17	15	57	**89**
Skylark	6	1	37	**44**
Song Thrush	8	2	10	**20**
Starling	1	8	2	**11**
Stonechat	1	0	4	**5**
Swallow	2	8	0	**10**
Whitethroat	0	1	0	**1**
Willow Warbler	5	7	8	**20**
Woodpigeon	9	3	11	**23**
Wren	16	7	18	**41**
Total	**143**	**136**	**293**	**572**

Table 21: Breeding Barn Owl Activity and Suitability Results.

Date	Survey Type	Start Time	End Time	Duration of Survey (sec)	Location of Sighting (ITM)	Barn Owl Sighting	Barn Owl Evidence	Site Type	Suitability of the Site for Barn Owls	Notes
08/04/2025	Suitability	08:00	14:30	23400	633215.92, 670091.77	-	-	Derelict Building	High	No evidence found. But the building has good access and layers for nesting.
08/04/2025	Suitability	08:00	14:30	23400	633771.00, 669597.78	-	-	Active Barn	Intermediate	No evidence found.
08/04/2025	Suitability	08:00	14:30	23400	635186.04, 668926.55	-	-	Derelict house	High	No evidence found.
08/04/2025	Suitability	08:00	14:30	23400	635154.78, 668993.28	-	-	Barn	Intermediate	No evidence found. Barn seems actively used. Has potential for nesting Barn Owl

Date	Survey Type	Start Time	End Time	Duration of Survey (sec)	Location of Sighting (ITM)	Barn Owl Sighting	Barn Owl Evidence	Site Type	Suitability of the Site for Barn Owls	Notes
08/04/2025	Suitability	08:00	14:30	23400	637744.57, 669239.75	-	-	Old derelict building	Intermediate	No evidence found
08/04/2025	Suitability	08:00	14:30	23400	636938.55, 669521.98	-	-	Barn and old buildings	Intermediate	No evidence found
08/04/2025	Suitability	08:00	14:30	23400	639698.69, 669187.68	-	-	Barn	Low	No evidence found
08/04/2025	Suitability	08:00	14:30	23400	631912.97, 669448.42	-	-	Farm buildings	Intermediate	Few Farm buildings with nesting potential. No evidence found.
25/06/2025	Activity	21:28	22:58	5400	638578.73, 668929.36	Nil sightings	Nil sightings	Old farm buildings and dwelling house	-	
13/08/2025	Activity	20:30	22:00	5400	633215.27, 670082.00	Nil sightings	Nil sightings	Derelict building	-	
27/08/2025	Activity	19:59	21:54	6900	635164.24, 668988.66	Nil sightings	Nil sightings	Agricultural building	-	
27/08/2025	Activity	19:59	21:54	6900	635185.21, 668930.57	Nil sightings	Nil sightings	Old stone agricultural building	-	
21/04/2026	Suitability	10:20	15:20	18000	639372.19, 669886.53	-	-	Cottage ruins	Intermediate	
21/04/2026	Suitability	10:20	15:20	18000	637759.64, 669249.60	-	-	Ruins	Intermediate	
21/04/2026	Suitability	10:20	15:20	18000	635931.30, 669742.49	-	-	Shed	Low	
21/04/2026	Suitability	10:20	15:20	18000	636282.31, 669930.45	-	-	Shed	Intermediate	
21/04/2026	Suitability	10:20	15:20	18000	632448.73, 672176.90	-	-	Building	Low	
21/04/2026	Suitability	10:20	15:20	18000	631707.40, 669533.30	-	-	Ruins	Low	
21/04/2026	Suitability	10:20	15:20	18000	631926.55, 669446.40	-	-	Ruins	Low	
21/04/2026	Suitability	10:20	15:20	18000	632397.95, 669331.04	-	-	Ruins	Low	
21/04/2026	Suitability	10:20	15:20	18000	634134.18, 668930.46	-	-	Shed	Low	Can't take picture. Located beside house, residents home
21/04/2026	Suitability	10:20	15:20	18000	634738.70, 668751.00	-	-	Shed	Low	

Date	Survey Type	Start Time	End Time	Duration of Survey (sec)	Location of Sighting (ITM)	Barn Owl Sighting	Barn Owl Evidence	Site Type	Suitability of the Site for Barn Owls	Notes
21/04/2026	Suitability	10:20	15:20	18000	635191.40, 668918.35	-	-	Shed	Low	
21/04/2026	Suitability	10:20	15:20	18000	635756.52, 668475.15	-	-	Shed	Low	
29/06/2026	Activity	21:28	22:58	5400	636277.91, 669923.35	Nil sightings	Nil sightings	Derelict house	-	
14/07/2026	Activity	21:17	22:47	5400	637755.29, 669249.49	Nil sightings	Nil sightings	Old building	-	
26/08/2026	Activity	20:00	21:30	5400	639166.65, 669797.95	Nil sightings	Nil sightings	Derelict building	Intermediate	

Table 22: Breeding Kestrel Survey Results.

Date	Survey Types	Start Time	End Time	Duration of Survey (sec)	Location of Sighting (ITM)	Species	Evidence	Site Type	Suitability	Notes
08/04/2025	Suitability	08:00	14:30	23400	639882.48, 670812.65	-	-	Old corvid nest	Intermediate	No evidence found. Has nesting potential as there is no corvid disturbance in the area.
21/05/2025	Activity	11:30	17:55	21600	635187.34, 668925.76	Nil sightings	Nil sightings	Old derelict building	-	Jackdaws nesting in the structure
21/05/2025	Activity	11:30	17:55	21600	635152.33, 668992.57	Nil sightings	Nil sightings	Active Barn	-	Large number of corvids present in the area
21/05/2025	Activity	11:30	17:55	21600	636942.03, 669521.16	Nil sightings	Nil sightings	Old farm buildings	-	
21/05/2025	Activity	11:30	17:55	21600	637745.20, 669237.24	Nil sightings	Nil sightings	Derelict building	-	
21/05/2025	Activity	11:30	17:55	21600	633215.50, 670091.75	Nil sightings	Nil sightings	Derelict building	-	
25/06/2025	Activity	12:50	14:50	7200	635185.93, 668923.73	Nil sightings	Nil sightings	Derelict stone building	-	

Date	Survey Types	Start Time	End Time	Duration of Survey (sec)	Location of Sighting (ITM)	Species	Evidence	Site Type	Suitability	Notes
10/07/2025	Activity	09:15	11:15	7200	635077.90, 668925.13	Peregrine	Species present	Derelict house and barn	-	Flyover @ 10:30
10/07/2025	Activity	11:30	13:00	5400	633187.77, 670003.38	Nil sightings	Nil sightings	Derelict building	-	
10/07/2025	Activity	13:15	15:15	7200	632773.83, 671100.26	Nil sightings	Nil sightings	Derelict building	-	
21/04/2026	Suitability	10:20	15:20	18000	639372.24, 669896.35	-	-	Cottage ruins	Intermediate	
21/04/2026	Suitability	10:20	15:20	18000	639893.50, 670913.52	-	-	Tree	Low	Large solitary nest, seemingly vacant
21/04/2026	Suitability	10:20	15:20	18000	637751.39, 669240.13	-	-	Ruins	Intermediate	
21/04/2026	Suitability	10:20	15:20	18000	638348.34, 666636.73	-	-	Tree	Low	
21/04/2026	Suitability	10:20	15:20	18000	635446.49, 671369.43	-	-	Tree	Low	Large cavities in tree
21/04/2026	Suitability	10:20	15:20	18000	631785.07, 671067.59	-	-	Tree	Low	
21/04/2026	Suitability	10:20	15:20	18000	633228.01, 670091.96	-	-	Ruins	Low	Kestrel frequently spotted nearby
21/04/2026	Suitability	10:20	15:20	18000	635184.51, 668934.45	-	-	Shed	Low	
11/05/2026	Activity	14:20	16:20	7200	636415.98, 670108.53	Nil sightings	Nil sightings	Ruins	-	Visibility of BL6 also
17/06/2026	Activity	10:20	12:20	7200	637748.11, 669225.60	Nil sightings	Nil sightings	Cottage ruins	-	
17/06/2026	Activity	12:22	14:22	7200	639403.68, 669901.75	Nil sightings	Nil sightings	cottage ruins	-	
25/06/2025	Activity	12:50	14:50	7200	635185.93, 668923.73	Kestrel	Nil Sightings	Derelict Stone Building		Nil Sightings
28/07/2026	Activity	12:25	13:55	5400	635943.12, 669727.75	Nil sightings	Nil sightings	Shed	-	
28/07/2026	Activity	14:00	15:30	5400	635444.90, 671365.82	Nil sightings	Nil sightings	Tree	-	
28/07/2026	Activity	15:39	17:09	5400	630697.80, 669817.83	Nil sightings	Nil sightings	Round tower	-	

Table 23: Peregrine Survey Results.

Date	Survey Types	Start Time	End Time	Duration of Survey (sec)	Location of Sighting (ITM)	Species	Evidence	Site Type	Suitability	Notes
08/04/2025	Suitability	08:00	14:30	23400	635610.62, 668633.18	-	-	Church	Low	No evidence and very low suitability for nesting as there is no access or surface present for nesting.
08/04/2025	Suitability	08:00	14:30	23400	635530.88, 674038.68	-	-	Castle	High	No evidence found. High nesting potential for Peregrine and Kestrel.
08/04/2025	Suitability	08:00	14:30	23400	639063.59, 672688.25	-	-	Active quarry	High	No evidence seen.
08/04/2025	Suitability	08:00	14:30	23400	632511.23, 670900.16	-	-	Old derelict castle building	High	No evidence found. Suitable for both Peregrine and Kestrel.
08/04/2025	Suitability	08:00	14:30	23400	640253.47, 667607.01	-	-	Church	Low	No evidence found.
08/04/2025	Suitability	08:00	14:30	23400	*Redacted*	Peregrine	Species Present	*Redacted*	High	Two Peregrine seen perched on structure. Potential breeding pair.
08/04/2025	Suitability	08:00	14:30	23400	641071.94, 670996.69	-	-	Church	Low	No evidence found. No suitable nesting spots for Peregrine or Kestrel.
07/05/2025	Activity	09:40	11:40	7200	*Redacted*	Peregrine	Species present	*Redacted*	-	Female perched on castle ruins, preening herself. Arrived 09:50. Male arrived at 10:25, female went to a lower ledge on the castle at potential nest. Male left at 10:35. Female was still at nest when I left at 11:40.
07/05/2025	Activity	11:50	13:50	7200	632509.66, 670898.89	Nil sightings	Nil sightings	Ruins	-	Nil sightings. Strong corvid presence.
07/05/2025	Activity	14:05	16:05	7200	635530.83, 674035.69	Nil sightings	Nil sightings	Ruins	-	Nil sightings, strong corvid presence.
21/05/2025	Activity	11:30	17:55	23100	*Redacted*	Peregrine	Species present	*Redacted*	-	Female Peregrine seen perched on structure. No nest found or signs of nesting as

Date	Survey Types	Start Time	End Time	Duration of Survey (sec)	Location of Sighting (ITM)	Species	Evidence	Site Type	Suitability	Notes
										structure is full of Jackdaw nests.
21/05/2025	Activity	11:30	17:55	23100	632512.60, 670904.74	Nil sightings	Nil sightings	Old derelict building	-	Nil sighting. Site seems to be fully occupied by corvids.
21/05/2025	Activity	11:30	17:55	23100	635531.66, 674036.85	Nil sightings	Nil sightings	Old castle building	-	Nil sighting for raptors. Jackdaws nesting on the structure.
21/05/2025	Activity	11:30	17:55	23100	*Redacted*	Peregrine	Nest found	*Redacted*	-	Both male and female seen. Female was slightly hidden behind the rocks and grass growing around the rocks and was heard calling repeatedly. Male was spotted few meters away from nest
21/05/2025	Activity	11:30	17:55	23100	635611.55, 668631.29	Nil sightings	Nil sightings	Church	-	Nil sightings
25/06/2025	Activity	09:30	11:00	5400	*Redacted*	Peregrine	Species present	*Redacted*	-	Three juvenile Peregrine present at top of castle. 09:50 Two adults arrived to drop off food. All Peregrine flew from castle at 10:05. 10:25 Female Peregrine brought back crow to the vicinity of the castle.
25/06/2025	Activity	11:10	12:40	5400	*Redacted*	Peregrine	Species present	*Redacted*	-	One Juvenile present on ledge. 11:17 Female Peregrine brought food to juvenile
21/04/2026	Suitability	10:20	15:20	18000	640255.19, 667610.83	-	-	Church	Low	
21/04/2026	Suitability	10:20	15:20	18000	639379.88, 669892.71	-	-	Cottage ruins	Intermediate	
21/04/2026	Suitability	10:20	15:20	18000	637744.98, 669231.82	-	-	Ruins	Intermediate	
21/04/2026	Suitability	10:20	15:20	18000	*Redacted*	-	-	*Redacted*	High	Species previously present, disregarded rings present
21/04/2026	Suitability	10:20	15:20	18000	637716.19, 667160.20	-	-	Shed	Low	
21/04/2026	Suitability	10:20	15:20	18000	635940.97, 669728.43	-	-	Shed	Intermediate	Galvanise roof, but peregrine spotted close by

Date	Survey Types	Start Time	End Time	Duration of Survey (sec)	Location of Sighting (ITM)	Species	Evidence	Site Type	Suitability	Notes
21/04/2026	Suitability	10:20	15:20	18000	636289.78, 669937.96	-	-	Shed	High	Peregrine spotted close by
21/04/2026	Suitability	10:20	15:20	18000	635559.94, 674010.52	-	-	Building	Intermediate	
21/04/2026	Suitability	10:20	15:20	18000	632535.51, 670887.41	-	-	Building	Intermediate	
21/04/2026	Suitability	10:20	15:20	18000	630700.24, 669817.17	-	-	Round tower	Intermediate	
21/04/2026	Suitability	10:20	15:20	18000	635187.26, 668927.08	-	-	Shed	Low	
21/04/2026	Suitability	10:20	15:20	18000	635621.49, 668631.46	-	-	Shed	Low	
11/05/2026	Activity	12:50	14:15	5100	*Redacted*	Peregrine	Species present	*Redacted*	-	Sitting on nest
17/06/2026	Activity	09:11	09:35	1440	*Redacted*	Peregrine	Species present	*Redacted*	-	
17/06/2026	Activity	09:45	10:17	1920	*Redacted*	Peregrine	Species present	*Redacted*	-	Parents and chick spotted*
17/06/2026	Activity	10:20	12:20	7200	637756.65, 669230.43	Nil sightings	Nil sightings	Cottage ruins	-	
17/06/2026	Activity	12:22	14:22	7200	639403.25, 669917.88	Nil sightings	Nil sightings	Cottage ruins	-	

Table 24: Hen Harrier Roost Survey Results.

Date	Start Time	End Time	Duration of Survey (sec)	Sunrise/Sunset Time	Location (ITM)	Bird Number.	Sex	Settling/ Rising	Direction of Arrival/ Departure	Other Species/ Interactions	Species List	Notes
26/10/2022	08:00	11:00	10800	08:10	635363.70, 669908.80	Nil sightings	-	-	-	-	-	-
10/11/2022	13:45	16:45	10800	16:41	635363.70, 669908.80	Nil sightings	-	-	-	-	-	-
17/01/2023	15:50	17.:20	5400	16:20	633140.00, 671051.00	Nil sightings	-	-	-	-	-	-
05/01/2022	07:56	10:56	10800	08:53	635363.70, 669908.80	Nil sightings	-	-	-	-	-	-
15/02/2023	17:10	18:40	5400	17:40	635363.70, 669908.80	Nil sightings	-	-	-	-	-	-

21/03/2023	18:13	19:43	5400	18:43	635363.70, 669908.80	Nil sightings	-	-	-	-	-	-
06/10/2025	18:24	19:54	5400	18:54	635363.70, 669908.80	Nil sightings						
26/11/2025	15:40	17:10	5400	16:22	635363.70, 669908.80	Nil sightings						
17/12/2025	15:44	17:14	5400	16:14	633140.00, 671051.00	Nil sightings						
26/01/2026	16:33	18:03	5400	17:03	635363.70, 669908.80	Nil sightings						
25/02/2026	17:29	19:01	5400	18:01	635363.70, 669908.80	Nil sightings						
09/03/2026	17:52	19:22	5400	18:22	635363.70, 669908.80	Nil sightings						

Table 25: Breeding Woodcock Survey Results.

Date	Start Time	End Time	Duration of Survey (sec)	Sunset Time	Location (ITM)	Time of Sighting	Species	Evidence	Notes
06/05/2025	20:36	22:06	5400	21:06	639242.40, 668618.01	20:36	Nil sightings	-	-
20/05/2025	20:15	21:30	4500	20:30	639242.40, 668618.01	20:15	Nil sightings	-	-
23/06/2025	21:28	22:58	5400	21:58	639242.40, 668618.01	21:28	Nil sightings	-	-
14/05/2026	21:04	22:19	4500	21:19	639058.00, 668392.00	21:04	Nil sightings	-	-
28/05/2026	21:25	22:40	4500	21:40	639058.00, 668392.00	21:26	Nil sightings	-	-

Table 26: Kingfisher Survey Results.

Date	Start Time	End Time	Duration of Survey (sec)	Location (ITM)	Watercourse Name	Signs or Sightings	Nesting Potential	Notes
23/04/2025	14:40	17:40	10800	635321.90, 670344.22	Gorteenahilla	Nil sightings	Low	No evidence of Kingfisher or Otter on either side of WC crossing
23/04/2025	14:40	17:40	10800	636077.20, 669682.88	Gorteenahilla	Nil sightings	Low	No evidence of Kingfisher or Otter on either side of WC crossing
23/04/2025	14:40	17:40	10800	637153.30, 670063.72	Gorteenahilla	Nil sightings	Low	No evidence of Kingfisher or Otter
23/04/2025	14:40	17:40	10800	641032.76, 671336.39	Lisdowney	Nil sightings	Intermediate	No evidence of Kingfisher or Otter on either side of WC crossing

Date	Start Time	End Time	Duration of Survey (sec)	Location (ITM)	Watercourse Name	Signs or Sightings	Nesting Potential	Notes
23/04/2025	14:40	17:40	10800	642150.20, 671862.41	Nore	Nil sightings	Negligible	No evidence of Kingfisher or Otter on either side of WC crossing
23/04/2025	14:40	17:40	10800	644503.66, 672760.49	Nore	Nil sightings	Negligible	No evidence of Kingfisher or Otter on either side of WC crossing
23/04/2025	14:40	17:40	10800	644390.82, 673065.99	Nore	Nil sightings	High	No evidence of Kingfisher or Otter on either side of WC crossing
28/04/2026	09:00	14:30	19800	641443.36, 670994.58	Lisdowney	Nil sightings	High	Exposed steep clay bank, free from vegetation. No burrows present
01/05/2025	13:50	16:50	10800	644435.95, 672941.13	Nore	Suitable Nesting	High	Potential nesting hole
01/05/2025	13:50	16:50	10800	644439.08, 672928.74	Nore	Kingfisher	High	KF seen flying by 3 times throughout watch - 2 different birds
09/05/2025	11:25	14:25	10800	644336.72, 673215.42	Nore	Nil sightings	High	Tree branch in the middle of the river, with traces of whitewash. Nil sightings.
28/04/2026	09:00	14:30	10800	639513.31, 669608.26	Lismaine	Nil sightings	Low	Heavily vegetated, limited areas of bare soil bank
28/04/2026	09:00	14:30	10800	639448.89, 669607.06	Lismaine	Nil sightings	Negligible	Heavily vegetated, limited areas of bare soil bank
28/04/2026	09:00	14:30	10800	639304.41, 669609.97	Lismaine	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	639166.35, 669633.16	Lismaine	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	639055.64, 669673.49	Lismaine	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	641443.36, 670994.58	Lisdowney	Suitable nesting	High	Exposed steep clay bank, free from vegetation. No burrows present
28/04/2026	09:00	14:30	10800	641516.41, 670920.02	Lisdowney	Suitable nesting	High	Exposed steep clay bank, free from vegetation. No burrows present
28/04/2026	09:00	14:30	10800	641539.94, 670907.98	Lisdowney	Suitable nesting	High	Exposed steep clay bank, free from vegetation. No burrows present
28/04/2026	09:00	14:30	10800	641545.47, 670879.43	Lisdowney	Suitable nesting	High	Exposed steep clay bank, free from vegetation. No burrows present
28/04/2026	09:00	14:30	10800	641565.45, 670844.4	Lisdowney	Suitable nesting	High	Exposed steep clay bank, free from vegetation. No burrows present
28/04/2026	09:00	14:30	10800	641623.67, 670759.69	Lisdowney	Suitable nesting	High	Exposed steep clay bank, free from vegetation. No burrows present

Date	Start Time	End Time	Duration of Survey (sec)	Location (ITM)	Watercourse Name	Signs or Sightings	Nesting Potential	Notes
28/04/2026	09:00	14:30	10800	641654.82, 670630.82	Lisdowney	Suitable nesting	High	Exposed steep clay bank, free from vegetation. No burrows present
28/04/2026	09:00	14:30	10800	641687.08, 670591.44	Lisdowney	Suitable nesting	High	Exposed steep clay bank, free from vegetation. No burrows present
28/04/2026	09:00	14:30	10800	641705.32, 670529.34	Lisdowney	Suitable nesting	High	Exposed steep clay bank, free from vegetation. No burrows present
28/04/2026	09:00	14:30	10800	641383.6, 671043.21	Lisdowney	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	641340.77, 671092.17	Lisdowney	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	641266.99, 671163.41	Lisdowney	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	641185.56, 671254.94	Lisdowney	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	641092.83, 671309.27	Lisdowney	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	642630.09, 670640.42	Ballyconra	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	642635.94, 670529.06	Ballyconra	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	642631.39, 670415.35	Ballyconra	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	642665.66, 670322.19	Ballyconra	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	642590.29, 670702.63	Ballyconra	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	642532.46, 670762.81	Ballyconra	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	642479.02, 670848.1	Ballyconra	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	642421.27, 670933.3	Ballyconra	Nil sightings	Negligible	Heavily vegetated, no areas of exposed soil bank
28/04/2026	09:00	14:30	10800	643956.81, 671679.14	Nore	Nil sightings	Negligible	High suitability area for foraging KF. However, no areas of exposed soil bank for nesting,
28/04/2026	09:00	14:30	10800	643934.33, 671818.86	Nore	Nil sightings	Negligible	High suitability area for foraging KF. However, no areas of exposed soil bank for nesting,

Date	Start Time	End Time	Duration of Survey (sec)	Location (ITM)	Watercourse Name	Signs or Sightings	Nesting Potential	Notes
28/04/2026	09:00	14:30	10800	643930.27, 671972.42	Nore	Nil sightings	Negligible	High suitability area for foraging KF. However, no areas of exposed soil bank for nesting,
28/04/2026	09:00	14:30	10800	643926.07, 672114.55	Nore	Nil sightings	Negligible	High suitability area for foraging KF. However, no areas of exposed soil bank for nesting,
28/04/2026	09:00	14:30	10800	644015.49, 671575.87	Nore	Nil sightings	Negligible	High suitability area for foraging KF. However, no areas of exposed soil bank for nesting,
28/04/2026	09:00	14:30	10800	644080.9, 671431.33	Nore	Nil sightings	Negligible	High suitability area for foraging KF. However, no areas of exposed soil bank for nesting,
28/04/2026	09:00	14:30	10800	644167.01, 671315.11	Nore	Nil sightings	Negligible	High suitability area for foraging KF. However, no areas of exposed soil bank for nesting,
21/05/2026	10:30	14:30	10800	637015.13, 668251.34	Gorteenahilla	Nil sightings	Negligible	Highly vegetated, no clay bank
21/05/2026	10:30	14:30	10800	637546.82, 669090.03	Ballyring Upper	Nil sightings	Negligible	Highly vegetated, no clay bank
21/05/2026	10:30	14:30	10800	637517.24, 669196.46	Ballyring Upper	Nil sightings	Negligible	Highly vegetated, no clay bank
21/05/2026	10:30	14:30	10800	637465.93, 669302.11	Ballyring Upper	Nil sightings	Negligible	Highly vegetated, no clay bank
21/05/2026	10:30	14:30	10800	637421.4, 669398.14	Ballyring Upper	Nil sightings	Negligible	Highly vegetated, no clay bank
21/05/2026	10:30	14:30	10800	637362.66, 669478.63	Ballyring Upper	Nil sightings	Negligible	Highly vegetated, no clay bank
21/05/2026	10:30	14:30	10800	637325.03, 669542.81	Ballyring Upper	Nil sightings	Negligible	Highly vegetated, no clay bank
21/05/2026	10:30	14:30	10800	637300.35, 669651.38	Ballyring Upper	Nil sightings	Negligible	Highly vegetated, no clay bank
21/05/2026	10:30	14:30	10800	639187.83, 669629.48	Lismaine	Nil sightings	Negligible	Highly vegetated, no clay bank
21/05/2026	10:30	14:30	10800	639124.03, 669634.72	Lismaine	Nil sightings	Negligible	Highly vegetated, no clay bank
21/05/2026	10:30	14:30	10800	639074.58, 669660.81	Lismaine	Nil sightings	Negligible	Highly vegetated, no clay bank
21/05/2026	10:30	14:30	10800	639255.69, 669618.61	Lismaine	Nil sightings	Negligible	
21/05/2026	10:30	14:30	10800	639333.39, 669608.63	Lismaine	Nil sightings	Negligible	

Date	Start Time	End Time	Duration of Survey (sec)	Location (ITM)	Watercourse Name	Signs or Sightings	Nesting Potential	Notes
21/05/2026	10:30	14:30	10800	639423.44, 669605.24	Lismaine	Nil sightings	Negligible	
21/05/2026	10:30	14:30	10800	639596.71, 669602.52	Lismaine	Nil sightings	Negligible	Vegetated
21/05/2026	10:30	14:30	10800	639650.47, 669550.37	Lismaine	Nil sightings	Negligible	Vegetated
21/05/2026	10:30	14:30	10800	639702.52, 669479.22	Lismaine	Nil sightings	Low	Exposed bank
21/05/2026	10:30	14:30	10800	639774.27, 669396.74	Lismaine	Nil sightings	Low	Exposed bank
21/05/2026	10:30	14:30	10800	639864.59, 669331.79	Lismaine	Nil sightings	Low	Exposed bank
21/05/2026	10:30	14:30	10800	639941.91, 669294.74	Lismaine	Suitable nesting	Intermediate	Tunnels present
21/05/2026	10:30	14:30	10800	640078.33, 669312.1	Lismaine	Suitable nesting	Intermediate	Tunnels present
21/05/2026	10:30	14:30	10800	640207.3, 669328.22	Lismaine	Suitable nesting	Intermediate	Tunnels present
21/05/2026	10:30	14:30	10800	640348.83, 669326.56	Lismaine	Suitable nesting	Intermediate	Tunnels present
21/05/2026	10:30	14:30	10800	640439.16, 669271.42	Lismaine	Suitable nesting	Intermediate	Tunnels present
21/05/2026	10:30	14:30	10800	641356.81, 671078.47	Lisdowney	Other (specify in notes)	Negligible	Highly vegetated
21/05/2026	10:30	14:30	10800	641284.44, 671137.55	Lisdowney	Other (specify in notes)	Negligible	Highly vegetated
21/05/2026	10:30	14:30	10800	641237.93, 671199.58	Lisdowney	Nil sightings	Negligible	High vegetated
21/05/2026	10:30	14:30	10800	641100.7, 671303.01	Lisdowney	Nil sightings	Negligible	Highly vegetated
21/05/2026	10:30	14:30	10800	641503.4, 670920.76	Lisdowney	Nil sightings	Negligible	Highly vegetated
21/05/2026	10:30	14:30	10800	641603.14, 670794.59	Lisdowney	Nil sightings	Low	Clay bank
21/05/2026	10:30	14:30	10800	641654.45, 670670.62	Lisdowney	Nil sightings	Low	Clay bank

Date	Start Time	End Time	Duration of Survey (sec)	Location (ITM)	Watercourse Name	Signs or Sightings	Nesting Potential	Notes
21/05/2026	10:30	14:30	10800	641711.47, 670535.65	Lisdowney	Nil sightings	Intermediate	Clay bank, suitable habitat
21/05/2026	10:30	14:30	10800	641801.52, 670410.14	Lisdowney	Nil sightings	Intermediate	Clay bank, suitable habitat
21/05/2026	10:30	14:30	10800	641894.8, 670313.91	Lisdowney	Nil sightings	Intermediate	Clay bank, suitable habitat
21/05/2026	10:30	14:30	10800	641951.98, 670216.45	Lisdowney	Nil sightings	Intermediate	Clay bank, suitable habitat
21/05/2026	10:30	14:30	10800	642040.52, 670161.68	Lisdowney	Nil sightings	Intermediate	Clay bank, suitable habitat
21/05/2026	10:30	14:30	10800	642099.08, 670103.54	Lisdowney	Nil sightings	Negligible	Heavily vegetated
21/05/2026	10:30	14:30	10800	642123.55, 670023.84	Lisdowney	Nil sightings	Negligible	Heavily vegetated
21/05/2026	10:30	14:30	10800	643920.85, 672036.43	Nore	Nil sightings	Negligible	Heavily vegetated
21/05/2026	10:30	14:30	10800	643926.27, 671971.86	Nore	Nil sightings	Negligible	Heavily vegetated
21/05/2026	10:30	14:30	10800	643932.84, 671895.11	Nore	Nil sightings	Negligible	Heavily vegetated
21/05/2026	10:30	14:30	10800	643936.61, 671812.55	Nore	Nil sightings	Negligible	Heavily vegetated
21/05/2026	10:30	14:30	10800	643939.61, 671731.35	Nore	Nil sightings	Negligible	Heavily vegetated
21/05/2026	10:30	14:30	10800	643969.86, 671643.19	Nore	Nil sightings	Negligible	Heavily vegetated
21/05/2026	10:30	14:30	10800	644003.21, 671571.85	Nore	Nil sightings	Negligible	Heavily vegetated
21/05/2026	10:30	14:30	10800	644035.98, 671516.56	Nore	Nil sightings	Negligible	Heavily vegetated
21/05/2026	10:30	14:30	10800	644070.75, 671446.37	Nore	Nil sightings	Negligible	Heavily vegetated
21/05/2026	10:30	14:30	10800	644103.03, 671381.7	Nore	Nil sightings	Negligible	Heavily vegetated
23/09/2026	09:30	11:30	7200	641910.48, 670274.26	Lisdowney	Nil sightings	Negligible	Heavily vegetated

Date	Start Time	End Time	Duration of Survey (sec)	Location (ITM)	Watercourse Name	Signs or Sightings	Nesting Potential	Notes
23/09/2026	09:30	11:30	7200	641919.20, 670248.27	Lisdowney	Nil sightings	Low	Uprooted tree with earth exposed
23/09/2026	09:30	11:30	7200	641939.09, 670232.37	Lisdowney	Nil sightings	Negligible	Heavily vegetated
23/09/2026	09:30	11:30	7200	641960.06, 670210.25	Lisdowney	Nil sightings	Negligible	Heavily vegetated
23/09/2026	09:30	11:30	7200	641980.27, 670194.11	Lisdowney	Nil sightings	Negligible	Heavily vegetated
23/09/2026	09:30	11:30	7200	642016.16, 670176.10	Lisdowney	Nil sightings	Negligible	Heavily vegetated
23/09/2026	09:30	11:30	7200	642043.23, 670163.20	Lisdowney	Nil sightings	Negligible	Heavily vegetated
23/09/2026	09:30	11:30	7200	642051.41, 670145.24	Lisdowney	Nil sightings	Negligible	Heavily vegetated
23/09/2026	09:30	11:30	7200	642065.01, 670130.44	Lisdowney	Nil sightings	Intermediate	Clay bank, suitable habitat
23/09/2026	09:30	11:30	7200	642088.45, 670123.27	Lisdowney	Nil sightings	Intermediate	Clay bank, suitable habitat
23/09/2026	09:30	11:30	7200	642102.03, 670103.45	Lisdowney	Nil sightings	Negligible	Heavily vegetated
23/09/2026	09:30	11:30	7200	642110.44, 670077.37	Lisdowney	Nil sightings	Negligible	Heavily vegetated
23/09/2026	09:30	11:30	7200	642625.11, 669934.25	Ballyconra	Nil sightings	Negligible	Drainage ditch; habitat and watercourse not suitable

Table 27: Nore Waterbird VP Surveys.

Species	February	March	April	Total
Black-headed Gull	0	328	0	**328**
Buzzard	4	1	1	**6**
Cormorant	1	1	5	**7**
Grey Heron	0	0	1	**1**
Lesser Black-backed Gull	336	0	1	**337**
Little Egret	0	0	1	**1**
Mute Swan	0	2	1	**3**
Sparrowhawk	0	0	1	**1**
Total	341	332	18	**691**

Table 28: I-WeBS Results and Peak Counts Per Effort 2022-2023.

Species	October			November			December	January				February			March		Overall Peak
	Effort 1	Effort 2	Peak	Effort 1	Effort 2	Peak	No efforts undertaken	Effort 1	Effort 2	Effort 3	Peak	Effort 1	Effort 2	Peak	Effort 1	Peak	
Black-headed Gull	0	0	0	0	0	0	-	0	9	0	9	0	0	0	0	0	**9**
Coot	0	0	0	1	0	1	-	3	0	0	3	3	1	3	1	1	**3**
Curlew	0	0	0	0	0	0	-	0	7	0	7	14	22	22	7	7	**22**
Dunlin	0	0	0	0	0	0	-	0	50	0	50	0	0	0	0	0	**50**
Grey Heron	1	2	2	3	1	3	-	2	0	1	2	0	2	2	0	0	**3**
Lapwing	0	0	0	6	0	6	-	15	29	0	29	50	64	64	50	50	**64**
Lesser Black-backed Gull	0	0	0	45	50	50	-	210	0	0	210	0	0	0	10	10	**210**
Little Egret	0	0	0	2	0	2	-	0	0	0	0	0	2	2	0	0	**2**
Mallard	2	1	2	2	0	2	-	6	0	0	6	0	14	14	16	16	**16**
Moorhen	1	0	1	0	0	0	-	0	0	0	0	0	0	0	0	0	**1**
Mute Swan	0	0	0	5	12	12	-	6	0	0	6	2	7	7	0	0	**12**
Snipe	0	0	0	0	0	0	-	1	0	0	1	0	10	10	0	0	**10**
Starling	0	0	0	0	0	0	-	0	40	0	40	0	0	0	0	0	**40**
Teal	0	0	0	5	6	6	-	20	60	0	60	25	10	25	30	30	**60**
Whooper Swan	0	0	0	0	0	0	-	11	17	0	17	28	14	28	18	18	**28**
Wigeon	0	0	0	25	0	25	-	48	70	0	70	100	60	100	80	80	**100**

Table 29: I-WeBS Results and Peak Counts Per Effort 2025-2026.

Species	October			November			December			January			February			March			Overall Peak
	Effort 1	Effort 2	Peak	Effort 1	Effort 2	Peak	Effort 1	Effort 2	Peak	Effort 1	Effort 2	Peak	Effort 1	Effort 2	Peak	Effort 1	Effort 2	Peak	
Black-headed Gull	0	0	0	34	14	34	0	67	67	0	30	30	50	12	50	27	10	27	**67**
Coot	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	12	0	12	**12**
Grey Heron	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2	**2**
Lapwing	0	0	0	12	44	44	0	0	0	68	70	70	45	28	45	19	15	19	**70**
Lesser Black-backed Gull	28	71	71	96	135	135	0	8	8	0	0	0	45	34	45	54	1	54	**135**
Little Egret	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	1	1	**2**
Little Grebe	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	2	0	2	**2**
Mallard	0	0	0	24	58	58	0	0	0	0	0	0	0	39	39	21	0	21	**58**
Moorhen	2	2	2	0	0	0	5	10	10	0	0	0	0	0	0	0	0	0	**10**
Mute Swan	0	0	0	0	9	9	2	0	2	0	0	0	0	6	6	3	0	3	**9**
Shoveler	0	0	0	0	1	1	0	0	0	0	25	25	0	0	0	18	0	18	**25**
Snipe	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Teal	0	0	0	8	43	43	20	2	20	0	40	40	0	23	23	21	5	21	**43**
Whooper Swan	0	9	9	24	34	34	0	0	0	0	0	0	0	2	2	50	0	50	**50**
Wigeon	0	0	0	30	55	55	70	0	70	0	55	55	105	118	118	208	15	208	**208**

Table 30: VP Species Counts Winter 2022-2023.

Species	October	November	December	January	February	March	April	May	Total
Black-headed Gull	0	0	25	49	38	0	0	0	**112**
Buzzard	3	1	6	15	6	13	8	4	**56**
Cormorant	0	0	0	3	0	0	0	0	**3**
Golden Plover	8	0	20	55	0	1295	0	0	**1378**
Grey Heron	1	1	0	1	0	0	0	0	**3**
Herring Gull	0	0	0	10	0	0	0	0	**10**
Kestrel	3	2	7	5	6	8	1	0	**32**
Lapwing	0	0	20	16	0	0	0	0	**36**
Lesser Black-backed Gull	0	0	640	57	4	6	0	0	**707**
Little Egret	0	0	0	4	0	0	0	0	**4**
Mallard	0	0	0	0	0	0	1	0	**1**
Mute Swan	0	0	0	6	0	4	0	0	**10**
Peregrine	0	0	0	0	1	0	0	0	**1**
Raven	0	0	7	0	0	0	0	0	**7**
Snipe	0	0	4	0	0	0	0	0	**4**
Sparrowhawk	0	0	0	0	1	1	3	0	**5**
Whooper Swan	3	0	0	0	0	0	0	0	**3**
Total	**18**	**4**	**729**	**221**	**56**	**1327**	**13**	**4**	**2372**

Table 31: VP Species Counts Breeding 2025.

Species	April	May	June	July	August	September	October	Total
Black-headed Gull	0	0	8	0	0	0	0	**8**
Buzzard	5	19	33	39	7	19	5	**127**
Golden Plover	0	0	0	0	0	28	0	**28**
Kestrel	0	1	0	18	4	8	0	**31**
Lesser Black-backed Gull	0	5	4	5	0	41	2	**57**
Peregrine	0	0	4	5	0	1	0	**10**
Raven	0	10	0	8	0	0	0	**18**
Snipe	0	0	0	0	1	0	0	**1**
Sparrowhawk	0	1	0	2	1	2	1	**7**
Total	**5**	**36**	**49**	**77**	**13**	**99**	**8**	**287**

Table 32: VP Species Counts Winter 2025-2026.

Species	October	November	December	January	February	March	Total
Black-headed Gull	0	0	3	5	59	22	**89**
Buzzard	4	7	1	10	12	7	**41**
Kestrel	7	2	7	4	0	4	**24**
Lapwing	8	0	0	0	0	0	**8**
Lesser Black-backed Gull	42	1	70	4	91	0	**208**
Mute Swan	8	0	0	0	0	0	**8**
Raven	0	0	1	12	0	0	**13**
Snipe	7	0	1	0	0	0	**8**
Sparrowhawk	0	1	1	6	1	0	**9**
Whooper Swan	0	6	0	0	0	0	**6**
Total	**76**	**17**	**84**	**41**	**163**	**33**	**414**

Table 33: VP Species Counts Breeding 2026.

Species	April	May	June	July	August	Total
Black-headed Gull	0	14	4	0	0	**18**
Buzzard	21	17	19	27	24	**108**
Grey Heron	0	0	0	1	0	**1**
Kestrel	1	4	7	2	7	**21**
Lesser Black-backed Gull	0	0	4	2	17	**23**
Mallard	0	2	0	0	0	**2**
Peregrine	0	2	1	2	4	**9**
Raven	0	0	8	8	47	**63**
Sparrowhawk	2	3	0	3	2	**10**
Total	**24**	**42**	**43**	**45**	**101**	**255**

Table 34: Nore Waterbird VP Flightline Data Winter 2025-2026.

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
09/02/2026	GCVP	Buzzard	1	16:49		30	45	15				90	
09/02/2026	GCVP	Buzzard	1	17:00		20						20	
09/02/2026	GCVP	Lesser Black-backed Gull	16	17:14					10	35		45	
10/02/2026	GCVP	Lesser Black-backed Gull	63	07:43						45		45	
10/02/2026	GCVP	Lesser Black-backed Gull	25	07:45			5	30	10			45	
10/02/2026	GCVP	Buzzard	1	07:46		20						20	
10/02/2026	GCVP	Buzzard	1	07:46	5	25						30	
10/02/2026	GCVP	Lesser Black-backed Gull	4	07:49			5	25	5			35	
10/02/2026	GCVP	Lesser Black-backed Gull	18	07:49					15	30		45	
10/02/2026	GCVP	Lesser Black-backed Gull	9	07:52						60		60	
10/02/2026	GCVP	Cormorant	1	07:54	2	1						3	
10/02/2026	GCVP	Lesser Black-backed Gull	5	07:55			15	10	20			45	
10/02/2026	GCVP	Lesser Black-backed Gull	36	07:58				35	10			45	
10/02/2026	GCVP	Lesser Black-backed Gull	84	08:02				45	15			60	
10/02/2026	GCVP	Lesser Black-backed Gull	17	08:05			10	30	5			45	
10/02/2026	GCVP	Lesser Black-backed Gull	8	08:07				5	5	20		30	
10/02/2026	GCVP	Lesser Black-backed Gull	30	08:11						60		60	
10/02/2026	GCVP	Lesser Black-backed Gull	3	08:28			30	5	10			45	
10/02/2026	GCVP	Lesser Black-backed Gull	6	08:56						45		45	

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
10/02/2026	GCVP	Lesser Black-backed Gull	10	09:15			5	40				45	
10/02/2026	GCVP	Lesser Black-backed Gull	2	09:53			5	20	15	5		45	
02/03/2026	GCVP	Black-headed Gull	40	18:20					180			180	
03/03/2026	GCVP	Black-headed Gull	1	07:15				120				120	
03/03/2026	GCVP	Black-headed Gull	13	07:34		50						50	
03/03/2026	GCVP	Black-headed Gull	7	07:42		80						80	
03/03/2026	GCVP	Black-headed Gull	7	07:58		60						60	
09/03/2026	GCVP	Buzzard	1	15:58					120			120	
09/03/2026	GCVP	Black-headed Gull	40	17:55				90				90	
09/03/2026	GCVP	Black-headed Gull	90	18:10					200			200	
09/03/2026	GCVP	Mute Swan	1	18:35		120						120	
10/03/2026	GCVP	Mute Swan	1	07:01		50						50	
10/03/2026	GCVP	Black-headed Gull	4	07:03				40				40	
10/03/2026	GCVP	Black-headed Gull	60	07:16	60							60	
10/03/2026	GCVP	Black-headed Gull	10	07:36		20						20	
10/03/2026	GCVP	Black-headed Gull	3	07:47			70					70	
19/03/2026	GCVP	Black-headed Gull	25	18:30			40					40	
20/03/2026	GCVP	Black-headed Gull	15	06:35			50					50	
20/03/2026	GCVP	Black-headed Gull	13	08:45				45				45	

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
20/03/2026	GCVP	Cormorant	1	08:53			60					60	
13/04/2026	GCVP	Black-headed Gull	7	18:15				20				20	
14/04/2026	GCVP	Mute Swan	1	07:07	20							20	
14/04/2026	GCVP	Cormorant	1	08:04			20					20	
14/04/2026	GCVP	Cormorant	1	08:16		8						8	
14/04/2026	GCVP	Sparrowhawk	1	08:41	10							10	
21/04/2026	GCVP	Cormorant	1	18:21						45		45	
21/04/2026	GCVP	Buzzard	1	18:29			10	80				90	
21/04/2026	GCVP	Grey Heron	1	19:19			45	15				60	
21/04/2026	GCVP	Cormorant	1	20:04		10	25					35	
22/04/2026	GCVP	Lesser Black-backed Gull	1	06:27				45				45	
22/04/2026	GCVP	Cormorant	1	06:54						60		60	
22/04/2026	GCVP	Little Egret	1	07:13			20					20	

Table 35: VP Flightline Data Winter 2022-2023.

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-160m	>160m	Total Duration (sec)	Notes
14/10/2022	1	Buzzard	2	08:12	15	60						75	
14/10/2022	1	Golden Plover	8	14:23	10	110						120	
02/11/2022	1	Nil Sightings											
14/12/2022	1	Black-headed Gull	1	13:08			90					90	
14/12/2022	1	Lapwing	6	15:48			60					60	
16/01/2023	1	Buzzard	1	11:22		60						60	
16/01/2023	1	Buzzard	1	12:03		60	120					180	
16/01/2023	1	Buzzard	1	13:57		240						240	
16/02/2023	1	Black-headed Gull	2	09:09			30	60				90	
16/02/2023	1	Buzzard	1	12:24			60	60				120	
21/02/2023	1	Kestrel	1	12:49				10	45			55	

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-160m	>160m	Total Duration (sec)	Notes
30/05/2023	1	Buzzard	2	09:16		30	150					180	
30/05/2023	1	Buzzard	1	12:09				90	330			420	
30/05/2023	1	Buzzard	1	12:54					60	480		540	
12/10/2022	2	Nil Sightings											
03/11/2022	2	Buzzard	1	10:12		200	40					240	
03/11/2022	2	Kestrel	1	09:34		140	40					180	
03/11/2022	2	Kestrel	1	10:48		80						80	
15/12/2022	2	Black-headed Gull	2	12:29			60					60	
15/12/2022	2	Snipe	1	12:56			30					30	
15/12/2022	2	Golden Plover	20	13:03				120				120	
15/12/2022	2	Buzzard	1	13:11				180				180	
15/12/2022	2	Black-headed Gull	2	13:41				90				90	
15/12/2022	2	Kestrel	2	12:14			90					90	
15/12/2022	2	Lapwing	14	12:08		30	150					180	
15/12/2022	2	Snipe	1	08:32		20	70					90	
15/12/2022	2	Snipe	2	12:09		5	55					60	
17/01/2023	2	Kestrel	1	11:08		5	55					60	
17/01/2023	2	Lesser Black-backed Gull	7	11:16			60					60	
17/01/2023	2	Buzzard	1	13:57		15	45					60	
21/02/2023	2	Buzzard	1	14:09		18						18	
07/03/2023	2	Kestrel	1	11:18		180						180	
07/03/2023	2	Kestrel	1	11:25	30	210						240	
07/03/2023	2	Mute Swan	4	14:57				120				120	
07/03/2023	2	Buzzard	1	15:11	10	80						90	
23/03/2023	2	Buzzard	1	10:46	30	90						120	
23/03/2023	2	Kestrel	1	10:47		60						60	
23/03/2023	2	Kestrel	1	11:01		120						120	
06/10/2022	3	Kestrel	1	15:08			20	20	50	30	60	180	Kestrel being followed/mobbed by 2 Rooks
04/11/2022	3	Nil Sightings											
07/12/2022	3	Kestrel	1	08:27			40					40	

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-160m	>160m	Total Duration (sec)	Notes
07/12/2022	3	Lesser Black-backed Gull	34	08:33						120		120	
07/12/2022	3	Lesser Black-backed Gull	110	08:51						60			
07/12/2022	3	Lesser Black-backed Gull	24	08:51	10	50	30	30	60	60		240	
07/12/2022	3	Buzzard	1	09:02		10	20					30	
07/12/2022	3	Kestrel	1	09:22			10					10	
07/12/2022	3	Lesser Black-backed Gull	22	10:26	5	5	30					40	
07/12/2022	3	Lesser Black-backed Gull	50	10:36	1	4	25					30	
07/12/2022	3	Lesser Black-backed Gull	30	10:40	10	20						30	
07/12/2022	3	Raven	3	12:06		10						10	
07/12/2022	3	Raven	4	12:10				30	30			60	
07/12/2022	3	Lesser Black-backed Gull	70	12:19	5	5	10	30				50	
07/12/2022	3	Black-headed Gull	20	12:27	5	5	10					20	
07/12/2022	3	Lesser Black-backed Gull	100	12:51	5	5	20	20	20	50		120	
07/12/2022	3	Lesser Black-backed Gull	200	13:18	10	10	20					40	
07/12/2022	3	Buzzard	1	14:11			10	50				60	
18/01/2023	3	Kestrel	1	10:54		90						90	
17/02/2023	3	Kestrel	1	09:04		120						120	
17/02/2023	3	Buzzard	1	12:18			60					60	
17/02/2023	3	Buzzard	1	12:35			30	90				120	
24/03/2023	3	Lesser Black-backed Gull	6	13:26				180				180	
11/04/2023	3	Nil Sightings											
12/04/2023	3	Sparrowhawk	1	07:59		180						180	
12/04/2023	3	Sparrowhawk	1	08:25	30	30						60	
12/04/2023	3	Buzzard	1	08:42			90					90	

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-160m	>160m	Total Duration (sec)	Notes
12/04/2023	3	Sparrowhawk	1	08:43		30						30	
19/10/2022	4	Grey Heron	1	15:18		50	180	40				270	
17/01/2023	4	Nil Sightings											
19/01/2023	4	Nil Sightings											
23/02/2023	4	Peregrine	1	14:44				25				25	
24/02/2023	4	Kestrel	1	12:07	180			240				420	
24/02/2023	4	Kestrel	1	12:25		35						35	
24/02/2023	4	Buzzard	1	13:12						240		240	
26/02/2023	4	Buzzard	1	12:45		12						12	
26/02/2023	4	Kestrel	1	14:20						180		180	
26/02/2023	4	Kestrel	1	15:25	46							46	
26/02/2023	4	Lesser Black-backed Gull	1	15:35						80		80	
02/03/2023	4	Buzzard	1	11:09		30	210					240	
02/03/2023	4	Buzzard	1	12:03			120					120	
30/03/2023	4	Kestrel	1	11:01	120	100	30					250	
30/03/2023	4	Kestrel	2	11:20				45				45	Flying together, territory flight display.
30/03/2023	4	Kestrel	1	11:40				125	200			325	
30/03/2023	4	Buzzard	1	12:18	45	80						125	
30/03/2023	4	Buzzard	3	13:42		60	80	80	60	210		490	
30/03/2023	4	Buzzard	3	14:45			20	150	150			320	
13/10/2022	5	Nil Sightings											
05/12/2022	5	Buzzard	1	12:42			60					60	
05/12/2022	5	Buzzard	1	15:06			60	60				120	
16/01/2023	5	Golden Plover	25	12:20			15					15	
16/01/2023	5	Kestrel	1	12:22		6	15	9				30	
16/01/2023	5	Black-headed Gull	1	13:20				21				21	
16/01/2023	5	Buzzard	1	13:24		5						5	
16/01/2023	5	Golden Plover	30	13:32	10	15	11					36	
16/01/2023	5	Buzzard	1	14:40	5	10	75					90	
17/01/2023	5	Black-headed Gull	15	15:05						90		90	

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-160m	>160m	Total Duration (sec)	Notes
17/01/2023	5	Buzzard	2	15:06		15						15	
20/01/2023	5	Buzzard	1	12:45	40							40	
20/01/2023	5	Buzzard	1	13:10	30							30	
13/02/2023	5	Black-headed Gull	30	08:23			60	30				90	
13/02/2023	5	Black-headed Gull	6	08:31			45	45				90	
13/02/2023	5	Lesser Black-backed Gull	3	09:46		10	50					60	
13/02/2023	5	Sparrowhawk	1	13:25		30						30	
24/03/2023	5	Buzzard	1	09:25	35							35	
24/03/2023	5	Golden Plover	120	09:30			50	150	160	160		520	Landed on cultivated field.
24/03/2023	5	Golden Plover	210	09:40		50	100	200	250	250		850	Landed on cultivated field. (Map note 2)
24/03/2023	5	Buzzard	1	10:55			65					65	
24/03/2023	5	Golden Plover	220	11:10		60	130	100				290	Landed on cultivated field. (Map note 2)
24/03/2023	5	Golden Plover	180	11:20			70	115				185	Landed on cultivated field. (Map note 2)
24/03/2023	5	Sparrowhawk	1	12:45	20							20	
24/03/2023	5	Golden Plover	65	13:10				30				30	
24/03/2023	5	Golden Plover	130	13:30			110	320	110	110		650	Landed on cultivated field. (Map note 2)
24/03/2023	5	Golden Plover	220	14:05			60	70	100	100		330	Landed on cultivated field. (Map note 2)
24/03/2023	5	Golden Plover	150	14:35			60	60	170			290	Landed on cultivated field. (Map note 2)

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-160m	>160m	Total Duration (sec)	Notes
20/10/2022	6	Whooper Swan	3	09:14				40	310			350	
20/10/2022	6	Kestrel	1	09:16			180	60				240	
20/10/2022	6	Kestrel	1	13:48		100	140					240	
06/12/2022	6	Kestrel	1	08:59		60	30					90	
06/12/2022	6	Kestrel	1	09:04		30						30	
06/12/2022	6	Kestrel	1	09:13			30					30	
06/12/2022	6	Buzzard	1	12:26			60					60	
03/01/2023	6	Buzzard	1	08:04			60	60				120	
03/01/2023	6	Kestrel	1	08:09		30	180	30				240	
03/01/2023	6	Mute Swan	3	08:52				120				120	
03/01/2023	6	Kestrel	1	09:23			120					120	
03/01/2023	6	Black-headed Gull	3	12:11				120				120	
03/01/2023	6	Buzzard	1	13:54			60					60	
18/01/2023	6	Buzzard	1	11:15		12						12	
18/01/2023	6	Nil Sightings											
19/01/2023	6	Buzzard	1	14:10		40	80					120	
19/01/2023	6	Nil Sightings											
19/04/2023	6	Buzzard	1	08:15			60					60	
19/04/2023	6	Buzzard	1	08:19			30	30				60	
19/04/2023	6	Buzzard	1	13:06			30	90				120	
19/04/2023	6	Kestrel	1	13:44		120	120					240	
19/04/2023	6	Buzzard	1	13:56			30	60				90	
18/10/2022	7 (Grid Connection)	Buzzard	1	12:42	30	290						320	
07/11/2022	7 (Grid Connection)	Grey Heron	1	15:15			120					120	
04/01/2023	7 (Grid Connection)	Lesser Black-backed Gull	8	09:57		30	60					90	
04/01/2023	7 (Grid Connection)	Lesser Black-backed Gull	8	10:02		10	50					60	
04/01/2023	7 (Grid Connection)	Lesser Black-backed Gull	30	10:59			240					240	

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-160m	>160m	Total Duration (sec)	Notes
04/01/2023	7 (Grid Connection)	Little Egret	1	11:04	5	5	20					30	
04/01/2023	7 (Grid Connection)	Black-headed Gull	2	11:06				60				60	
04/01/2023	7 (Grid Connection)	Grey Heron	1	13:31	10	50						60	
04/01/2023	7 (Grid Connection)	Little Egret	1	13:32	10	80						90	
18/01/2023	7 (Grid Connection)	Herring Gull	10	12:45	60							60	
18/01/2023	7 (Grid Connection)	Black-headed Gull	4	13:10	60							60	
18/01/2023	7 (Grid Connection)	Lapwing	5	15:00	80							80	
18/01/2023	7 (Grid Connection)	Buzzard	1	15:15	200	400						600	
19/01/2023	7 (Grid Connection)	Black-headed Gull	1	11:07	4							4	
19/01/2023	7 (Grid Connection)	Black-headed Gull	3	11:15	13	4						17	
19/01/2023	7 (Grid Connection)	Black-headed Gull	1	11:15	10							10	
19/01/2023	7 (Grid Connection)	Black-headed Gull	2	11:20	10	12						22	
19/01/2023	7 (Grid Connection)	Black-headed Gull	1	11:27		15	12					27	
19/01/2023	7 (Grid Connection)	Black-headed Gull	1	11:50	35	12						47	
19/01/2023	7 (Grid Connection)	Lapwing	1	12:21	4							4	
19/01/2023	7 (Grid Connection)	Black-headed Gull	1	12:32		5	32					37	
19/01/2023	7 (Grid Connection)	Little Egret	1	12:41	15							15	

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-160m	>160m	Total Duration (sec)	Notes
19/01/2023	7 (Grid Connection)	Lapwing	5	12:49	20	5	5	10				40	
19/01/2023	7 (Grid Connection)	Black-headed Gull	1	14:28		32	10	10				52	
19/01/2023	7 (Grid Connection)	Lesser Black-backed Gull	1	14:37					32			32	
19/01/2023	7 (Grid Connection)	Cormorant	1	14:49					58			58	
19/01/2023	7 (Grid Connection)	Lapwing	5	15:07		28						28	
19/01/2023	7 (Grid Connection)	Lesser Black-backed Gull	3	15:08					10			10	
19/01/2023	7 (Grid Connection)	Little Egret	1	15:26	8							8	
19/01/2023	7 (Grid Connection)	Mute Swan	3	15:30			7					7	
19/01/2023	7 (Grid Connection)	Black-headed Gull	12	15:47	10	5	27					42	
19/01/2023	7 (Grid Connection)	Cormorant	2	16:17					25			25	
19/01/2023	7 (Grid Connection)	Black-headed Gull	1	16:30	3	4	8					15	
11/04/2023	7 (Grid Connection)	Mallard	1	10:33	10	20						30	
12/04/2023	7 (Grid Connection)	Buzzard	1	14:05			90					90	
12/04/2023	7 (Grid Connection)	Buzzard	1	14:14			30	30				60	
12/04/2023	7 (Grid Connection)	Buzzard	1	14:22		30	60					90	

Table 36: VP Flightline Data Breeding 2025.

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)
07/04/2025	1	Buzzard	1	09:41				25	50			75
09/04/2025	1	Buzzard	1	09:36	5							5
09/04/2025	1	Buzzard	1	10:46	5	10	5	20	100	60	100	300
20/05/2025	1	Buzzard	1	17:32		10	10	20				40
09/06/2025	1	Nil Sightings		15:30								
26/06/2025	1	Buzzard	1	15:27			35					35
09/07/2025	1	Buzzard	1	17:25	10	10	25					45
09/07/2025	1	Buzzard	1	18:12		10	20	40				70
09/07/2025	1	Buzzard	1	19:17		10						10
09/07/2025	1	Buzzard	1	20:37	10	10	30					50
21/07/2025	1	Nil Sightings		15:30								
21/07/2025	1	Nil Sightings		17:00								
24/07/2025	1	Buzzard	1	10:00				150				150
24/07/2025	1	Buzzard	1	10:30			50	250				300
24/07/2025	1	Kestrel	1	13:05		35						35
13/08/2025	1	Nil Sightings		16:26								
04/09/2025	1	Nil Sightings		07:46								
04/09/2025	1	Buzzard	1	11:04	5	15						20
04/09/2025	1	Buzzard	1	11:30		15	120	45				180
10/09/2025	1	Buzzard	1	09:16		5						5
10/09/2025	1	Nil Sightings		11:35								
11/09/2025	1	Lesser Black-backed Gull	6	10:59	5							5
25/04/2025	2	Nil Sightings		09:45								
25/04/2025	2	Buzzard	2	13:30			30	100	200	390		720
07/05/2025	2	Sparrowhawk	1	09:55	5							5
07/05/2025	2	Raven	1	10:48		30						30
07/05/2025	2	Kestrel	1	10:54		5	10					15
07/05/2025	2	Raven	1	12:06			45					45
07/05/2025	2	Raven	1	12:27			60	30				90
07/05/2025	2	Raven	2	12:42			60	60	120			240
07/05/2025	2	Raven	5	12:50			60	120	120	60		360
07/05/2025	2	Buzzard	1	13:04		30						30

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)
07/05/2025	2	Buzzard	1	13:07							20	20
09/06/2025	2	Nil Sightings		18:45								
10/06/2025	2	Buzzard	1	19:37		15	20					35
07/07/2025	2	Buzzard	1	11:19		15	45	15	15	270		360
07/07/2025	2	Buzzard	1	11:46	5	30	10					45
08/07/2025	2	Buzzard	1	10:38	10	15						25
08/07/2025	2	Buzzard	1	10:57	5	5	30					40
08/07/2025	2	Buzzard	1	11:01	7							7
08/07/2025	2	Buzzard	1	13:08	10	40	40	10				100
11/07/2025	2	Buzzard	1	10:09		50	25	25	47			147
11/07/2025	2	Raven	1	11:10			17					17
11/07/2025	2	Buzzard	1	11:29		50	50	50	56			206
17/07/2025	2	Nil Sightings		13:50								
22/07/2025	2	Nil Sightings		13:00								
22/07/2025	2	Nil Sightings		14:30								
05/08/2025	2	Snipe	1	07:28	3	2						5
05/08/2025	2	Kestrel	1	08:11		30	60					90
05/08/2025	2	Kestrel	1	08:20		150	20	10				180
05/08/2025	2	Kestrel	1	08:27		5						5
05/08/2025	2	Buzzard	1	09:42	5	30	10					45
05/08/2025	2	Buzzard	1	09:57		25	5					30
12/08/2025	2	Buzzard	1	18:57		10	10	40	20			80
13/08/2025	2	Nil Sightings		18:35								
11/09/2025	2	Buzzard	1	12:24		45						45
11/09/2025	2	Lesser Black-backed Gull	1	13:49				15	15	30		60
12/09/2025	2	Nil Sightings		09:50								
12/09/2025	2	Lesser Black-backed Gull	4	12:36		25						25
12/09/2025	2	Lesser Black-backed Gull	6	14:09		25	5					30
12/09/2025	2	Lesser Black-backed Gull	2	14:12		20						20
10/06/2025	3	Lesser Black-backed Gull	1	17:39			10	120	20			150

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)
26/06/2025	3	Buzzard	1	09:57	10	20	20	50	50	150		300
26/06/2025	3	Buzzard	1	10:02		10	10	20	30	50		120
26/06/2025	3	Buzzard	1	10:07	20	30	330	400				780
26/06/2025	3	Peregrine	1	11:00		60	20	20	20	60	300	480
26/06/2025	3	Buzzard	1	11:15		60	120					180
26/06/2025	3	Buzzard	1	11:15			80	200	100	100		480
26/06/2025	3	Buzzard	1	12:03		120	180					300
26/06/2025	3	Buzzard	1	12:09		50	60	60	30	100	300	600
26/06/2025	3	Buzzard	2	12:09	60	140	600	100				900
26/06/2025	3	Buzzard	1	12:28	60	200	480	100				840
26/06/2025	3	Buzzard	1	13:32		30						30
26/06/2025	3	Buzzard	1	13:39		120	60					180
26/06/2025	3	Buzzard	1	13:38		20	280	100	300	200		900
26/06/2025	3	Buzzard	1	14:51		30	60	20	100	210		420
26/06/2025	3	Buzzard	1	15:07		60	100	60	200			420
27/06/2025	3	Lesser Black-backed Gull	2	10:14						120		120
27/06/2025	3	Buzzard	1	10:21	40	140	200	60	100			540
27/06/2025	3	Lesser Black-backed Gull	1	10:27						160		160
27/06/2025	3	Buzzard	1	10:45	50	150						200
27/06/2025	3	Buzzard	1	10:53	20	20	30	30	50	100		250
27/06/2025	3	Peregrine	3	11:08	10	20						30
27/06/2025	3	Buzzard	1	12:17		90	30					120
07/07/2025	3	Buzzard	1	10:04	7	10						17
07/07/2025	3	Kestrel	1	11:11				50	20	23		93
07/07/2025	3	Peregrine	1	11:27				40	47	100		187
07/07/2025	3	Buzzard	1	12:20	6	10						16
07/07/2025	3	Buzzard	1	13:01				50	23			73
07/07/2025	3	Buzzard	1	13:05				30	31			61
08/07/2025	3	Nil Sightings		14:32								
22/07/2025	3	Peregrine	1	18:28		20						20
22/07/2025	3	Buzzard	1	19:42			30	15				45
23/07/2025	3	Nil Sightings		14:00								
23/07/2025	3	Kestrel	1	15:40			10	35				45

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)
23/07/2025	3	Peregrine	1	15:58		35						35
23/07/2025	3	Peregrine	1	16:03	15							15
23/07/2025	3	Lesser Black-backed Gull	2	16:13		65						65
23/07/2025	3	Lesser Black-backed Gull	2	16:17		45						45
23/07/2025	3	Lesser Black-backed Gull	1	16:19		10	45					55
26/08/2025	3	Buzzard	1	16:36		20						20
26/08/2025	3	Kestrel	1	17:03	25							25
04/09/2025	3	Buzzard	2	11:09			120	60	60			240
04/09/2025	3	Buzzard	1	12:39	15	45						60
04/09/2025	3	Lesser Black-backed Gull	1	13:37	5	5	20					30
04/09/2025	3	Kestrel	1	13:41	15	75						90
01/10/2025	3	Lesser Black-backed Gull	2	10:56			5	10				15
01/10/2025	3	Nil Sightings		11:59								
01/10/2025	3	Buzzard	1	12:42		5	15	10				30
01/10/2025	3	Buzzard	2	12:48			30	60	30			120
06/10/2025	3	Buzzard	1	15:00			15	55				70
06/10/2025	3	Buzzard	1	15:02			10					10
06/10/2025	3	Sparrowhawk	1	16:11		20						20
15/05/2025	4	Buzzard	1	09:45						76		76
15/05/2025	4	Buzzard	1	10:07						100	515	615
15/05/2025	4	Buzzard	1	10:46			20	10	20	47		97
15/05/2025	4	Buzzard	1	10:52						172		172
15/05/2025	4	Buzzard	1	11:12						70	65	135
15/05/2025	4	Buzzard	1	11:41		44						44
15/05/2025	4	Buzzard	1	11:50		25						25
15/05/2025	4	Buzzard	1	13:32					105			105
15/05/2025	4	Buzzard	2	14:07						100	287	387
15/05/2025	4	Buzzard	1	14:36							209	209
15/05/2025	4	Buzzard	1	15:55						156		156
20/06/2025	4	Buzzard	2	09:23	10	20	90	120				240

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)
20/06/2025	4	Buzzard	1	10:01		20	5	5	150			180
20/06/2025	4	Buzzard	1	12:04		20	60	100				180
20/06/2025	4	Buzzard	1	12:23						420		420
20/06/2025	4	Buzzard	1	12:40						330		330
20/06/2025	4	Buzzard	1	14:14		20						20
20/06/2025	4	Black-headed Gull	8	14:57		35	10					45
11/07/2025	4	Buzzard	1	13:42			50	153				203
11/07/2025	4	Buzzard	1	14:04		50	34	75	75			234
14/07/2025	4	Buzzard	1	14:53	13	30						43
14/07/2025	4	Buzzard	1	14:59	20							20
14/07/2025	4	Buzzard	1	15:05	10	20						30
15/07/2025	4	Buzzard	1	11:25		20	20	40				80
21/07/2025	4	Nil Sightings		17:15								
28/07/2025	4	Nil Sightings		08:07								
05/08/2025	4	Buzzard	1	12:19				15	180	45		240
05/08/2025	4	Buzzard	1	13:35						360		360
05/08/2025	4	Buzzard	1	13:50						330		330
21/08/2025	4	Nil Sightings		08:52								
21/08/2025	4	Nil Sightings		09:48								
21/08/2025	4	Sparrowhawk	1	12:03	4	1						5
25/09/2025	4	Golden Plover	28	08:26						30		30
02/10/2025	4	Nil Sightings		08:14								
08/05/2025	5	Buzzard	1	19:19	15							15
08/05/2025	5	Buzzard	1	20:11	5							5
13/06/2025	5	Buzzard	1	09:11			15	105				120
23/06/2025	5	Buzzard	1	08:18	5	25						30
23/06/2025	5	Buzzard	1	12:25		30						30
23/06/2025	5	Buzzard	1	12:42			70	20				90
23/06/2025	5	Buzzard	1	13:14		45	15					60
09/07/2025	5	Buzzard	1	09:56			100	50	61			211
09/07/2025	5	Kestrel	1	10:18		50	50	100	34			234
09/07/2025	5	Kestrel	1	10:47		34	50	50				134
09/07/2025	5	Kestrel	1	11:34			20	24				44

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)
09/07/2025	5	Kestrel	1	13:21		20	20	17				57
09/07/2025	5	Kestrel	6	14:22	50	57	150	50				307
09/07/2025	5	Raven	3	14:52		50	57	50				157
22/07/2025	5	Peregrine	1	16:02	10	20	20	30				80
22/07/2025	5	Buzzard	1	17:20	10	20	30					60
22/07/2025	5	Kestrel	1	17:30			80	40				120
23/07/2025	5	Buzzard	1	18:40		50	150	40				240
23/07/2025	5	Nil Sightings		19:35								
27/08/2025	5	Nil Sightings		11:50								
27/08/2025	5	Nil Sightings		14:20								
12/09/2025	5	Lesser Black-backed Gull	8	12:05	5	15	25					45
12/09/2025	5	Buzzard	1	12:31	30	150	120					300
12/09/2025	5	Buzzard	1	12:32		120	120					240
12/09/2025	5	Kestrel	1	12:35	30							30
12/09/2025	5	Peregrine	1	12:54			10					10
24/09/2025	5	Nil Sightings		12:15								
24/09/2025	5	Nil Sightings		14:45								
25/09/2025	5	Lesser Black-backed Gull	12	11:07						180		180
25/09/2025	5	Buzzard	1	11:22	10	35						45
25/09/2025	5	Buzzard	1	11:46		60	30					90
25/09/2025	5	Kestrel	1	11:59	5	45	10					60
25/09/2025	5	Kestrel	1	12:11	5	25						30
20/05/2025	6	Buzzard	1	10:07	30	30						60
20/05/2025	6	Lesser Black-backed Gull	1	10:18					60			60
20/05/2025	6	Buzzard	1	11:02		15	45					60
21/05/2025	6	Lesser Black-backed Gull	4	10:34			30					30
01/07/2025	6	Buzzard	1	11:37			20					20
01/07/2025	6	Buzzard	1	13:33	15	20	10					45
01/07/2025	6	Buzzard	1	13:47	20							20
08/07/2025	6	Raven	2	09:36						67		67
08/07/2025	6	Buzzard	1	11:35	19	20						39

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)
08/07/2025	6	Raven	1	11:54						48		48
08/07/2025	6	Buzzard	1	12:56					21			21
08/07/2025	6	Sparrowhawk	1	13:29		20	23					43
08/07/2025	6	Buzzard	1	13:42		24	25	25				74
08/07/2025	6	Raven	1	13:47		48	20					68
08/07/2025	6	Buzzard	1	15:01			50	49				99
08/07/2025	6	Buzzard	1	15:10				28				28
08/07/2025	6	Sparrowhawk	1	15:25	32							32
15/07/2025	6	Buzzard	1	10:20			100	200				300
15/07/2025	6	Kestrel	1	11:36		15						15
15/07/2025	6	Kestrel	1	11:43		160						160
15/07/2025	6	Buzzard	1	12:09		10	35					45
15/07/2025	6	Kestrel	1	12:19		85						85
15/07/2025	6	Kestrel	1	13:58		170						170
15/07/2025	6	Buzzard	1	14:13		15						15
26/08/2025	6	Nil Sightings		08:33								
28/08/2025	6	Nil Sightings		13:50								
28/08/2025	6	Nil Sightings		15:20								
29/09/2025	6	Buzzard	1	15:34	15							15
29/09/2025	6	Buzzard	2	16:26	15	60	15					90
29/09/2025	6	Buzzard	1	16:38		30	60	30				120
29/09/2025	6	Lesser Black-backed Gull	1	17:02		15						15
29/09/2025	6	Sparrowhawk	1	17:08		15	30	15				60
29/09/2025	6	Buzzard	1	17:10		30						30
29/09/2025	6	Sparrowhawk	1	17:12	10							10
30/09/2025	6	Buzzard	2	10:27	30	60	30					120
30/09/2025	6	Kestrel	1	10:46	120	120						240
30/09/2025	6	Kestrel	1	11:09	5	10	5					20
30/09/2025	6	Kestrel	1	11:11		60	60	15	15			150
30/09/2025	6	Buzzard	1	13:31	15	45	15					75
30/09/2025	6	Kestrel	1	14:09	15	30	45	60	30			180

Table 37: VP Flightline Data Winter 2025-2026.

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
16/10/2025	1	Snipe	1	09:30		15	15					30	
16/10/2025	1	Snipe	4	10:10		25	5					30	
16/10/2025	1	Nil Sightings		12:03									
27/11/2025	1	Buzzard	1	11:11		5	25					30	
27/11/2025	1	Buzzard	1	11:56		15	5					20	
27/11/2025	1	Nil Sightings		13:05									
27/11/2025	1	Nil Sightings		14:24									
16/12/2025	1	Raven	1	12:39		30	30					60	Calling occasionally
18/12/2025	1	Nil Sightings		10:30									
13/01/2026	1	Nil Sightings		10:50									
20/01/2026	1	Sparrowhawk	2	12:17		30	90	60				180	Pair interacting and circling together. Potential pair bonding or territorial dispute, more likely the former due to them sticking together the whole flight and lack of alarm/distress calling
20/01/2026	1	Sparrowhawk	1	15:34	15							15	
30/01/2026	1	Nil Sightings		10:30									
26/02/2026	1	Nil Sightings		09:24									
27/02/2026	1	Buzzard	1	09:56		25	5					30	
27/02/2026	1	Buzzard	1	11:09			20	5	5	420		450	
27/02/2026	1	Buzzard	1	12:40			30					30	
27/02/2026	1	Buzzard	1	12:57	10	20						30	

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
09/03/2026	1	Nil Sightings		13:24									
13/03/2026	1	Nil Sightings		08:49									
13/03/2026	1	Nil Sightings		12:18									
09/10/2025	2	Snipe	2	11:31		10	10					20	
09/10/2025	2	Lesser Black-backed Gull	9	15:09					45	15		60	
09/10/2025	2	Lapwing	8	15:36		10	20					30	
12/11/2025	2	Nil Sightings		09:14									
12/11/2025	2	Nil Sightings		13:35									
18/11/2025	2	Nil Sightings		10:10									
16/12/2025	2	Lesser Black-backed Gull	1	13:58			15					15	
16/12/2025	2	Lesser Black-backed Gull	8	14:07		15	30					45	
16/12/2025	2	Lesser Black-backed Gull	9	14:08		15	30					45	Separate flock to bout 2 but circles with them before parting ways
16/12/2025	2	Lesser Black-backed Gull	5	14:14			30	30				60	
16/12/2025	2	Lesser Black-backed Gull	1	14:23			15					15	Flying towards some other gulls calling in the distance
16/12/2025	2	Lesser Black-backed Gull	20	14:28			25					25	
16/12/2025	2	Snipe	1	14:34	2	3						5	Alarm calling, flushed by something
16/12/2025	2	Lesser Black-backed Gull	1	14:45			15					15	
16/12/2025	2	Lesser Black-backed Gull	15	14:49				20				20	11 juveniles, 4 adults

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
08/01/2026	2	Black-headed Gull	1	11:57			40					40	
08/01/2026	2	Sparrowhawk	1	14:23		15						15	
14/01/2026	2	Nil Sightings		10:05									
27/01/2026	2	Lesser Black-backed Gull	3	12:01		15						15	
27/01/2026	2	Raven	1	13:25			30					30	Struggling in the wind a bit
11/02/2026	2	Nil Sightings		09:00									
11/02/2026	2	Buzzard	1	14:05					40			40	
11/02/2026	2	Buzzard	1	14:25				180				180	
05/03/2026	2	Nil Sightings		10:00									
19/03/2026	2	Buzzard	3	11:45				120		180		300	
19/03/2026	2	Buzzard	2	12:09					260			260	
19/03/2026	2	Nil Sightings		14:00									
07/10/2025	3	Nil Sightings		14:22									
09/10/2025	3	Nil Sightings		11:52									
20/10/2025	3	Lesser Black-backed Gull	2	16:15			35					35	
20/10/2025	3	Lesser Black-backed Gull	21	16:42				55				55	5/21 juveniles
07/11/2025	3	Nil Sightings		10:02									
07/11/2025	3	Whooper Swan	6	13:59						60		60	
18/11/2025	3	Nil Sightings		12:40									
04/12/2025	3	Sparrowhawk	1	12:39			25					25	
11/12/2025	3	Kestrel	1	11:03	5							5	Perched in tree alarm calling occasionally. Harassed by JD and RO. Chased out and off VP.
11/12/2025	3	Nil Sightings		15:30									

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
17/12/2025	3	Kestrel	1	13:46		10						10	
17/12/2025	3	Kestrel	1	13:50		80	10					90	
17/12/2025	3	Kestrel	1	13:58		190	20					210	
17/12/2025	3	Lesser Black-backed Gull	2	14:29			10	30	5			45	
17/12/2025	3	Kestrel	1	14:56	10	5						15	
14/01/2026	3	Nil Sightings		13:20									
22/01/2026	3	Sparrowhawk	1	12:00	10	10						20	Dives quickly in pursuit of something and fails, continues over scrub and forestry out of sight
10/02/2026	3	Nil Sightings		10:00									
10/02/2026	3	Buzzard	1	15:16					35			35	
10/02/2026	3	Buzzard	1	15:25					60			60	
11/03/2026	3	Nil Sightings		09:35									
11/03/2026	3	Buzzard	1	14:10						120		120	
11/03/2026	3	Buzzard	1	14:25						20		20	
04/11/2025	4	Nil Sightings		09:33									
04/11/2025	4	Nil Sightings		13:02									
13/11/2025	4	Sparrowhawk	1	11:07	5	15						20	
13/11/2025	4	Buzzard	1	12:08		30						30	
04/12/2025	4	Nil Sightings		13:16									
02/01/2026	4	Nil Sightings		11:36									
02/01/2026	4	Sparrowhawk	1	15:27		30						30	
29/01/2026	4	Raven	2	09:39		7						7	
29/01/2026	4	Kestrel	1	12:15	90	100						190	
29/01/2026	4	Kestrel	1	12:58	27	20						47	
29/01/2026	4	Raven	2	13:44	3	7	20					30	
29/01/2026	4	Raven	1	15:03	5	11						16	Calling
13/02/2026	4	Nil Sightings		12:00									
24/02/2026	4	Buzzard	1	10:56	10	110						120	

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
24/02/2026	4	Buzzard	1	11:38			45	10	5			60	
24/02/2026	4	Buzzard	1	11:38		25	5					30	
24/02/2026	4	Buzzard	1	12:23			90	10	20			120	
10/03/2026	4	Nil Sightings		09:55									
20/03/2026	4	Nil Sightings		09:30									
09/10/2025	5	Buzzard	1	11:40		60				180		240	
20/10/2025	5	Lesser Black-backed Gull	8	13:57			45					45	
20/10/2025	5	Lesser Black-backed Gull	2	14:05	5	15	10					30	
20/10/2025	5	Kestrel	1	14:16	5	80	5					90	
20/10/2025	5	Kestrel	1	14:20	5	15	90	10				120	
20/10/2025	5	Buzzard	1	14:21						60		60	
20/10/2025	5	Kestrel	1	14:44	5	55						60	
20/10/2025	5	Kestrel	1	14:48	3	7						10	
20/10/2025	5	Kestrel	1	14:58		180	20	10				210	
20/10/2025	5	Kestrel	1	15:13	10	75	5					90	
31/10/2025	5	Nil Sightings		08:05									
18/11/2025	5	Lesser Black-backed Gull	1	09:54		25	5					30	
18/11/2025	5	Kestrel	1	11:41	3	17						20	
18/11/2025	5	Kestrel	1	11:50	5	40						45	
18/11/2025	5	Buzzard	1	15:07						210		210	
17/12/2025	5	Lesser Black-backed Gull	1	10:57	10	20						30	
17/12/2025	5	Lesser Black-backed Gull	1	11:01	10							10	
17/12/2025	5	Lesser Black-backed Gull	1	11:27		30						30	
17/12/2025	5	Buzzard	1	14:02	45	15	15					75	
17/12/2025	5	Lesser Black-backed Gull	5	14:22			30					30	
14/01/2026	5	Nil Sightings		12:07									
27/01/2026	5	Buzzard	1	11:29	10							10	
27/01/2026	5	Buzzard	1	12:08			42					42	Calling

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
27/01/2026	5	Lesser Black-backed Gull	1	12:16		8						8	
30/01/2026	5	Black-headed Gull	1	11:12		6						6	
30/01/2026	5	Kestrel	1	11:29	16							16	Calling
30/01/2026	5	Kestrel	1	11:34	5	5						10	Mobbed by x2 HC
30/01/2026	5	Black-headed Gull	3	12:32		22						22	Calling
03/02/2026	5	Black-headed Gull	20	10:31			40					40	
03/02/2026	5	Black-headed Gull	1	11:53		30						30	
20/02/2026	5	Sparrowhawk	1	15:30		40						40	
25/02/2026	5	Lesser Black-backed Gull	28	13:19	10	30	5					45	
25/02/2026	5	Lesser Black-backed Gull	3	13:31	5	25						30	
25/02/2026	5	Lesser Black-backed Gull	2	13:44	3	7						10	
25/02/2026	5	Lesser Black-backed Gull	2	14:08		20	10					30	
25/02/2026	5	Lesser Black-backed Gull	54	14:10		15	75					90	
25/02/2026	5	Lesser Black-backed Gull	1	14:46		30						30	
25/02/2026	5	Lesser Black-backed Gull	1	14:58		30						30	
25/02/2026	5	Black-headed Gull	35	15:46	10	60	30	20				120	
13/03/2026	5	Black-headed Gull	2	11:07			40					40	
13/03/2026	5	Kestrel	2	14:20				180				180	
13/03/2026	5	Black-headed Gull	15	15:12			30					30	

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
13/03/2026	5	Black-headed Gull	5	16:28	10							10	
10/10/2025	6	Nil Sightings		10:30									
10/10/2025	6	Buzzard	1	13:49						15		15	
10/10/2025	6	Buzzard	1	14:51							240	240	
10/10/2025	6	Kestrel	1	14:58		10						10	
17/10/2025	6	Mute Swan	4	09:06			20	20	50			90	
17/10/2025	6	Mute Swan	4	09:17						120		120	
17/11/2025	6	Nil Sightings		10:45									
17/11/2025	6	Nil Sightings		15:14									
24/11/2025	6	Buzzard	1	12:40	2	1						3	Perched in tree at end of this flightline
24/11/2025	6	Buzzard	1	12:42	3	2						5	Perched in tree at end of this flightline
24/11/2025	6	Buzzard	1	12:49	3	2						5	
01/12/2025	6	Nil Sightings		10:05									
01/12/2025	6	Black-headed Gull	3	12:35			30					30	
01/12/2025	6	Kestrel	1	14:00		25						25	
01/12/2025	6	Kestrel	1	14:10		15						15	Mobbed by crows
14/01/2026	6	Nil Sightings		10:00									
28/01/2026	6	Raven	1	09:59		12						12	Landed in field then onto fence post
28/01/2026	6	Raven	1	10:37		15						15	
28/01/2026	6	Raven	1	11:01		11						11	
28/01/2026	6	Buzzard	1	11:47			32					32	
28/01/2026	6	Buzzard	1	12:12	5	5						10	3rd BZ; joined both from previous bout
28/01/2026	6	Raven	1	13:02	6	10						16	

Date	VP Number	Species	Number	Time of Sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
28/01/2026	6	Raven	1	13:22	10	28						38	
28/01/2026	6	Buzzard	2	13:38		20	20	41				81	
28/01/2026	6	Buzzard	1	13:39			35					35	
28/01/2026	6	Buzzard	3	13:51			5	5	20			30	
28/01/2026	6	Raven	1	14:45		15						15	
03/02/2026	6	Black-headed Gull	3	14:38			45					45	
25/02/2026	6	Nil Sightings		12:30									
25/02/2026	6	Nil Sightings		15:00									
04/03/2026	6	Kestrel	1	14:22				30				30	
04/03/2026	6	Kestrel	1	14:30			45					45	

Table 38: VP Flightline Data Breeding 2026.

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
22/04/2026	1	Buzzard	1	12:16		5	10					15	
22/04/2026	1	Buzzard	1	12:29		10						10	
22/04/2026	1	Kestrel	1	12:43	3	4						7	
30/04/2026	1	Nil Sightings		08:45									
20/05/2026	1	Nil Sightings		08:06									
26/05/2026	1	Buzzard	1	10:32			9	10	60	10		89	
26/05/2026	1	Buzzard	1	10:43			15	40				55	
26/05/2026	1	Buzzard	1	10:51			50					50	
26/05/2026	1	Buzzard	1	11:46		2	18					20	
26/05/2026	1	Buzzard	2	12:59						200		200	
26/05/2026	1	Kestrel	1	13:09		25						25	
26/05/2026	1	Nil Sightings		13:55									Short break due to hot weather
08/06/2026	1	Buzzard	1	16:51	5	55	90					150	
25/06/2026	1	Kestrel	1	15:12		47						47	
25/06/2026	1	Kestrel	1	15:27		106						106	

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
25/06/2026	1	Buzzard	1	15:36		77						77	
25/06/2026	1	Buzzard	2	15:42					73			73	
25/06/2026	1	Buzzard	1	15:46						29		29	
25/06/2026	1	Lesser Black-backed Gull	1	16:01			27					27	
25/06/2026	1	Buzzard	1	16:11		20						20	Landed in tree
25/06/2026	1	Kestrel	1	16:17		125						125	
25/06/2026	1	Raven	2	16:17			32					32	
25/06/2026	1	Raven	4	16:23		35						35	
25/06/2026	1	Raven	1	17:10			60					60	
25/06/2026	1	Raven	1	18:01				60				60	
25/06/2026	1	Lesser Black-backed Gull	1	18:22		21						21	
25/06/2026	1	Kestrel	1	18:25			45					45	
25/06/2026	1	Lesser Black-backed Gull	1	18:40				58				58	
29/06/2026	1	Nil Sightings		18:00									Other species: WW, BC, MP, SL, R., HS, CH, WP, RO, HM, SG, M., B., WH, WR, GO, JD
02/07/2026	1	Lesser Black-backed Gull	1	09:19					15	30		45	
02/07/2026	1	Buzzard	1	09:56		75	35	10				120	
02/07/2026	1	Buzzard	1	10:30		35	10					45	
02/07/2026	1	Buzzard	1	11:01	5	70	15					90	
02/07/2026	1	Lesser Black-backed Gull	1	12:44		5	55					60	
02/07/2026	1	Buzzard	1	12:48	3	17						20	
14/08/2026	1	Buzzard	1	08:42						60		60	
14/08/2026	1	Sparrowhawk	1	09:15	18							18	

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
17/08/2026	1	Buzzard	1	15:32				20				20	
21/08/26	1	Lesser Black-backed Gull	3	06:49	30	45						75	Two adults and a juvenile. Flying low and slow mostly
21/08/26	1	Raven	3	10:07		15	15					30	Displaying and calling
24/08/2026	1	Buzzard	1	17:14	30	90	120					240	
24/08/2026	1	Buzzard	1	17:33	30	120	60					210	Perches on mast. Occasionally harassed by smaller birds
24/08/2026	1	Buzzard	1	19:14			30					30	Heard calling before entering view.
24/08/2026	1	Raven	2	20:23			15					15	Calling a lot as they fly
22/04/2026	2	Buzzard	1	09:42					60			60	Mobbed by crow
22/04/2026	2	Buzzard	2	09:55					120			120	
22/04/2026	2	Buzzard	1	10:09					120			120	
22/04/2026	2	Buzzard	1	10:30					90			90	
22/04/2026	2	Buzzard	1	10:32			5					5	
22/04/2026	2	Buzzard	2	10:36						70		70	
22/04/2026	2	Buzzard	1	11:26					90			90	
22/04/2026	2	Buzzard	1	11:30					250	50		300	
22/04/2026	2	Buzzard	1	12:25					60			60	
22/04/2026	2	Buzzard	1	12:33					50			50	
22/04/2026	2	Buzzard	2	14:42					120			120	

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
22/04/2026	2	Buzzard	1	15:28				80				80	
13/05/2026	2	Buzzard	1	17:31					45			45	
13/05/2026	2	Buzzard	1	17:40						30		30	
18/05/2026	2	Sparrowhawk	2	17:46		20						20	
18/05/2026	2	Sparrowhawk	1	18:11	10							10	
03/06/2026	2	Nil Sightings		10:20									
08/06/2026	2	Nil Sightings		11:30									
22/06/2026	2	Buzzard	1	13:49	5	10						15	Dives after something
22/06/2026	2	Buzzard	2	14:25		120	300	120	120	120	60	840	
22/06/2026	2	Buzzard	1	15:09			150					150	
08/07/2026	2	Kestrel	1	12:26		5						5	
08/07/2026	2	Buzzard	1	12:34			8					8	
08/07/2026	2	Buzzard	1	12:35			11					11	
23/07/2026	2	Buzzard	1	14:18		25	10					35	
06/08/2026	2	Raven	3	19:00		53						53	
06/08/2026	2	Sparrowhawk	1	19:08		36						36	
06/08/2026	2	Raven	1	19:16				54				54	
06/08/2026	2	Raven	1	19:36			53					53	
14/08/2026	2	Raven	2	13:40			24					24	
14/08/2026	2	Raven	2	14:09			40					40	
14/08/2026	2	Raven	1	14:25			20					20	
14/08/2026	2	Raven	3	15:10					100	70		170	
20/08/26	2	Buzzard	1	06:30				70				70	
20/08/26	2	Buzzard	1	06:40					95			95	
20/08/26	2	Peregrine	1	09:10				25				25	
26/08/2026	2	Nil Sightings		NA									
25/08/2026	2	Raven	1	16:49		10						10	
25/08/2026	2	Lesser Black-backed Gull	1	19:41		10						10	Calling as it flies
23/04/2026	3	Nil Sightings		09:50									
23/04/2026	3	Nil Sightings		13:20									
30/04/2026	3	Nil Sightings		10:00									
19/05/2026	3	Black-headed Gull	7	18:31			80					80	

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
27/05/2026	3	Peregrine	1	09:45		25						25	
27/05/2026	3	Peregrine	1	10:37			100	20	20			140	Mobbed by crows
27/05/2026	3	Kestrel	1	10:38		15						15	Flying below peregrine
27/05/2026	3	Kestrel	1	10:39		25						25	
10/06/2026	3	Nil Sightings		10:20									
10/06/2026	3	Buzzard	1	14:10					40			40	
10/06/2026	3	Buzzard	1	14:13				35				35	
16/06/2026	3	Black-headed Gull	1	8:22			15					15	Calling
16/06/2026	3	Lesser Black-backed Gull	1	8:24		20						20	
14/07/2026	3	Raven	1	18:38			47					47	
14/07/2026	3	Raven	1	18:55			58					58	
14/07/2026	3	Peregrine	2	19:25			100	207				307	
15/07/2026	3	Grey Heron	1	13:58			30					30	
15/07/2026	3	Buzzard	1	14:03	45	15						60	
15/07/2026	3	Buzzard	1	16:18	90	90						180	
10/08/2026	3	Raven	1	17:21				36	50	150		236	
10/08/2026	3	Peregrine	1	17:24					42			42	
10/08/2026	3	Raven	1	17:41			23					23	Landed on telegraph post
10/08/2026	3	Raven	1	17:44				53				53	
10/08/2026	3	Buzzard	2	18:23						182		182	
10/08/2026	3	Raven	1	18:52			43					43	
10/08/2026	3	Buzzard	1	18:52		20						20	
10/08/2026	3	Raven	1	20:00						94		94	
10/08/2026	3	Raven	4	21:03			90					90	
14/08/2026	3	Buzzard	1	11:15			177					177	
14/08/2026	3	Buzzard	1	11:25				100	120			220	
14/08/2026	3	Raven	2	11:25					150			150	
14/08/2026	3	Raven	1	11:35		75						75	

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
14/08/2026	3	Raven	1	11:36					94			94	
14/08/2026	3	Raven	3	11:52				96				96	
14/08/2026	3	Raven	1	11:53				53				53	
14/08/2026	3	Raven	2	12:19		32						32	
14/08/2026	3	Raven	1	12:23		30						30	
14/08/2026	3	Peregrine	1	06:01						25		25	
27/08/26	3	Lesser Black-backed Gull	6	07:31		10	35					45	
27/08/26	3	Nil Sightings		09:33									
27/04/2026	4	Sparrowhawk	1	16:34	45							45	
27/04/2026	4	Sparrowhawk	1	16:40	30							30	
27/04/2026	4	Buzzard	1	18:49						60		60	
20/05/2026	4	Nil Sightings		10:40									
03/06/2026	4	Nil Sightings		09:48									
12/06/2026	4	Black-headed Gull	1	09:32		20						20	
24/06/2026	4	Nil Sightings		12:04									
17/07/2026	4	Buzzard	1	12:44			15					15	
17/07/2026	4	Buzzard	1	13:03				15	15	94		124	
17/07/2026	4	Kestrel	1	13:25	30	40	52					122	
17/07/2026	4	Buzzard	1	14:49	24							24	Carrying prey
17/07/2026	4	Raven	1	15:00						330		330	
21/07/2026	4	Buzzard	1	19:11	30	90	30					150	Heard calling in distance occasionally
10/08/2026	4	Peregrine	1	17:36		15						15	
13/08/2026	4	Buzzard	1	17:07				44	50	150		244	
13/08/2026	4	Raven	1	17:34				122				122	
13/08/2026	4	Raven	2	17:34					56			56	
13/08/2026	4	Raven	4	17:47			83					83	
13/08/2026	4	Lesser Black-backed Gull	1	18:05		15						15	
13/08/2026	4	Nil Sightings		19:30									

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
19/08/2026	4	Buzzard	1	16:08	15	15	30					60	Calling occasionally
26/08/2026	4	Nil Sightings		15:00									
26/08/2026	4	Nil Sightings		17:25									
29/04/2026	5	Nil Sightings		08:55									
29/04/2026	5	Nil Sightings		12:25									
15/05/2026	5	Kestrel	1	11:20		70						70	
15/05/2026	5	Black-headed Gull	1	11:30		15						15	
15/05/2026	5	Black-headed Gull	4	14:58		50						50	
20/05/2026	5	Nil Sightings		13:51									
04/06/2026	5	Nil Sightings	1	08:30					50			50	
04/06/2026	5	Buzzard	1	11:41		30						30	
04/06/2026	5	Kestrel	1	12:51			50					50	
05/06/2026	5	Nil Sightings		11:15									
14/07/2026	5	Buzzard	1	20:04		60	120	60	60			300	
22/07/2026	5	Buzzard	1	13:11	60	120	60					240	
22/07/2026	5	Buzzard	1	14:13		15	15	15				45	
22/07/2026	5	Buzzard	1	15:57			10					10	
10/08/2026	5	Buzzard	1	18:38					20			20	
10/08/2026	5	Buzzard	1	19:36				30				30	
17/08/2026	5	Buzzard	1	18:03	30	15						45	
17/08/2026	5	Buzzard	1	19:38		30	15	15				60	
19/08/2026	5	Nil Sightings		14:10									
26/08/2026	5	Buzzard	1	07:02		30						30	
26/08/2026	5	Lesser Black-backed Gull	6	07:04			20					20	
26/08/2026	5	Nil Sightings		10:30									
29/04/2026	6	Buzzard	1	14:41		10	100	70				180	
29/04/2026	6	Buzzard	2	15:05	3	17						20	
27/05/2026	6	Nil Sightings		07:26									
28/05/2026	6	Buzzard	1	17:06		45	90	15				150	
28/05/2026	6	Buzzard	1	17:13		10	35					45	
28/05/2026	6	Buzzard	1	17:15						120		120	

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
28/05/2026	6	Buzzard	1	17:19	10	65	15					90	
28/05/2026	6	Buzzard	1	17:22						210		210	
28/05/2026	6	Buzzard	1	17:27		15						15	
28/05/2026	6	Buzzard	1	17:35		35						35	
28/05/2026	6	Black-headed Gull	2	17:37		5	40	15				60	
28/05/2026	6	Mallard	2	17:40	3	17						20	
28/05/2026	6	Buzzard	1	17:51		15	5					20	
28/05/2026	6	Buzzard	1	20:47		15						15	
09/06/2026	6	Nil Sightings		10:50									
09/06/2026	6	Peregrine	1	12:57			50					50	
09/06/2026	6	Buzzard	1	13:30	50							50	
09/06/2026	6	Buzzard	1	13:32		120						120	
09/06/2026	6	Kestrel	1	13:45		30						30	
09/06/2026	6	Kestrel	1	13:47		30						30	Mobbed by crows
09/06/2026	6	Black-headed Gull	2	14:49			40					40	
17/06/2026	6	Buzzard	1	9:02	60	60	120	120				360	
17/06/2026	6	Buzzard	1	9:24		60	120	120				300	
17/06/2026	6	Buzzard	1	9:46	30	30	60	15				135	
17/06/2026	6	Buzzard	1	10:48	120	120	60					300	
15/07/2026	6	Buzzard	1	13:52					94			94	
15/07/2026	6	Buzzard	1	13:52				70				70	
15/07/2026	6	Sparrowhawk	1	14:10						137	100	237	
15/07/2026	6	Buzzard	1	14:24			26					26	
15/07/2026	6	Buzzard	1	14:42						307		307	
15/07/2026	6	Sparrowhawk	1	15:14		37						37	
15/07/2026	6	Sparrowhawk	1	15:25						189		189	
15/07/2026	6	Buzzard	1	15:25			50					50	
15/07/2026	6	Raven	1	16:11			37					37	
15/07/2026	6	Raven	1	16:14	23	40						63	Landed in tree
15/07/2026	6	Buzzard	1	16:28						137		137	

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
15/07/2026	6	Raven	1	16:31		47						47	Landed in tree
15/07/2026	6	Buzzard	1	16:33	5							5	Must have been a BZ nest in these trees. There was at least 2 juveniles calling throughout survey, but only sometimes visible
15/07/2026	6	Raven	1	16:45	27							27	Landed in tree
15/07/2026	6	Buzzard	1	17:02						310		310	
15/07/2026	6	Buzzard	1	17:17		23						23	
15/07/2026	6	Raven	1	17:20	44							44	
15/07/2026	6	Buzzard	1	17:38						322		322	
21/07/2026	6	Nil Sightings		20:25									
11/08/2026	6	Buzzard	1	18:43					100			100	
11/08/2026	6	Nil Sightings		19:35									
13/08/2026	6	Buzzard	1	17:01						40		40	
13/08/2026	6	Kestrel	1	17:25		10						10	
13/08/2026	6	Kestrel	1	17:27			20					20	
17/08/2026	6	Buzzard	1	12:30					40			40	
17/08/2026	6	Buzzard	1	13:47			30					30	
24/08/2026	6	Buzzard	1	06:10		15						15	Landed on post
24/08/2026	6	Kestrel	1	06:25		300						300	
24/08/2026	6	Kestrel	1	06:37		50	38	20				108	
24/08/2026	6	Kestrel	1	09:57				69	50	100		219	
24/08/2026	6	Kestrel	1	09:59			35					35	

Date	VP Number	Species	Number	Time of sighting	<10m	10-20m	20-30m	30-40m	40-50m	50-200m	>200m	Total Duration (sec)	Notes
24/08/2026	6	Kestrel	1	10:09			97					97	
24/08/2026	6	Raven	1	10:22		20	40					60	Landed in tree
25/08/2026	2	Raven	1	16:49		10						10	25/08/2026
25/08/2026	2	Lesser Black-backed Gull	1	19:41		10						10	25/08/2026
26/08/2026	2	Nil Sightings		NA									26/08/2026
26/08/2026	4	Nil Sightings		15:00									26/08/2026
26/08/2026	4	Nil Sightings		17:25									26/08/2026
26/08/2026	5	Buzzard	1	07:02		30						30	26/08/2026
26/08/2026	5	Lesser Black-backed Gull	6	07:04			20					20	26/08/2026
26/08/2026	5	Nil Sightings		10:30									26/08/2026
27/08/2026	3	Lesser Black-backed Gull	6	07:31		10	35					45	27/08/2026
27/08/2026	3	Nil Sightings		09:33									27/08/2026

***Redacted* A13.6.3** Peregrine Sensitive Data

Table 39: *Redacted* Peregrine Survey Results.

Date	Survey Types	Start Time	End Time	Duration of Survey (sec)	Location of Sighting (10km OS Grid Square)	Species	Evidence	Site Type	Suitability	Notes
08/04/2025	Suitability	08:00	14:30	23400	S36	Peregrine	Species Present	Old derelict Castle building	High	Two Peregrine seen perched on structure. Potential breeding pair.
07/05/2025	Activity	09:40	11:40	7200	S36	Peregrine	Species present	Ruins	-	Female perched on castle ruins, preening herself. Arrived 09:50. Male arrived at 10:25, female went to a lower ledge on the castle at potential nest. Male left at 10:35. Female was still at nest when I left at 11:40.
21/05/2025	Activity	11:30	17:55	23100	S36	Peregrine	Species present	Old Castle structure	-	Female Peregrine seen perched on structure. No nest found or signs of nesting as structure is full of Jackdaw nests.
21/05/2025	Activity	11:30	17:55	23100	S37	Peregrine	Nest found	Active quarry	-	Both male and female seen. Female was slightly hidden behind the rocks and grass growing around the rocks and was heard calling repeatedly. Male was spotted few meters away from nest
25/06/2025	Activity	09:30	11:00	5400	S36	Peregrine	Species present	Ruins	-	Three juvenile Peregrine present at top of castle. 09:50 Two adults arrived to drop off food. All Peregrine flew from castle at 10:05. 10:25 Female Peregrine brought back crow to the vicinity of the castle.

Date	Survey Types	Start Time	End Time	Duration of Survey (sec)	Location of Sighting (10km OS Grid Square)	Species	Evidence	Site Type	Suitability	Notes
25/06/2025	Activity	11:10	12:40	5400	S37	Peregrine	Species present	Quarry	-	One Juvenile present on ledge. 11:17 Female Peregrine brought food to juvenile
21/04/2026	Suitability	10:20	15:20	18000	S36	-	-	Ruins	High	Species previously present, disregarded rings present
11/05/2026	Activity	12:50	14:15	5100	S36	Peregrine	Species present	Castle ruin	-	Sitting on nest
17/06/2026	Activity	09:11	09:35	1440	S37	Peregrine	Species present	Castle ruins	-	
17/06/2026	Activity	09:45	10:17	1920	S36	Peregrine	Species present	Castle ruins	-	Parents and chick spotted*

Ecopower Developments Ltd.

Gathabawn Wind Farm

Appendix to the Screening for Appropriate Assessment Report

Appendix F: Collision Risk Model

September 2026

This report considers the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

INIS Environmental Consultants Ltd.
Suite 16,
Clare Technology Park,
Gort Road,
Ennis,
County Clare
Ireland.

Quality Assurance

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The findings outlined within this report and the data we have provided are to our knowledge true and express our bona fide professional opinions. This report has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Code of Professional Conduct. Where pertinent CIEEM Guidelines used in the preparation of this report include the *Guidelines for Ecological Report Writing* (CIEEM, 2017a), and *Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2024).

Due cognisance has been given at all times to the provisions of the *Wildlife Acts 1976 - 2024,* the *European Union (Natural Habitats) Regulations. SI 378/2005*, the *European Communities (Birds and Natural Habitats) Regulations 2011,* EU Regulation on Invasive Alien Species under *EU Regulation 1143/2014*, the EU Birds *Directive 2009/147/EC* and the EU *Habitats Directive 92/43/EEC*.

No method of assessment can completely remove the possibility of obtaining partially imprecise or incomplete information. Any limitation to the methods applied or constraints however are clearly identified within the main body of this document.

Notice

This Collision Risk Model (CRM) was produced by INIS Environmental Consultants Ltd. (INIS) on behalf of Ecopower Developments Ltd. (hereafter known as the Applicant) to accompany **EIAR Chapter 13. Biodiversity** for the proposed Gathabawn Wind Farm Project in County Kilkenny. The purpose of this CRM is to provide information on avian collision risk associated with the Gathabawn Wind Farm Project.

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Appendix A Gathabawn Windfarm - Vantage Point Survey Effort
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1. INTRODUCTION

Inis Environmental Consultants Ltd. (INIS) was commissioned to undertake an assessment of collision risk for potentially sensitive avian receptors at the proposed Gathabawn Windfarm Project in Co. Kilkenny (hereafter referred to as the 'proposed Project') using standardised Collision Risk Modelling (CRM) methods.

1.1. Constraints and Limitations

There are a number of constraints and limitations associated with pre-planning ecological assessments of potential development sites, as well as constraints and limitations inherent to the collection and analysis of field-based ecological data (Band, 2024; NatureScot, 2024; NatureScot, 2025).

The data evaluated here comprises:

- Bird flight data from timed Vantage Point (VP) watches (using six VPs), clipped to the proposed Project footprint with a 1km buffer and consisting of flights within the rotor-swept heights (10-200m). Flight duration (in seconds) for all bird observations, along with data relevant to each flight record (date, timing, weather conditions, VP location (number), etc.), are included;
- Vantage Point survey effort data (recorded as hours of observations) on a monthly basis during the breeding season (April to October for 2025 and April to August 2026) and wintering season (October 2022 to May 2023 and October 2025 to March 2026) for all VP survey work undertaken;
- Area viewed from each VP (in hectares) within the Flight Risk Area – this comprises an area with extending 600m from each turbine;
- Description and metrics for the wind farm as a whole, as well as for individual turbines.

This collision risk model relates specifically to the VP survey data. In particular, any variation in the flight data, coverage of the VPs surveyed during fieldwork, layout of the wind farm or individual turbine specifications, including upper and lower rotor swept heights, would require the outputs from this model to be amended.

Note that the methodology presented here involves using a 1km buffer to clip flight lines. This is beyond the minimum blade length plus 500m buffer extending from each turbine indicated by Best Practice guidelines (NatureScot, 2024). Therefore, the CRM results presented here include additional flightlines beyond the area that is calculated for collision risk. By including these additional flightlines, a substantially more conservative (i.e. higher) estimate of collision risk than is likely to be the case by incorporating additional flight lines within this extended buffer (the areal bird density calculations are based upon a survey area extending 600m from each turbine). This approach therefore allows a more robust evaluation of potential impacts (if any) arising from the data presented here.

For field-based surveys, the availability of suitable weather conditions for completing surveys, with good visibility and avoidance of strong winds or heavy rain, must be considered. The avian flight data presented here were all collected in suitable weather conditions, as determined by Best Practice guidance (NatureScot, 2017). In some circumstances, this required re-arrangement of monthly schedules, with some VPs being surveyed twice in one month to compensate for months when no survey work took place. These are clearly indicated within the data and are presented in **Appendix A**.

It should be noted that such scheduling falls well within the tolerances of Best Practice guidelines (SNH, 2017) for such survey work. In all cases, Best Practice guidance (SNH, 2017) on selection and surveying at VPs has been adhered to throughout the work being reported.

When recording birds in flight, exact determination of ground location and flight height, both of which are essential to calculating collision risk, can be subject to variation between observers. It is therefore required to allow some margin of error for determining the exact location of flying birds, and this has been included within the CRM presented here by the inclusion of all recorded flight lines in an expanded 1km buffer zone, and also including data from all flight lines that intersect with this extended buffer, i.e. if a flight line originated within the buffer zone, but flew beyond the 1km boundary, the flight was continuously recorded, and the time flying outside the buffer also included within the CRM calculations. Similarly for flight height, two hub heights are proposed – 82m for Turbine T6, T7 & T9, and 102m for all other turbines. This gives a rotor-swept height between 14m and 150m for T6, T7 & T9, and between 34m and 170m for all other turbines. However, all bird records consisting of flight heights between 10m and 200m are included in the model.

Collectively, the inclusion of these data will increase the estimation of collision risk, supporting more robust outputs and therefore interpretation of results than would otherwise be the case.

1.2. Statement of Authority

Dr Alex Copland BSc PhD MIEnvSc MCIEEM is a Technical Director with INIS and reviewed this report. He has over 30 years of professional experience working in both statutory agencies and private companies, in third-level research institutions and with environmental NGOs. He is proficient in experimental design and data analysis and has managed several large-scale, multi-disciplinary ecological projects. These have included research and targeted management work for species of conservation concern, the design and delivery of practical conservation actions with a range of stakeholders and end-users, education, and interpretation on the interface between people and the environment and the development of co-ordinated, strategic plans for birds and biodiversity.

He has authored numerous scientific papers, developed and contributed to evidence-based position papers, visions and strategies on birds and habitats in Ireland. He has supervised the successful completion of research theses for several post-graduate students, including doctoral candidates. He lectures to both undergraduate and post-graduate students at UCD, as well as being a collaborative researcher with both UCD and UCC. He also sits on the Editorial Panel of the scientific journal, *Irish Birds*, which publishes original ornithological research relevant to Ireland's avifauna.

1.3. Site and Project Description

The proposed Gathabawn Windfarm Project site is located entirely within County Kilkenny, with the nearest village is Gathabawn village which is 1km southeast from the nearest Ballylehaun turbine and 3km west from the nearest Ballyring turbine. Lisdowney village is also located 3km to the northeast of the nearest Ballyring turbine, and at least 6km from the Ballylehaun turbines. The town of Ballyragget is located 6km northeast of Ballyring and 10km east of Ballylehaun, while the town of Johnstown is located 6km from Ballylehaun and 9km from Ballyring.

The receiving environment for the Proposed Project is characterised as rural open countryside with lands enclosed by hedgerows or stone walls. There are farmsteads and one-off housing located along the local roads and generally the commercial, civic and community services are in the surrounding

small towns and villages. Farming in the area is predominantly grassland supporting dairy and beef cattle and to a lesser degree sheep farming and tillage.

The layout of the proposed Project consists of 12 turbines, of which one turbine option is being considered (i.e., Vestas 136). The proposed Project comprises five turbines in the Ballyring area and seven turbines in the Ballylehaun area.

The turbine specifications used in this CRM are shown in **Table 1.1**.

Table 1.1 *Turbine specification for VESTAS V-136 for the proposed Project*

Technical information	Turbine Option
Number of turbines	12
Number of blades per turbine	3
Rotor diameter	136m
Rotor radius	68m
Hub height	82m & 102m
Lowest swept area of blade	14m & 32m
Maximum tip height	150m and 170m
Rotor blade maximum chord	4.1m
Pitch angle of the blade during normal operation[1]	30°
Rotation speed	14rpm
Rotation period	4.29s
Turbine operation time[2]	85%

[1] *The pitch angle of the blade is determined by wind speed, which is variable depending upon geographical location, landscape, local topographic factors, etc. To maintain a constant operating speed for a turbine, altering the pitch angle of the blade is used. This is usually determined by wind speed, with higher wind speeds requiring greater pitch angle to "feather" the wind and thereby control the rotation speed. The figure of 30° used here is derived from Band (2012) which gives an average pitch along the blade length of between 15 – 30 degrees (30° results in greater likelihood of effects and is used within this model which has adopted a precautionary approach to the determination of risk).*

[2] *European Wind Energy Association (2020) gives the average operation time of a turbine of between 70% and 85% of the time; NatureScot (2024) recommends default of 85% which is used here.*

1.4. Background to bird species assessed

The species selected for collision risk modelling are shown in **Tables 1.2** (breeding season) and **Table 1.3** (non-breeding season). Whilst some birds can occur at a site all year round, there tends to be differing activity levels between breeding and non-breeding seasons. This can be seen by the differences in activity between **Table 1.2** and **Table 1.3** where, for example, Black-headed Gull *Chroicocephalus ridibundus* and Lesser Black-backed Gull *Larus argentatus* are more regularly observed in winter months compared to summer. Conversely, there is increased activity of Buzzard *Buteo buteo* and Peregrine *Falco peregrinus* during the breeding season.

Target species for the proposed Project are based upon likely collision risk as well as their status as Birds of Conservation Concern in Ireland (BoCCI) Red or Amber Lists (Gilbert *et al*., 2021). Target species were:

- All species of waterfowl;
- All species of raptors;
- All species of wader; and
- All species of gull.

From this target species list, ten species were recorded during VP Watches in the breeding season (see **Table 1.2**) with 12 species recorded during the winter season (see **Table 1.3**). From these species, only those with sufficient flight activity (defined here as a minimum total of five flights per season and a minimum of ten individuals of each species recorded during each season of analysis; numbers below these thresholds will exhibit negligible collision risk) are retained for analysis. This resulted in nine species being assessed for collision risk during the breeding season (Black-headed Gull, Buzzard, Golden Plover *Pluvialis apricaria*, Kestrel *Falco tinnunculus*, Lesser Black-backed Gull, Peregrine, Snipe *Gallinago gallinago* and Sparrowhawk *Accipiter nisus*; see **Table 1.2**) and 11 species being assessed during the wintering season (Black-headed Gull*,* Buzzard, Golden Plover, Kestrel, Lapwing *Vanellus vanellus*, Lesser Black-backed Gull, Mute Swan *Cygnus olor*, Peregrine, Snipe, Sparrowhawk and Whooper Swan *Cygnus cygnus*; **see Table 1.3**).

For the 11 species being assessed, biometric data is required for inputting to the CRMs. These are shown in **Table 1.4**, along with the recommended avoidance rates applied in the CRMs (NatureScot, 2025).

Table 1.2 *Breeding season flight data for target species from Vantage Point Surveys*

Species	Number of Bouts			Number of Individuals			Duration of Bouts (s)			Inclusion in CRM
	Ballylehaun	Ballyring	TOTAL	Ballylehaun	Ballyring	TOTAL	Ballylehaun	Ballyring	TOTAL	
Black-headed Gull *Chroicocephalus ridibundus*	**6**	**1**	**7**	**18**	**3**	**6**	**795**	**560**	**1,355**	**Yes**
Buzzard *Buteo buteo*	**103**	**97**	**200**	**108**	**108**	**216**	**13,994**	**20,148**	**34,142**	**Yes**
Golden Plover *Pluvialis apricaria*	**1**		**1**	**28**		**28**	**840**		**840**	**Yes**
Grey Heron *Ardea cinerea*		1	1		1	1		30	30	No
Kestrel *Falco tinnunculus*	**29**	**8**	**37**	**34**	**8**	**42**	**4,852**	**302**	**5,154**	**Yes**
Lesser Black-backed Gull *Larus fuscus*	**7**	**16**	**23**	**33**	**28**	**61**	**2,850**	**1,461**	**4,311**	**Yes**
Mallard *Anas platyrhnchos*	1		1	2		2	40		40	No
Peregrine *Falco peregrinus*	**4**	**5**	**9**	**4**	**5**	**9**	**155**	**857**	**1,012**	**Yes**
Snipe *Gallinago Gallinago*		**1**	**1**		**1**	**1**		**5**	**5**	**Yes**
Sparrowhawk *Accipiter nisus*	**8**	**3**	**11**	**8**	**4**	**12**	**646**	**136**	**782**	**Yes**

Table 1.3 *Wintering season flight data for target species from Ballyring Vantage Point Surveys*

Species	Number of Bouts			Number of Individuals			Duration of Bouts (s)			Inclusion in CRM
	Ballylehaun	Ballyring	TOTAL	Ballylehaun	Ballyring	TOTAL	Ballylehaun	Ballyring	TOTAL	
Black-headed Gull *Chroicocephalus ridibundus*	**6**	**14**	**20**	**28**	**138**	**166**	**1,010**	**10,828**	**11,838**	**Yes**
Buzzard *Buteo buteo*	**26**	**38**	**64**	**31**	**46**	**77**	**4,038**	**5,493**	**9,531**	**Yes**
Golden Plover *Pluvialis apricaria*	**2**	**10**	**12**	**28**	**1,350**	**1,378**	**3,360**	**542,005**	**545,365**	**Yes**
Grey Heron *Ardea cinerea*		1	1		1	1		270	270	No
Kestrel *Falco tinnunculus*	**14**	**31**	**45**	**15**	**33**	**48**	**1,685**	**3,697**	**5,382**	**Yes**
Lapwing *Vanellus vanellus*		**2**	**2**		**14**	**14**		**600**	**600**	**Yes**
Lesser Black-backed Gull *Larus fuscus*	**24**	**16**	**40**	**750**	**114**	**864**	**48,490**	**7,278**	**55,768**	**Yes**
Mute Swan *Cygnus olor*	**7**	**3**	**10**	**4**	**11**	**15**	**480**	**1,200**	**1,680**	**Yes**
Peregrine *Falco peregrinus*		**1**	**1**		**1**	**1**		**25**	**25**	**Yes**
Snipe *Gallinago Gallinago*		**7**	**7**		**12**	**12**		**435**	**435**	**Yes**
Sparrowhawk *Accipiter nisus*	**4**	**4**	**8**	**5**	**4**	**9**	**420**	**120**	**540**	**Yes**
Whooper Swan *Cygnus cygnus*	**1**	**1**	**2**	**6**	**3**	**9**	**360**	**1,050**	**1,410**	**Yes**

Table 1.4 *Bird species biometrics and avoidance rates for use in CRM*

Species	Assessment Season	Length (bill to tail)	Wingspan	Flight speed[2]	Collision Avoidance Rate (%)[3]	Flight type	Nocturnal Activity Factor
Black-headed Gull	Breeding + Winter	0.37m	1.10m	11.9ms^{-1}	99.2%	Flapping	1
Buzzard	Breeding + Winter	0.57m	1.28m	11.6ms^{-1}	98%	Gliding	1
Golden Plover	Breeding + Winter	0.29m	0.76m	17.9ms^{-1}	99.6%[4]	Flapping	5[5]
Kestrel	Breeding + Winter	0.35m	0.80m	10.1ms^{-1}	95%	Flapping	1
Lapwing	Winter	0.31m	0.87	11.9ms^{-1}	98%	Flapping	5[5]
Lesser Black-backed Gull	Breeding + Winter	0.64m	1.50m	11.9ms^{-1}	99.5%	Gliding	1
Mute Swan	Winter	1.60m	2.38m	16.2ms^{-1}	99.5%	Flapping	3[6]
Peregrine	Breeding + Winter	0.5m	1.15m	12.1ms^{-1}	98%	Gliding	1
Snipe	Breeding + Winter	0.28m	0.45m	17.1ms^{-1}	98%	Flapping	5[7]
Sparrowhawk	Breeding + Winter	0.38m	0.70m	10.0ms^{-1}	98%	Flapping	1
Whooper Swan	Winter	1.60m	2.35m	17.3ms^{-1}	99.5%	Flapping	**3**[8]

Data sourced from https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/ [Accessed November 2025]

[2] Data sourced from Alerstam *et al*. (2007); for Golden Plover, data for Grey Plover *Pluvialis squatarola* are used.

[3] Avoidance rates sourced from NatureScot (2025).

[4] Avoidance Rate for Golden Plover is given by NatureScot (2025) as 98% (the default avoidance rate). However, recent studies, including a review of collision monitoring data from four UK wind farms, recommended the use of two avoidance rate values: 99.6% and 99.8% (Gittings, 2022); 99.6% is used here.

[5] Determined from Gillings & Sutherland (2007) (which indicates that nocturnal prey intake rates were higher than diurnal rates (likely due to reduced competition); no information on movement but assumption that nocturnal activity may equal diurnal activity on a precautionary basis).

[6] Determined from Włodarczyk (2017), which indicates that Mute Swan shows some activity at low light levels around dusk and dawn; as such, a precautionary approach has been taken here.

[7] Determined from McNeil & Rodríguez (1996) which indicates increased crepuscular and nocturnal Snipe activity over daytime periods.

[8] Determined from Larsen & Clausen (2002), which indicates that sunrise and sunset activity occurs; as such, a precautionary approach has been taken here.

2. METHODOLOGICAL APPROACH

Collision Risk Modelling adopts a mathematical approach to determining the likelihood of a bird species colliding with wind turbine rotors at a pre-defined site and is fully described by Band *et al*. (2024) and NatureScot (2024), with supporting information provided by NatureScot (2025). This determination is based upon field data collected at the proposed wind farm site. The output from the model indicates the number of birds likely to collide with rotors of all turbines within the wind farm per year of operation of the wind farm as a whole. The inverse of this (i.e., the number of years over which a single fatality would be likely) is also indicated.

Standardised field data collected following Best Practice methods on birds flying through the proposed site (SNH, 2017) are used to determine the number of flights through the wind farm in the absence of any avoidance (or attraction) behaviours. This is Stage A of the standardized CRM approach (NatureScot, 2024). The output of Stage A is reconciled against the cross-sectional area of the rotors (**Table 1.1**) to estimate the number of flights through the rotor-swept area (Stage B of the standardized CRM approach (NatureScot, 2024)).

Stage C of the standardized CRM (NatureScot, 2024) determines the probability of collision for a single rotor transit of a bird, using further data on the rotor characteristics (**Table 1.1**) as well as biometric data on the bird species themselves (**Table 1.4**).

These data from Stages A, B and C are then used to determine the number of bird flights through the rotors of all turbines within the area on an annual basis (CRM Stage D) as well as the proportion of time that the wind farm rotors are operational (**see Table 1.**1). Stage E applies an avoidance rate for birds (see **Table 1.4**), based on published data.

The final part of the CRM (Stage F) is to identify any uncertainties around the output from Stage E.

2.1. Collection of field data

The CRM is based upon data collected from VPs at the proposed Gathabawn Windfarm Project, during the breeding season (March to October inclusive in 2025 and April to August inclusive in 2026), and two wintering seasons (October 2022 to April 2023 and October 2025 to March 2026). These data are collected following Best Practice methods (SNH, 2017). For full details of sources of timing of survey efforts for the data used for this CRM, please see **Appendix A.**

Both areas are covered by three Vantage Points (VPs) each: VP1, VP2 and VP3 cover Ballyring; VP4, VP5 and VP6 cover Ballylehaun. As the two areas, Ballyring and Ballylehaun, are separated by c.3km, separate collision risk models have been prepared for each area with the results combined to determine overall collision risk. The data for the two areas, Ballyring and Ballylehaun, are tabulated together in this report to assist with interpretation; however, the output from the NatureSCot Band model (see **Appendix B**) is presented for each area separately.

2.2. CRM Stage A: Determination of Flight Activity

Stage A of the CRM determines the number of flights through the wind farm in the absence of any avoidance (or attraction) behaviours. This is expressed as the **Areal Bird Density** ($\mathbf{D_A}$), which is the time per unit area that a bird species may be present within the turbines are, and is derived from the Vantage Point data. $\mathbf{D_A}$ is presented as bird-seconds/km^2, and is calculated as follows:

$$D_A = b/(t \times A)$$

Where: b is the number of flight seconds from a vantage point;
t is the time (in seconds) that the vantage point is watched; and
A is the area of the vantage point viewshed (km^2)

D_A is therefore calculated for each species for each Vantage Point within each season. These data can be presented monthly, but with low levels of activity they can also be averaged over the whole season and across the whole site (including both Ballyring and Ballylehaun areas) for all Vantage Points (see **Tables 2.1a – 2.1k**; Note that VP1, VP2 and VP3 cover Ballyring; VP4, VP5 and VP6 cover Ballylehaun). For all species considered in the CRM, the mean bird density per season (breeding or non-breeding) has been used to determine **D_A**. These are shown in **Tables 2.1a – 2.1k** and in **Appendix B** for all species considered.

Note that best practice requires that all flight activity within the Flight Risk Area - an area equal to the rotor length plus 500m, extending from each turbine, is used to determine **D_A**. For the proposed Project this would make the area for data collection a maximum of 568m (see **Table 1.1** for the Turbine measurements). To ensure that all areas are covered within the CRM, this data used to determine **D_A** extends to 600m from the turbine bases. However, all flightlines that touch into a 1km buffer from the turbines are included in full (i.e. all flight times outside the 1km buffer are also include within the model). As a result, **D_A** is therefore higher than is required by the published methodology (NatureScot, 2024), which increases the value of the collision risk estimate provided by the model.

Table 2.1a *Determination of Flight Activity for Black-headed Gull*

Season / Year	VP	Survey Area (km^2)	Breeding			Non-breeding		
			Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km^2)	Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km^2)
Year 1	VP1	1.46	129,600	0	0	108,000	270	0.001712
	VP2	1.68	129,600	0	0	129,600	300	0.001378
	VP3	1.22	129,600	0	0	162,000	400	0.002024
	VP4	1.74	129,600	360	0.001596	146,700	0	0
	VP5	2.21	129,600	0	0	127,800	4,611	0.016326
	VP6	2.04	145,800	0	0	129,600	360	0.001362
Year 2	VP1	1.46	129,600	0	0	129,600	40	0.000211
	VP2	1.68	129,600	0	0	129,600	0	0
	VP3	1.22	129,600	560	0.003542	129,600	0	0
	VP4	1.74	129,600	20	0.000089	129,600	0	0
	VP5	2.21	129,600	215	0.000751	129,600	5,632	0.019664
	VP6	2.04	129,600	200	0.000672	129,600	225	0.000851
Mean bird density					**0.000554**	**Mean bird density**		**0.003627**

Table 2.1b *Determination of Flight Activity for Buzzard*

Season / Year	VP	Survey Area (km²)	Breeding			Non-breeding		
			Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)	Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)
Year 1	VP1	1.46	129,600	1,280	0.006765	108,000	750	0.004756
	VP2	1.68	129,600	2,453	0.011266	129,600	708	0.003252
	VP3	1.22	129,600	9,704	0.061374	162,000	270	0.001366
	VP4	1.74	129,600	5,538	0.024558	146,700	3,167	0.012407
	VP5	2.21	129,600	1,516	0.005293	127,800	370	0.001310
	VP6	2.04	145,800	1,451	0.004878	129,600	1,212	0.004584
Year 2	VP1	1.46	129,600	1,896	0.010020	129,600	810	0.004281
	VP2	1.68	129,600	3,614	0.016599	129,600	520	0.002388
	VP3	1.22	129,600	541	0.003422	129,600	900	0.005692
	VP4	1.74	129,600	653	0.002896	129,600	360	0.001596
	VP5	2.21	129,600	830	0.002898	129,600	627	0.002189
	VP6	2.04	129,600	3,676	0.013904	129,600	597	0.002258
Mean bird density					**0.013656**	**Mean bird density**		**0.003840**

Table 2.1c *Determination of Flight Activity for Golden Plover*

Season / Year	VP	Survey Area (km²)	Breeding			Non-breeding		
			Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)	Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)
Year 1	VP1	1.46	129,600	0	0	108,000	960	0.006088
	VP2	1.68	129,600	0	0	129,600	2,400	0.011023
	VP3	1.22	129,600	0	0	162,000	0	0
	VP4	1.74	129,600	840	0.003725	146,700	0	0
	VP5	2.21	129,600	0	0	127,800	542005	1.919023
	VP6	2.04	145,800	0	0	129,600	0	0
Year 2	VP1	1.46	129,600	0	0	129,600	0	0
	VP2	1.68	129,600	0	0	129,600	0	0
	VP3	1.22	129,600	0	0	129,600	0	0
	VP4	1.74	129,600	0	0	129,600	0	0
	VP5	2.21	129,600	0	0	129,600	0	0
	VP6	2.04	129,600	0	0	129,600	0	0
Mean bird density					**0.000310**	**Mean bird density**		**0.161345**

Table 2.1d *Determination of Flight Activity for Kestrel*

Season / Year	VP	Survey Area (km²)	Breeding			Non-breeding		
			Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)	Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)
Year 1	VP1	1.46	129,600	35	0.000185	108,000	55	0.000349
	VP2	1.68	129,600	15	0.000069	129,600	1,100	0.005052
	VP3	1.22	129,600	45	0.000285	162,000	230	0.001164
	VP4	1.74	129,600	0	0.000000	146,700	1,300	0.005093
	VP5	2.21	129,600	2,521	0.008802	127,800	30	0.000106
	VP6	2.04	145,800	1,020	0.003429	129,600	1,230	0.004652
Year 2	VP1	1.46	129,600	202	0.001068	129,600	0	0.000000
	VP2	1.68	129,600	5	0.000023	129,600	0	0.000000
	VP3	1.22	129,600	0	0.000000	129,600	300	0.001897
	VP4	1.74	129,600	122	0.000541	129,600	237	0.001051
	VP5	2.21	129,600	100	0.000349	129,600	1015	0.003544
	VP6	2.04	129,600	849	0.003211	129,600	125	0.000473
Mean bird density					**0.001497**	**Mean bird density**		**0.001948**

Table 2.1e *Determination of Flight Activity for Lapwing*

Season / Year	VP	Survey Area (km²)	Non-breeding		
			Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)
Year 1	VP1	1.46	108,000	360	0.002283
	VP2	1.68	129,600	0	0.000000
	VP3	1.22	162,000	0	0.000000
	VP4	1.74	146,700	0	0.000000
	VP5	2.21	127,800	0	0.000000
	VP6	2.04	129,600	0	0.000000
Year 2	VP1	1.46	129,600	0	0.000000
	VP2	1.68	129,600	240	0.001102
	VP3	1.22	129,600	0	0.000000
	VP4	1.74	129,600	0	0.000000
	VP5	2.21	129,600	0	0.000000
	VP6	2.04	129,600	0	0.000000
Mean bird density			**Mean bird density**		**0.000282**

Table 2.1f *Determination of Flight Activity for Lesser Black-backed Gull*

Season Year	VP	Survey Area (km²)	Breeding			Non-breeding		
			Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)	Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)
Year 1	VP1	1.46	129,600	0	0	108,000	0	0
	VP2	1.68	129,600	380	0.001745	129,600	420	0.001929
	VP3	1.22	129,600	665	0.004206	162,000	44,300	0.224145
	VP4	1.74	129,600	0	0	146,700	80	0.000313
	VP5	2.21	129,600	2,520	0.008798	127,800	180	0.000637
	VP6	2.04	145,800	195	0.000656	129,600	0	0
Year 2	VP1	1.46	129,600	435	0.002299	129,600	0	0
	VP2	1.68	129,600	10	0.000046	129,600	2,495	0.011459
	VP3	1.22	129,600	0	0	129,600	1,245	0.007874
	VP4	1.74	129,600	15	0.000067	129,600	0	0
	VP5	2.21	129,600	120	0.000419	129,600	7,018	0.024503
	VP6	2.04	129,600	0	0	129,600	0	0
Mean bird density					**0.001520**	**Mean bird density**		**0.022572**

Table 2.1g *Determination of Flight Activity for Mute Swan*

Season Year	VP	Survey Area (km²)	Non-breeding		
			Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)
Year 1	VP1	1.46	108,000	0	0
	VP2	1.68	129,600	480	0.002205
	VP3	1.22	162,000	0	0
	VP4	1.74	146,700	0	0
	VP5	2.21	127,800	0	0
	VP6	2.04	129,600	360	0.001362
Year 2	VP1	1.46	129,600	0	0
	VP2	1.68	129,600	0	0
	VP3	1.22	129,600	0	0
	VP4	1.74	129,600	0	0
	VP5	2.21	129,600	0	0
	VP6	2.04	129,600	840	0.003177
Mean bird density			**Mean bird density**		**0.000562**

Table 2.1h *Determination of Flight Activity for Peregrine*

Season / Year	VP	Survey Area (km²)	Breeding			Non-breeding		
			Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)	Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)
Year 1	VP1	1.46	129,600	0	0	108,000	0	0
	VP2	1.68	129,600	0	0	129,600	0	0
	VP3	1.22	129,600	667	0.004219	162,000	667	0.003375
	VP4	1.74	129,600	0	0	146,700	25	0.000098
	VP5	2.21	129,600	90	0.000314	127,800	0	0
	VP6	2.04	145,800	0	0	129,600	0	0
Year 2	VP1	1.46	129,600	0	0	129,600	0	0
	VP2	1.68	129,600	25	0.000115	129,600	0	0
	VP3	1.22	129,600	165	0.001044	129,600	0	0
	VP4	1.74	129,600	15	0.000067	129,600	0	0
	VP5	2.21	129,600	0	0	129,600	0	0
	VP6	2.04	129,600	50	0.000189	129,600	0	0
Mean bird density					**0.000496**	**Mean bird density**		**0.000289**

Table 2.1i *Determination of Flight Activity for Snipe*

Season / Year	VP	Survey Area (km²)	Breeding			Non-breeding		
			Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)	Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km²)
Year 1	VP1	1.46	129,600	0	0	108,000	0	0
	VP2	1.68	129,600	5	0.000023	129,600	240	0.001102
	VP3	1.22	129,600	0	0	162,000	0	0
	VP4	1.74	129,600	0	0	146,700	0	0
	VP5	2.21	129,600	0	0	127,800	0	0
	VP6	2.04	145,800	0	0	129,600	0	0
Year 2	VP1	1.46	129,600	0	0	129,600	150	0.000793
	VP2	1.68	129,600	0	0	129,600	45	0.000207
	VP3	1.22	129,600	0	0	129,600	0	0
	VP4	1.74	129,600	0	0	129,600	0	0
	VP5	2.21	129,600	0	0	129,600	0	0
	VP6	2.04	129,600	0	0	129,600	0	0
Mean bird density					**0.000002**	**Mean bird density**		**0.000175**

Table 2.1j *Determination of Flight Activity for Sparrowhawk*

Season / Year	VP	Survey Area (km^2)	Breeding			Non-breeding		
			Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km^2)	Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km^2)
Year 1	VP1	1.46	129,600	0	0	108,000	0	0
	VP2	1.68	129,600	0	0	129,600	0	0
	VP3	1.22	129,600	0	0	162,000	60	0.000304
	VP4	1.74	129,600	5	0.000022	146,700	0	0
	VP5	2.21	129,600	0	0	127,800	30	0.000106
	VP6	2.04	145,800	103	0.000346	129,600	0	0
Year 2	VP1	1.46	129,600	0	0	129,600	360	0.001903
	VP2	1.68	129,600	76	0.000349	129,600	15	0.000069
	VP3	1.22	129,600	0	0	129,600	45	0.000285
	VP4	1.74	129,600	75	0.000333	129,600	50	0.000222
	VP5	2.21	129,600	0	0	129,600	40	0.000140
	VP6	2.04	129,600	463	0.001751	129,600	0	0
Mean bird density					**0.000233**	**Mean bird density**		**0.000252**

Table 2.1k *Determination of Flight Activity for Whooper Swan*

Season / Year	VP	Survey Area (km^2)	Non-breeding		
			Survey Time (s)	Time in Flight (s)	Areal Bird Density (bird-secs/km^2)
Year 1	VP1	1.46	108,000	0	0
	VP2	1.68	129,600	0	0
	VP3	1.22	162,000	0	0
	VP4	1.74	146,700	0	0
	VP5	2.21	127,800	0	0
	VP6	2.04	129,600	1,050	0.003971
Year 2	VP1	1.46	129,600	0	0
	VP2	1.68	129,600	0	0
	VP3	1.22	129,600	360	0.002277
	VP4	1.74	129,600	0	0
	VP5	2.21	129,600	0	0
	VP6	2.04	129,600	0	0
Mean bird density			**Mean bird density**		**0.000521**

As stated, the CRM uses the monthly mean bird density on a monthly basis. In cases where there is overlap between months and season (e.g. April and October appearing in both breeding and non-breeding seasons) an average of the two season's mean values can be used (NatureSccot, 2024); these values are shown in **Appendix B**.

Weighting can be applied based on habitat variability across the site. In the case of the proposed Project, which is relatively small with homogenous habitat, no weighting needs to be applied as there is an equal likelihood of flightline occurring throughout the site for the two breeding or winter seasons.

The CRM methodology also allows for estimation of the proportion of birds flying at risk height ($\mathbf{Q_{2R}}$). For the VP data collected for the proposed Project, flight height data was collected in height bands of 0-10m, 10m-20m, 20m-30m, 30m-40m, 40m-50m 50m-200m and >200m. For the proposed Project, the lowest swept height of the turbine option is 14m (see **Table 1.1**) and the highest swept height is 170m (see **Table 1.1**). The proportion of data to include would therefore be part of the flight heights within the 10m-20m height band (6m of this 10m band has a turbine blade within it) and in the 50m-200m band. However, for the purposes of this assessment, all data in the 10-20m and 50-200m flight bands are retained within the model. Furthermore, all flights within the >200m height band are also included (i.e. the model output will produce a higher estimation of collision risk). As a result, for the collision risk models calculated here, $\mathbf{Q_{2R}}$ is considered to have a value of **1.**

Another factor in determining the number of flights through the rotors, based upon the aerial bird density, is the nocturnal activity of the target species. Clearly, it is not possible to undertake flightline surveys at night with any degree of accuracy, so a weighting factor is used, based upon the known behaviour of the individual bird species, to reflect the likely nocturnal activity. This factor is based upon a scale of 1 (0% nocturnal activity) to 5 (where nocturnal activity is considered to be at the same level as the daytime activity). For the proposed Project, the nocturnal activity factor ($\mathbf{f_{night}}$) for each of the species to be assessed is shown in **Table 1.4**, along with the source (where relevant) to determine these levels.

2.3. CRM Stage B: Estimating number of flights through the rotors

The total number of bird transits expected through rotors is proportional to the number and cross-sectional area of the rotors, and to the density of birds in the airspace at risk height ($\mathbf{D_A}$), incorporating the proportion of birds at collision height ($\mathbf{Q_{2R}}$) and the nocturnal activity factor ($\mathbf{f_{night}}$). These calculations are performed in the NatureScot collision risk model[1] (see **Appendix B**). The spreadsheet also considers daylight hours, based on the latitude for the proposed project.

2.4. CRM Stage C: Probability of single rotor transit collision

Stage C of the CRM uses information on the size and speed of the turbines, as well as biometric details on size and flight speed of a bird species to determine the risk of collision for a bird making a single flight through an operational rotor.

The bird is assumed to enter the rotor swept area at random anywhere on the disc. The calculations determine the collision risk at 20 locations along the length of the rotor blade (in intervals of 0.05R, where R is the radius of the rotor swept area) using numerical integration of various elements in relation to the rotors (notably, chord width and angular velocity of the blade) and the bird (such as the point at which the bird enters the rotor along the radius and the flight speed of the bird). These are calculated for both up-wind and down-wind flights and averaged to give a probability of collision assuming no avoiding action is taken.

These calculations are performed in the NatureScot collision risk model[1] (see **Appendix B**), where the relevant data on the turbines and bird species are entered, and the model estimates the probability of a collision when a bird flies through the rotor area.

2.5. CRM Stage D: Estimation of collisions per annum

Stage D combines the data from the three stages above and incorporates the likely operation time for the turbines (85%), to estimate the likely number of flights through the rotors for the whole wind farm in a year, assuming that no avoiding action is taken by the species being assessed. Outputs from Stage D are shown in **Appendix B**.

2.6. CRM Stage E: Estimation of collisions per annum with avoidance

It has been well documented that birds demonstrate avoidance of wind turbines. This includes macro-avoidance, where birds avoid the whole wind farm area, as well as micro-avoidance, where birds fly within the wind farm but avoid the turbines and blades. The documented level of avoidance for different species varies (NatureScot, 2025), and published avoidance rates for the bird species being assessed at the proposed Project are shown in **Table 1.4** (and repeated in **Table 2.2** below). These calculations are performed in the NatureScot collision risk model[2] (see **Appendix B**), where four avoidance rates (95%, 98%, 99% and 99.5%) are shown (except for Black-headed Gull, which has a default avoidance rate of 99.2%, which is presented in **Appendix B** in place of the 99% avoidance rate).

The final results from the CRM, using the default avoidance rates as recommended by the guidance (NatureScot, 2025) are shown in **Table 1.4** (and repeated in **Table 2.2** below)**.**

Table 2.2 *Estimated collision rates (collisions/annum) allowing for avoidance*

Species	Avoidance Rate (%)	Estimated Collision Rate/annum	No. of years/collision
Black-headed Gull	99.2%	0.3	3.33
Buzzard	98%	4.2	0.24
Golden Plover	99.6%	12.3	0.08
Kestrel	95%	1.6	0.63
Lapwing	98%	0.1	10
Lesser Black-backed Gull	99.5%	0.9	1.11
Mute Swan	99.5%	0.1	10
Peregrine	98%	0.2	5
Snipe	98%	0.0	N/A
Sparrowhawk	98%	0.1	10
Whooper Swan	99.5%	0.1	10

Of the 12 species assessed, Golden Plover has the highest rate with 12.3 estimated collisions per annum while Buzzard has an estimated collision rate of 4.2 birds/annum, Kestrel has an estimated

[1] https://www.nature.scot/doc/collision-risk-model-onshore-wind-farms-spreadsheet-2024 [accessed May 2026]
[2] https://www.nature.scot/doc/collision-risk-model-onshore-wind-farms-spreadsheet-2024 [accessed May 2026]

collision risk of 1.6 individuals/annum, Lesser Black-backed Gull has an estimated collision risk of 0.9 individuals per annum, Black-headed Gull has an estimated collision rate of 0.3/annum and Peregrine has an estimated collision risk of 0.2 birds/annum. All other species modelled for collision risk had collision rates of 0.1 birds/annum or lower.

2.7. CRM Stage F: Assessment of uncertainty in CRM outputs

The CRM guidance (NatureScot, 2024) several sources of variability or uncertainty in the data being collected and the resultant outputs from the model. Band (2024) highlights possible sources for many of these areas of uncertainty that could impact upon the outcome of the CRM. Due to these potential sources of uncertainty, the output from any CRM should convey the uncertainty in the collision risk estimate, by indicating, in addition to a 'best estimate', a range of confidence around that estimate. Though it is unlikely that these can be subject to detailed statistical analysis (with the exception of the survey data), the aim should be to reflect the range of uncertainty as it would impact on target species populations and/or growth rates. Information to include should reflect:

- uncertainty or variability in flight activity data, including imprecision on flight height estimates and lack of knowledge about nighttime behaviour;
- uncertainty due to the limitations of the collision model, including the variability of bird dimensions and flight speed, the simplification in shape of a bird and turbine blades;
- uncertainty arising from turbine options yet to be decided, in number, size and speed. These options should include a 'worst case' in terms of the option likely to present greatest bird collision risk; and
- uncertainty of avoidance behaviour of the bird species in question, noting any variability in this behaviour and drawing conclusions about the likely collision risk.

The errors in some of these elements may be quantified and combined to estimate the total error or uncertainty. Each error or uncertainty (e_1 to e_5) is expressed as a relative error, i.e. expressed as a fraction or percentage of the value to which it refers. These errors arise independently so, in combining errors, it is appropriate to take a root mean square approach to allow for the likelihood that some errors will offset others. Uncertainty (E) is therefore calculated as:

$$E = \sqrt{(e_1^2 + e_2^2 + e_3^2 + e_4^2 + e_5^2)}$$

2.7.1. Bird Density (e_1)

Bird density survey measurements showed variability between surveys (see **Tables 2.1a – 2.1m**). Band (2024) recommends that the relative error in the collision estimate in each period is presented. This is calculated for each species. The Areal Bird Density (as shown in **Tables 2.1a – 2.1k** and **Tables 2.2a – 2.2k**) are used to generate SE, using the following formula:

$$SE = \frac{s}{\sqrt{n}}$$

Where *s* is the standard deviations of the areal bird densities and *n* is the number of sampling elements (n=6 for one season and n=12 for two seasons). The relative error (RE) is therefore calculated as:

$$RE = \frac{(1.96 \times SE)}{\bar{x}}$$

Where $\bar{x}$ is the mean areal bird density across all seasons, and 1.96 provides a 95% confidence interval. The results of these calculations are presented in **Table 2.3** for all species.

Table 2.3 *Overall uncertainty factors associated with the collision risk model estimates*

Species	Bird Density (e_1)	No. active hours (e_2)	Proportion at risk height (e_3)	Turbine size and operation (e_4)	CRM limitations (e_5)	Overall Uncertainty (E)
Black-headed Gull	0.936	0.05	0.10	0	0.20	0.96
Buzzard	0.563	0.05	0.10	0	0.20	0.61
Golden Plover	1.897	0.05	0.10	0	0.20	1.91
Kestrel	0.524	0.05	0.10	0	0.20	0.57
Lapwing	1.166	0.05	0.10	0	0.20	1.19
Lesser Black-backed Gull	1.480	0.05	0.10	0	0.20	1.50
Mute Swan	1.049	0.05	0.10	0	0.20	1.07
Peregrine	1.076	0.05	0.10	0	0.20	1.10
Snipe	1.202	0.05	0.10	0	0.20	1.22
Sparrowhawk	0.816	0.05	0.10	0	0.20	0.85
Whooper Swan	1.320	0.05	0.10	0	0.20	1.34

As noted earlier, the data used for the CRM for the proposed Project in Gathabawn were selected from recorded Vantage Point survey data using a 1km buffer to clip flight lines. This is beyond the minimum rotor length plus 500m buffer extending from each turbine indicated by Best Practice guidelines (NatureScot, 2024). Therefore, the CRM results presented here indicate a substantially more conservative (i.e. higher) estimate of collision risk than is likely to be the case by incorporating additional flight lines within this extended buffer.

As part of the model, bird flights were considered to be of equal chance to be upwind or downwind when passing through the rotor area of the turbine. Whether a bird is flying upwind or downwind can have an effect on the speed at which they are travelling and therefore the time spent within the area of the rotor that a collision could occur. Due to turbine blade geometry, the risk of collision is higher for birds flying upwind than downwind, even if they are travelling at the same speed. Certain species may be transiting the area of the windfarm in a similar direction each time, and due to prevailing winds, may be more likely to be flying up or downwind each time. As this is not part of the recording of data, it has to be assumed there is an equal chance.

2.7.2. Nocturnal activity (e_2)

For many species of bird there is a very little literature on nighttime activity and due to the lack of nighttime surveying, estimates of nocturnal activity are used. A small sample size of studies results in nighttime activity factors which may not accurately reflect the actual activity of those species at night. Furthermore, species not typically active at night may still fly if flushed or disturbed from roosting places. As a result, it is likely that the uncertainty around nocturnal activity for the species assessed may vary on a species-by-species basis but, given the evidence-based approach used, a value for e_2 of 5% is applied for all species.

2.7.3. Proportion at risk height (e_3)

The CRM methodology also allows for estimation of the proportion of birds flying at risk height ($\mathbf{Q_{2R}}$). As discussed, for the VP data collected for the proposed Project, flightline data from the flight bands

between 10m and 200m were all retained for inclusion within the model, which extends below the lowest swept height of the turbines model proposed (14m; see **Table 1.1**) and substantially above the highest swept height (which is 170m; see **Table 1.1**). As a result, for the collision risk models calculated here, Q_{2R} is considered to have a value of **1**, and therefore presents a higher estimate of collision risk than is likely to be the case. Nevertheless, e_3 is still calculated at 10% to cover off any issues with observers missing species at the 10m level due to landscape structure.

2.7.4. Turbine size and time operational (e_4)

Only one turbine model has been proposed for the project, therefore there is no likely error or uncertainty associated with this.

An operational time of 85% has been used in this model. The European Wind Energy Association (2020) gives the average operation time of a turbine to be between 70% and 85% of the time and NatureScot (2024) recommends default of 85%.

Collectively, these data as presented are considered to be accurate (i.e. $e_4 = 0$)

2.7.5. Uncertainty due to CRM limitations (e_5)

The CRM uses specific data for consideration within the model, such as the length, wingspan and weight of the bird species being assessed. Clearly bird size differs around a mean size. For the size characteristics, the source data used in **Table 1.4** presents a range of length and wingspan. In order to ensure the CRM outputs presented here are robust, the longest length and wingspan are used in the model to return the higher estimate of collision risk. Similarly, flight speeds vary with wind conditions (whether the bird is flying upwind/downwind, wind speed etc.) and the bird's activity, so a mean airspeed has been used for the model.

Aspects of the turbine blade and operation are simplified for sake of the model. Rotor speed used in the modelling is a calculated mean over operational time. Turbines will operate within a cut-in (lowest wind speed viable for operation) and cut-out speed (speed at which the turbine is generating its full amount of power). This results in an uncertainty as the speed of the turbine's rotation will vary depending on wind speed at a particular point in time, with a collision more likely at higher operating speeds.

Additionally, the pitch of the blade is altered depending on the speed of the wind while the turbine is operating. In the case of this CRM, a pitch angle of 30 degrees was used. This figure is derived from Band (2012) which gives an average pitch along the blade length of between 25 – 30 degrees. Gittings (2025) suggests that monitoring data from onshore windfarms in Ireland shows pitch angles are rarely more than 9 degrees. As the 30 degrees of pitch has a greater likelihood of increased risk for collision.

Nevertheless, Band (2024) indicates that uncertainty arising from the CRM may be of an order of +/- 20%, and that has been used here (i.e. $e_5 = 20\%$)

2.7.6. Uncertainty due to avoidance behaviour

It is noted that the avoidance behaviour of bird species may be subject to several influencing factors. A good example is Golden Plover, where the avoidance Rate for Golden Plover is given by NatureScot (2025) as 98%. However, recent studies, including a review of collision monitoring data from four UK wind farms, recommended the use of two avoidance rate values: 99.6% and 99.8% (Gittings, 2022). An avoidance rate of 99.6% is used here; the 99.8% avoidance rate would give an estimated 6.1 collisions per annum.

There are similar issues using the 95% avoidance rate for Kestrel. This is largely due to their hovering behaviour during foraging, when they can spend long periods within the rotor collision risk area. Kestrels have been shown to be particularly susceptible to collision with turbines (NatureScot, 2025), which may be due to foraging behaviours when they tend to be looking down as they rise into the turbine swept area (Cullen *et al.*, 2019). However, where there are not suitable foraging habitats under the turbines the likelihood of collision would be substantially reduced. A 98% avoidance rate is the default avoidance rate for raptors (NatureScot, 2025), which would result in a reduction of collision risk to Kestrels by a magnitude of 2.5. Applying this reduction to the CRM outputs for Kestrel arising from the data presented here for the proposed Project would result in an estimated collision risk of c.0.6 collisions per annum.

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Appendix A GATHABAWN WINDFARM - VANTAGE POINT SURVEY EFFORT

Table A-1a *Vantage Point Survey hours for the two breeding seasons used for the CRM calculations*

VP	Breeding season 2025								Breeding season 2026							
	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Apr	May	Jun	Jul	Aug	Sep	Total
1	6	3	5	10	2	10	0	**36**	6	6	8	4	12	0	**36**
2	4	4	2	13	7	6	0	**36**	6	6	6	4	14	0	**36**
3	0	0	12	12	3	3	6	**36**	9	3	6	6	12	0	**36**
4	0	6	6	12	7	2	3	**36**	6	3	9	6	12	0	**36**
5	0	3	9	12	4	8	0	36	6	6	6	6	12	0	**36**
6	0	6	0	20.5	8	6	0	40.5	6	6	6	6	12	0	**36**
Total	**10**	**22**	**34**	**79.5**	**31**	**35**	**9**	**220.5**	**39**	**30**	**41**	**32**	**74**	**0**	**216**

Table A-1b *Vantage Point Survey hours for the two wintering seasons used for the CRM calculations*

VP	Winter season 2022/23								Winter season 2025/26							
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total	Oct	Nov	Dec	Jan	Feb	Mar	Total
1	6	3	6	6	9	0	0	**30**	6	6	4	8	6	6	**36**
2	6	3	6	6	3	12	0	**36**	6	6	2	10	6	6	**36**
3	6	3	6	6	6	6	12	**45**	6	6	8	4	6	6	**36**
4	6	0	0	10.75	12	12	0	**40.75**	0	12	2	10	6	6	**36**
5	6	0	6	11.5	6	6	0	**35.5**	6	6	4	6	8	6	**36**
6	6	0	6	18	0	0	6	**36**	6	6	4	8	6	6	**36**
Total	**36**	**9**	**30**	**58.25**	**36**	**36**	**18**	**223.25**	**30**	**42**	**24**	**46**	**38**	**36**	**216**

Appendix B COLLISION RISK MODEL SPREADSHEET OUTPUT

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Black-headed Gull	
Bird length	L	0.37	m
Wingspan	W	1.1	m
Bird flight speed	v	11.9	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Gathabawn	
Latitude		52.78	degrees
No of turbines	T	12	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		V136	
Hub height		102	m
Rotor radius	R	68	m
No of blades	b	3	
Rotation speed	Ω	14	rpm
Max blade width	C	4.1	m
Blade pitch	λ	30	degrees
Risk height range		34-170	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2	0.003627	0.003627	0.003627	0.002094	0.000561	0.000561	0.000561	0.000561	0.000561	0.002094	0.003627	0.003627	0.0021
Proportion at rotor risk height	$Q_{2\,lt}$	100.00%														
At latitude 52.8		Daylight hours per month		254.5	275.1	366.5	417.3	488.6	503.6	506.8	457.0	382.1	330.7	263.4	239.1	4484.9
		Nighttime hours per month		489.5	396.9	377.5	302.7	255.4	216.4	237.2	287.0	337.9	413.3	456.6	504.9	4275.1

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	12															
Rotor radius	R	68	m														
		Total rotor frontal area m^2		174321													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	11.9	m s^{-1}														
		Projected number of rotor transits			50.7	54.8	73.0	48.0	15.1	15.5	15.6	14.1	11.8	38.0	52.5	47.6	**437**

Stage C

No of blades	b	3		Bird length	l	0.37	m	
Rotation speed	Ω	14	rpm	Wingspan	w	1.1	m	
Rotor radius	R	68	m	Bird flight speed	v	11.9	m s^{-1}	
Max blade width	C	4.1	m	Flight type		flapping		
Pitch	λ	30	degrees	% of flights upwind/downwind		50%	50%	
Blade profile		see Blade profile sheet						

Single transit risk	upwind	12.12%
	downwind	6.31%
	weighted mean	9.21%

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
		Collision rates before avoidance												year total
		3.97	4.29	5.72	3.76	1.18	1.21	1.22	1.10	0.92	2.98	4.11	3.73	**34**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

			large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
				Collision rates allowing for avoidance												
Avoidance rates modelled		95.00%	100.00%	0.20	0.21	0.29	0.19	0.06	0.06	0.06	0.06	0.05	0.15	0.21	0.19	**1.7**
		98.00%	100.00%	0.08	0.09	0.11	0.08	0.02	0.02	0.02	0.02	0.02	0.06	0.08	0.07	**0.7**
		99.20%	100.00%	0.03	0.03	0.05	0.03	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.03	**0.3**
		99.50%	100.00%	0.02	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.02	0.02	**0.2**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Buzzard	
Bird length	L	0.57	m
Wingspan	W	1.28	m
Bird flight speed	v	11.6	m s^{-1}
Flight type, flapping or gliding		gliding	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Gathabawn	
Latitude		52.78	degrees
No of turbines	T	12	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		V136	
Hub height		102	m
Rotor radius	R	68	m
No of blades	b	3	
Rotation speed	Ω	14	rpm
Max blade width	C	4.1	m
Blade pitch	λ	30	degrees
Risk height range		34-170	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2	0.00384	0.00384	0.00384	0.008748	0.013656	0.013656	0.013656	0.013656	0.013656	0.008748	0.00384	0.00384	0.0087
Proportion at rotor risk height	Q_{2R}	100.00%														
At latitude 52.8		Daylight hours per month		254.5	275.1	366.5	417.3	488.6	503.6	506.8	457.0	382.1	330.7	263.4	239.1	4484.9
		Nighttime hours per month		489.5	396.9	377.5	302.7	255.4	216.4	237.2	287.0	337.9	413.3	456.6	504.9	4275.1

Stage B

No of turbines	T	12														
Rotor radius	R	68	m													
		Total rotor frontal area m^2	174321													
Nocturnal activity factor	f_{night}	0%														
Bird flight speed	v	11.6	m s^{-1}	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits		52.3	56.6	75.3	195.4	357.1	368.1	370.5	334.1	279.3	154.8	54.1	49.1	**2347**

Stage C

No of blades	b	3		Bird length	l	0.57	m
Rotation speed	Ω	14	rpm	Wingspan	w	1.28	m
Rotor radius	R	68	m	Bird flight speed	v	11.6	m s^{-1}
Max blade width	C	4.1	m	Flight type		gliding	
Pitch	λ	30	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	13.40%
	downwind	7.56%
	weighted mean	**10.48%**

Stage D		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
		Collision rates before avoidance												year total
		4.66	5.04	6.71	17.41	31.82	32.80	33.01	29.77	24.89	13.80	4.82	4.38	**209**

Stage E

Allow for large array correction?		No														
Width of windfarm	w	3	km													
			large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
				Collision rates allowing for avoidance												
Avoidance rates modelled		95.00%	100.00%	0.23	0.25	0.34	0.87	1.59	1.64	1.65	1.49	1.24	0.69	0.24	0.22	**10.5**
		98.00%	100.00%	0.09	0.10	0.13	0.35	0.64	0.66	0.66	0.60	0.50	0.28	0.10	0.09	**4.2**
		99.00%	100.00%	0.05	0.05	0.07	0.17	0.32	0.33	0.33	0.30	0.25	0.14	0.05	0.04	**2.1**
		99.50%	100.00%	0.02	0.03	0.03	0.09	0.16	0.16	0.17	0.15	0.12	0.07	0.02	0.02	**1.0**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		Golden Plover	
Bird length	L	0.29	m
Wingspan	W	0.76	m
Bird flight speed	v	17.9	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		5	
Nocturnal activity factor	f_{night}	100%	

Windfarm data		Value	Units
Site name		Gathabawn	
Latitude		52.78	degrees
No of turbines	T	12	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		V136	
Hub height		102	m
Rotor radius	R	68	m
No of blades	b	3	
Rotation speed	Ω	14	rpm
Max blade width	C	4.1	m
Blade pitch	λ	30	degrees
Risk height range		34-170	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A birds/km^2		0.16135	0.16135	0.16135	0.08083	0.00031	0.00031	0.00031	0.00031	0.00031	0.08083	0.16135	0.16135	0.0808
Proportion at rotor risk height	Q_{AR}	100.00%													
At latitude 52.8		Daylight hours per month	254.5	275.1	366.5	417.3	488.6	503.6	506.8	457.0	382.1	330.7	263.4	239.1	4484.9
		Nighttime hours per month	489.5	396.9	377.5	302.7	255.4	216.4	237.2	287.0	337.9	413.3	456.6	504.9	4275.1

Stage B

No of turbines	T	12		
Rotor radius	R	68	m	
		Total rotor frontal area m^2	174321	
Nocturnal activity factor	f_{night}	100%		
Bird flight speed	v	17.9	m s^{-1}	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Projected number of rotor transits	9915.0	8955.5	9915.0	4806.8	19.1	18.4	19.1	19.1	18.4	4967.0	9595.2	9915.0	**58164**

Stage C

No of blades	b	3		Bird length	l	0.29	m
Rotation speed	Ω	14	rpm	Wingspan	w	0.76	m
Rotor radius	R	68	m	Bird flight speed	v	17.9	m s^{-1}
Max blade width	C	4.1	m	Flight type		flapping	
Pitch	λ	30	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	8.89%
	downwind	3.55%
	weighted mean	**6.22%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
		Collision rates before avoidance												year total
		524.03	473.32	524.03	254.05	1.01	0.97	1.01	1.01	0.97	262.52	507.13	524.03	**3074**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

			array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
				Collision rates allowing for avoidance												
Avoidance rates modelled		95.00%	100.00%	26.20	23.67	26.20	12.70	0.05	0.05	0.05	0.05	0.05	13.13	25.36	26.20	**153.7**
		98.00%	100.00%	10.48	9.47	10.48	5.08	0.02	0.02	0.02	0.02	0.02	5.25	10.14	10.48	**61.5**
		99.60%	100.00%	2.10	1.89	2.10	1.02	0.00	0.00	0.00	0.00	0.00	1.05	2.03	2.10	**12.3**
		99.80%	100.00%	1.05	0.95	1.05	0.51	0.00	0.00	0.00	0.00	0.00	0.53	1.01	1.05	**6.1**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		Kestrel	
Bird length	L	0.35	m
Wingspan	W	0.8	m
Bird flight speed	v	10.1	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Gathabawn	
Latitude		52.78	degrees
No of turbines	T	12	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		V136	
Hub height		102	m
Rotor radius	R	68	m
No of blades	b	3	
Rotation speed	Ω	14	rpm
Max blade width	C	4.1	m
Blade pitch	λ	30	degrees
Risk height range		34-170	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2	0.00195	0.00195	0.00195	0.00172	0.0015	0.0015	0.0015	0.0015	0.0015	0.00172	0.00195	0.00195	0.0017
Proportion at rotor risk height	Q_{ar}	100.00%														
At latitude 52.8		Daylight hours per month		254.5	275.1	366.5	417.3	488.6	503.6	506.8	457.0	382.1	330.7	263.4	239.1	4484.9
		Nighttime hours per month		489.5	396.9	377.5	302.7	255.4	216.4	237.2	287.0	337.9	413.3	456.6	504.9	4275.1

Stage B

No of turbines	T	12		
Rotor radius	R	68	m	
		Total rotor frontal area m^2		174321
Nocturnal activity factor	f_{night}	0%		
Bird flight speed	v	10.1	m s^{-1}	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Projected number of rotor transits	23.1	25.0	33.3	33.5	34.1	35.1	35.4	31.9	26.7	26.6	23.9	21.7	**350**

Stage C

No of blades	b	3		Bird length	l	0.35	m	
Rotation speed	Ω	14	rpm	Wingspan	w	0.8	m	
Rotor radius	R	68	m	Bird flight speed	v	10.1	m s^{-1}	
Max blade width	C	4.1	m	Flight type		flapping		
Pitch	λ	30	degrees	% of flights upwind/downwind		50%	50%	
Blade profile		see Blade profile sheet						

Single transit risk	upwind	13.39%
	downwind	7.46%
	weighted mean	**10.42%**

Stage D		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
		Collision rates before avoidance												year total
		2.05	2.21	2.95	2.97	3.02	3.11	3.13	2.83	2.36	2.35	2.12	1.92	**31**

Stage E

Allow for large array correction?		No		
Width of windfarm	w	3	km	

		array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled	95.00%	100.00%	0.10	0.11	0.15	0.15	0.15	0.16	0.16	0.14	0.12	0.12	0.11	0.10	**1.6**
	98.00%	100.00%	0.04	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.04	**0.6**
	99.00%	100.00%	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	**0.3**
	99.50%	100.00%	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	**0.2**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		Lapwing	
Bird length	L	0.31	m
Wingspan	W	0.87	m
Bird flight speed	v	11.9	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		5	
Nocturnal activity factor	f_{night}	100%	

Windfarm data		Value	Units
Site name		Gathabawn	
Latitude		52.78	degrees
No of turbines	T	12	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		V136	
Hub height		102	m
Rotor radius	R	68	m
No of blades	b	3	
Rotation speed	Ω	14	rpm
Max blade width	C	4.1	m
Blade pitch	λ	30	degrees
Risk height range		34-170	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2	0.00028	0.00028	0.00028	0.00014	0	0	0	0	0	0.00014	0.00028	0.00028	0.0001
Proportion at rotor risk height	$Q_{2/3}$	100.00%														
At latitude 52.8		Daylight hours per month		254.5	275.1	366.5	417.3	488.6	503.6	506.8	457.0	382.1	330.7	263.4	239.1	4484.9
		Nighttime hours per month		489.5	396.9	377.5	302.7	255.4	216.4	237.2	287.0	337.9	413.3	456.6	504.9	4275.1

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	12															
Rotor radius	R	68	m														
		Total rotor frontal area m^2		174321													
Nocturnal activity factor	f_{night}	100%															
Bird flight speed	v	11.9	m s^{-1}														
		Projected number of rotor transits			11.5	10.4	11.5	5.6	0.0	0.0	0.0	0.0	0.0	5.8	11.1	11.5	**67**

Stage C

No of blades	b	3		Bird length	l	0.31	m	
Rotation speed	Ω	14	rpm	Wingspan	w	0.87	m	
Rotor radius	R	68	m	Bird flight speed	v	11.9	m s^{-1}	
Max blade width	C	4.1	m	Flight type		flapping		
Pitch	λ	30	degrees	% of flights upwind/downwind		50%		50%
Blade profile		see Blade profile sheet						

Single transit risk	upwind	11.70%
	downwind	5.89%
	weighted mean	**8.80%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
		Collision rates before avoidance												year total
		0.86	0.78	0.86	0.42	0.00	0.00	0.00	0.00	0.00	0.43	0.83	0.86	**5**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled	95.00%	100.00%	0.04	0.04	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.04	**0.3**
	98.00%	100.00%	0.02	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	**0.1**
	99.00%	100.00%	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	**0.1**
	99.50%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		esser Black-backed Gull	
Bird length	L	0.64	m
Wingspan	W	1.5	m
Bird flight speed	v	11.9	m s^{-1}
Flight type, flapping or gliding		gliding	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Gathabawn	
Latitude		52.78	degrees
No of turbines	T	12	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		V136	
Hub height		102	m
Rotor radius	R	68	m
No of blades	b	3	
Rotation speed	Ω	14	rpm
Max blade width	C	4.1	m
Blade pitch	λ	30	degrees
Risk height range		34-170	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2	0.02257	0.02257	0.01205	0.00152	0.00152	0.00152	0.00152	0.00152	0.00152	0.01205	0.02257	0.02257	0.0103
Proportion at rotor risk height	Q_{kR}	100.00%														
At latitude 52.8		Daylight hours per month		254.5	275.1	366.5	417.3	488.6	503.6	506.8	457.0	382.1	330.7	263.4	239.1	4484.9
		Nighttime hours per month		489.5	396.9	377.5	302.7	255.4	216.4	237.2	287.0	337.9	413.3	456.6	504.9	4275.1

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	12															
Rotor radius	R	68	m														
		Total rotor frontal area m^2		174321													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	11.9	m s^{-1}														
		Projected number of rotor transits			315.5	341.0	242.4	34.8	40.8	42.0	42.3	38.1	31.9	218.7	326.5	296.3	**1970**

Stage C

No of blades	b	3			Bird length	l	0.64	m
Rotation speed	Ω	14	rpm		Wingspan	w	1.5	m
Rotor radius	R	68	m		Bird flight speed	v	11.9	m s^{-1}
Max blade width	C	4.1	m		Flight type		gliding	
Pitch	λ	30	degrees	% of flights upwind/downwind			50%	50%
Blade profile		see Blade profile sheet						

Single transit risk	upwind	13.59%
	downwind	7.77%
	weighted mean	**10.68%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
		Collision rates before avoidance												year total
		28.64	30.96	22.01	3.16	3.70	3.82	3.84	3.46	2.90	19.86	29.64	26.90	**179**

Stage E

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Allow for large array correction?		No															
Width of windfarm	w	3	km														
			array correction		Collision rates allowing for avoidance												
Avoidance rates modelled		95.00%	100.00%		1.43	1.55	1.10	0.16	0.19	0.19	0.19	0.17	0.14	0.99	1.48	1.35	**8.9**
		98.00%	100.00%		0.57	0.62	0.44	0.06	0.07	0.08	0.08	0.07	0.06	0.40	0.59	0.54	**3.6**
		99.00%	100.00%		0.29	0.31	0.22	0.03	0.04	0.04	0.04	0.03	0.03	0.20	0.30	0.27	**1.8**
		99.50%	100.00%		0.14	0.15	0.11	0.02	0.02	0.02	0.02	0.02	0.01	0.10	0.15	0.13	**0.9**

COLLISION RISK MODEL

Required input data is in orange boxes
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		Value	Units
Bird data			
Species name		Mute Swan	
Bird length	L	1.6	m
Wingspan	W	2.38	m
Bird flight speed	v	16.2	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		3	
Nocturnal activity factor	f_{night}	50%	

		Value	Units
Windfarm data			
Site name		Gathabawn	
Latitude		52.78	degrees
No of turbines	T	12	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		V136	
Hub height		102	m
Rotor radius	R	68	m
No of blades	b	3	
Rotation speed	Ω	14	rpm
Max blade width	C	4.1	m
Blade pitch	λ	30	degrees
Risk height range		34-170	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A	birds/km^2	0.00056	0.00056	0.00056	0.00028	0	0	0	0	0	0.00029	0.00056	0.00056	0.0003
Proportion at rotor risk height	$Q_{2/R}$	100.00%													
At latitude 52.8		Daylight hours per month	254.5	275.1	366.5	417.3	488.6	503.6	506.8	457.0	382.1	330.7	263.4	239.1	4484.9
		Nighttime hours per month	489.5	396.9	377.5	302.7	255.4	216.4	237.2	287.0	337.9	413.3	456.6	504.9	4275.1

Stage B

No of turbines	T	12	
Rotor radius	R	68	m
		Total rotor frontal area m^2	174321
Nocturnal activity factor	f_{night}	50%	
Bird flight speed	v	16.2	m s^{-1}

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Projected number of rotor transits	21.0	19.9	23.3	11.9	0.0	0.0	0.0	0.0	0.0	11.6	20.7	20.7	**129**

Stage C

No of blades	b	3		Bird length	l	1.6 m
Rotation speed	Ω	14	rpm	Wingspan	w	2.38 m
Rotor radius	R	68	m	Bird flight speed	v	16.2 m s^{-1}
Max blade width	C	4.1	m	Flight type		flapping
Pitch	λ	30	degrees	% of flights upwind/downwind		50% 50%
Blade profile		see Blade profile sheet				

Single transit risk	upwind	15.22%
	downwind	9.74%
	weighted mean	**12.48%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
		Collision rates before avoidance												year total
		2.23	2.11	2.47	1.27	0.00	0.00	0.00	0.00	0.00	1.23	2.19	2.19	**14**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled	95.00%	100.00%	0.11	0.11	0.12	0.06	0.00	0.00	0.00	0.00	0.00	0.06	0.11	0.11	**0.7**
	98.00%	100.00%	0.04	0.04	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.04	**0.3**
	99.00%	100.00%	0.02	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	**0.1**
	99.50%	100.00%	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	**0.1**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Peregrine	
Bird length	L	0.5	m
Wingspan	W	1.15	m
Bird flight speed	v	12.1	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Gathabawn	
Latitude		52.78	degrees
No of turbines	T	12	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		V136	
Hub height		102	m
Rotor radius	R	68	m
No of blades	b	3	
Rotation speed	Ω	14	rpm
Max blade width	C	4.1	m
Blade pitch	λ	30	degrees
Risk height range		34-170	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2	0.00029	0.00029	0.00029	0.00039	0.0005	0.0005	0.0005	0.0005	0.0005	0.00039	0.00029	0.00029	0.0004
Proportion at rotor risk height	Q_{ER}	100.00%														
At latitude 52.8		Daylight hours per month		254.5	275.1	366.5	417.3	488.6	503.6	506.8	457.0	382.1	330.7	263.4	239.1	4484.9
		Nighttime hours per month		489.5	396.9	377.5	302.7	255.4	216.4	237.2	287.0	337.9	413.3	456.6	504.9	4275.1

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	12															
Rotor radius	R	68	m														
		Total rotor frontal area m^2		174321													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	12.1	m s^{-1}														
		Projected number of rotor transits			4.1	4.4	5.9	9.1	13.5	13.9	14.0	12.7	10.6	7.2	4.3	3.9	**104**

Stage C

No of blades	b	3		Bird length	l	0.5	m	
Rotation speed	Ω	14	rpm	Wingspan	w	1.15	m	
Rotor radius	R	68	m	Bird flight speed	v	12.1	m s^{-1}	
Max blade width	C	4.1	m	Flight type		flapping		
Pitch	λ	30	degrees	% of flights upwind/downwind		50%		50%
Blade profile		see Blade profile sheet						

Single transit risk	upwind	12.68%
	downwind	6.88%
	weighted mean	**9.78%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
		Collision rates before avoidance												year total
		0.34	0.37	0.49	0.76	1.12	1.16	1.17	1.05	0.88	0.60	0.35	0.32	**9**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
	95.00%	100.00%	0.02	0.02	0.02	0.04	0.06	0.06	0.06	0.05	0.04	0.03	0.02	0.02	**0.4**
	98.00%	100.00%	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	**0.2**
	99.00%	100.00%	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	**0.1**
	99.50%	100.00%	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Snipe	
Bird length	L	0.28	m
Wingspan	W	0.45	m
Bird flight speed	v	17.1	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		5	
Nocturnal activity factor	f_{night}	100%	

Windfarm data		Value	Units
Site name		Gathabawn	
Latitude		52.77	degrees
No of turbines	T	12	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		V136	
Hub height		102	m
Rotor radius	R	68	m
No of blades	b	3	
Rotation speed	Ω	14	rpm
Max blade width	C	4.1	m
Blade pitch	λ	30	degrees
Risk height range		34-170	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A	birds/km^2	0.00018	0.00018	0.00018	8.9E-05	2E-06	2E-06	2E-06	2E-06	2E-06	8.9E-05	0.00018	0.00018	0.0001
Proportion at rotor risk height	Q_{2R}	100.00%													
At latitude 52.8		Daylight hours per month	254.6	275.2	366.5	417.3	488.5	503.5	506.8	457.0	382.1	330.7	263.4	239.1	4484.8
		Nighttime hours per month	489.4	396.8	377.5	302.7	255.5	216.5	237.2	287.0	337.9	413.3	456.6	504.9	4275.2

Stage B

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	12														
Rotor radius	R	68	m													
		Total rotor frontal area m^2	174321													
Nocturnal activity factor	f_{night}	100%														
Bird flight speed	v	17.1	m s^{-1}													
		Projected number of rotor transits		10.3	9.3	10.3	5.1	0.1	0.1	0.1	0.1	0.1	5.2	9.9	10.3	**61**

Stage C

No of blades	b	3		Bird length	l	0.28	m
Rotation speed	Ω	14	rpm	Wingspan	w	0.45	m
Rotor radius	R	68	m	Bird flight speed	v	17.1	m s^{-1}
Max blade width	C	4.1	m	Flight type		flapping	
Pitch	λ	30	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk		
upwind	8.95%	
downwind	3.54%	
weighted mean	**6.24%**	

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
		Collision rates before avoidance												year total
		0.55	0.49	0.55	0.27	0.01	0.01	0.01	0.01	0.01	0.28	0.53	0.55	**3**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled	95.00%	100.00%	0.03	0.02	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.03	**0.2**
	98.00%	100.00%	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	**0.1**
	99.00%	100.00%	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	**0.0**
	99.50%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Sparrowhawk	
Bird length	L	0.38	m
Wingspan	W	0.7	m
Bird flight speed	v	10	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Gathabawn	
Latitude		52.78	degrees
No of turbines	T	12	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		V136	
Hub height		102	m
Rotor radius	R	68	m
No of blades	b	3	
Rotation speed	Ω	14	rpm
Max blade width	C	4.1	m
Blade pitch	λ	30	degrees
Risk height range		34-170	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2	0.00025	0.00025	0.00025	0.00024	0.00023	0.00023	0.00023	0.00023	0.00023	0.00024	0.00025	0.00025	0.0002
Proportion at rotor risk height	Q_{AR}	100.00%														
At latitude 52.8		Daylight hours per month		254.5	275.1	366.5	417.3	488.6	503.6	506.8	457.0	382.1	330.7	263.4	239.1	4484.9
		Nighttime hours per month		489.5	396.9	377.5	302.7	255.4	216.4	237.2	287.0	337.9	413.3	456.6	504.9	4275.1

Stage B

No of turbines	T	12														
Rotor radius	R	68	m													
		Total rotor frontal area m^2	174321													
Nocturnal activity factor	f_{night}	0%														
Bird flight speed	v	10	m s^{-1}	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits		3.0	3.2	4.3	4.7	5.3	5.4	5.4	4.9	4.1	3.7	3.1	2.8	50

Stage C

No of blades	b	3		Bird length	l	0.38	m
Rotation speed	Ω	14	rpm	Wingspan	w	0.7	m
Rotor radius	R	68	m	Bird flight speed	v	10	m s^{-1}
Max blade width	C	4.1	m	Flight type		flapping	
Pitch	λ	30	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	13.67%
	downwind	7.73%
	weighted mean	**10.70%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
		Collision rates before avoidance												year total
		0.27	0.29	0.39	0.43	0.48	0.49	0.50	0.45	0.37	0.34	0.28	0.25	5

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
	95.00%	100.00%	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	**0.2**
	98.00%	100.00%	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	**0.1**
	99.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
	99.50%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Whooper Swan	
Bird length	L	1.6	m
Wingspan	W	2.35	m
Bird flight speed	v	17.3	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		3	
Nocturnal activity factor	f_{night}	50%	

Windfarm data		Value	Units
Site name		Gathabawn	
Latitude		52.78	degrees
No of turbines	T	12	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		V136	
Hub height		102	m
Rotor radius	R	68	m
No of blades	b	3	
Rotation speed	Ω	14	rpm
Max blade width	C	4.1	m
Blade pitch	λ	30	degrees
Risk height range		34-170	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2	0.00052	0.00052	0.00052	0.00026	0	0	0	0	0	0.00026	0.00052	0.00052	0.0003
Proportion at rotor risk height	Q_{ra}	100.00%														
At latitude 52.8		Daylight hours per month		254.5	275.1	366.5	417.3	488.6	503.6	506.8	457.0	382.1	330.7	263.4	239.1	4484.9
		Nighttime hours per month		489.5	396.9	377.5	302.7	255.4	216.4	237.2	287.0	337.9	413.3	456.6	504.9	4275.1

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	12															
Rotor radius	R	68	m														
		Total rotor frontal area m^2		174321													
Nocturnal activity factor	f_{night}	50%															
Bird flight speed	v	17.3	m s^{-1}														
		Projected number of rotor transits			20.8	19.7	23.1	11.8	0.0	0.0	0.0	0.0	0.0	11.2	20.5	20.4	**127**

Stage C

No of blades	b	3		Bird length	l	1.6	m	
Rotation speed	Ω	14	rpm	Wingspan	w	2.35	m	
Rotor radius	R	68	m	Bird flight speed	v	17.3	m s^{-1}	
Max blade width	C	4.1	m	Flight type		flapping		
Pitch	λ	30	degrees	% of flights upwind/downwind		50%		50%
Blade profile		see Blade profile sheet						

Single transit risk	upwind	14.49%
	downwind	9.10%
	weighted mean	**11.79%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
		Collision rates before avoidance												year total
		2.08	1.97	2.32	1.18	0.00	0.00	0.00	0.00	0.00	1.12	2.05	2.05	**13**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled	95.00%	100.00%	0.10	0.10	0.12	0.06	0.00	0.00	0.00	0.00	0.00	0.06	0.10	0.10	**0.6**
	98.00%	100.00%	0.04	0.04	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.04	**0.3**
	99.00%	100.00%	0.02	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	**0.1**
	99.50%	100.00%	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	**0.1**

APPENDIX TO SCREENING FOR
APPROPRIATE ASSESSMENT REPORT

APPENDIX G1: CULLAHILL MOUNTAIN SAC SITE SYNOPSIS

SITE SYNOPSIS

Site Name: Cullahill Mountain SAC

Site Code: 000831

Cullahill Mountain SAC lies on a western outlier of the Castlecomer plateau, 6 km north-east of Johnstown in Co. Kilkenny. In this area, the underlying limestone has been exposed relatively recently by erosion of the higher shales. The rock is in the form of an escarpment, with a steep side facing the central plain (and the Cork-Dublin road) and more gradual slopes to the south-east where the shale soon appears.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[6210] Orchid-rich Calcareous Grassland*

The vegetation of most of the site comprises a herb-rich grassland over limestone. Grasses found include Quaking-grass (*Briza media*), Crested Dog's-tail (*Cynosurus cristatus*), Sheep's-fescue (*Festuca ovina*), Downy Oat-grass (*Avenula pubescens*) and Yellow Oat-grass (*Trisetum flavescens*). Amongst these grasses Mouse-ear Hawkweed (*Hieracium pilosella*), Wild Thyme (*Thymus praecox*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Lady's Bedstraw (*Galium verum*), Carline Thistle (*Carlina vulgaris*), Mountain Everlasting (*Antennaria dioica*), Fairy Flax (*Linum catharticum*) and eyebrighta (*Euphrasia* spp.) grow, while a number of smaller annual species are associated with rock outcrops. The orchid flora of the grassland is notably rich, with Common Twayblade (*Listera ovata*), Frog Orchid (*Coeloglossum viride*), Bee Orchid (*Ophrys apifera*), Early-purple Orchid (*Orchis mascula*) and Green-winged Orchid (*Orchis morio*) occurring. Green-winged Orchid is an uncommon species and the site is particularly notable for the abundance of this species (some 350 individuals were recently recorded from the site).

On its west side, the site extends downslope to some Ash (*Fraxinus excelsior*)/Hazel (*Corylus avellana*) woodland which is regenerating well and spreading on the hill. Some of the trees grow out of moss-covered rocks and although the ground flora is as yet fairly sparse, most of the expected species occur within the wood. Woodland on limestone is quite rare in the midlands and is distinct from adjacent Hazel stands on shale, such as at Spahill.

This site is of conservation importance due to the presence of a priority-listed Annex I habitat type (orchid-rich calcareous grassland), as well as the occurrence of a large population of the rare plant species, Green-winged Orchid.

APPENDIX TO SCREENING FOR APPROPRIATE ASSESSMENT REPORT

APPENDIX G2: CULLAHILL MOUNTAIN SAC CONSERVATION OBJECTIVES SERIES

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Cullahill Mountain SAC 000831

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

National Parks and Wildlife Service,
Department of Housing, Local Government and Heritage,

90 King Street North, Dublin 7, D07 N7CV, Ireland.

Web: www.npws.ie
E-mail: natureconservation@housing.gov.ie

Citation:

NPWS (2021) Conservation Objectives: Cullahill Mountain SAC 000831. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

Series Editors: Rebecca Jeffrey and Christina Campbell
ISSN 2009-4086

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- 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, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

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

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

000831	Cullahill Mountain SAC
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	2007
Title :	Grasslands monitoring project 2006
Author :	Dwyer, R.; Crowley, W.; Wilson, F.
Series :	Unpublished report to NPWS
Year :	2013
Title :	Irish semi-natural grasslands survey 2007-2012
Author :	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
Series :	Irish Wildlife Manuals, No. 78
Year :	2018
Title :	The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats
Author :	Martin, J.R.; O'Neill, F.H.; Daly, O.H.
Series :	Irish Wildlife Manuals, No. 102

Spatial data sources

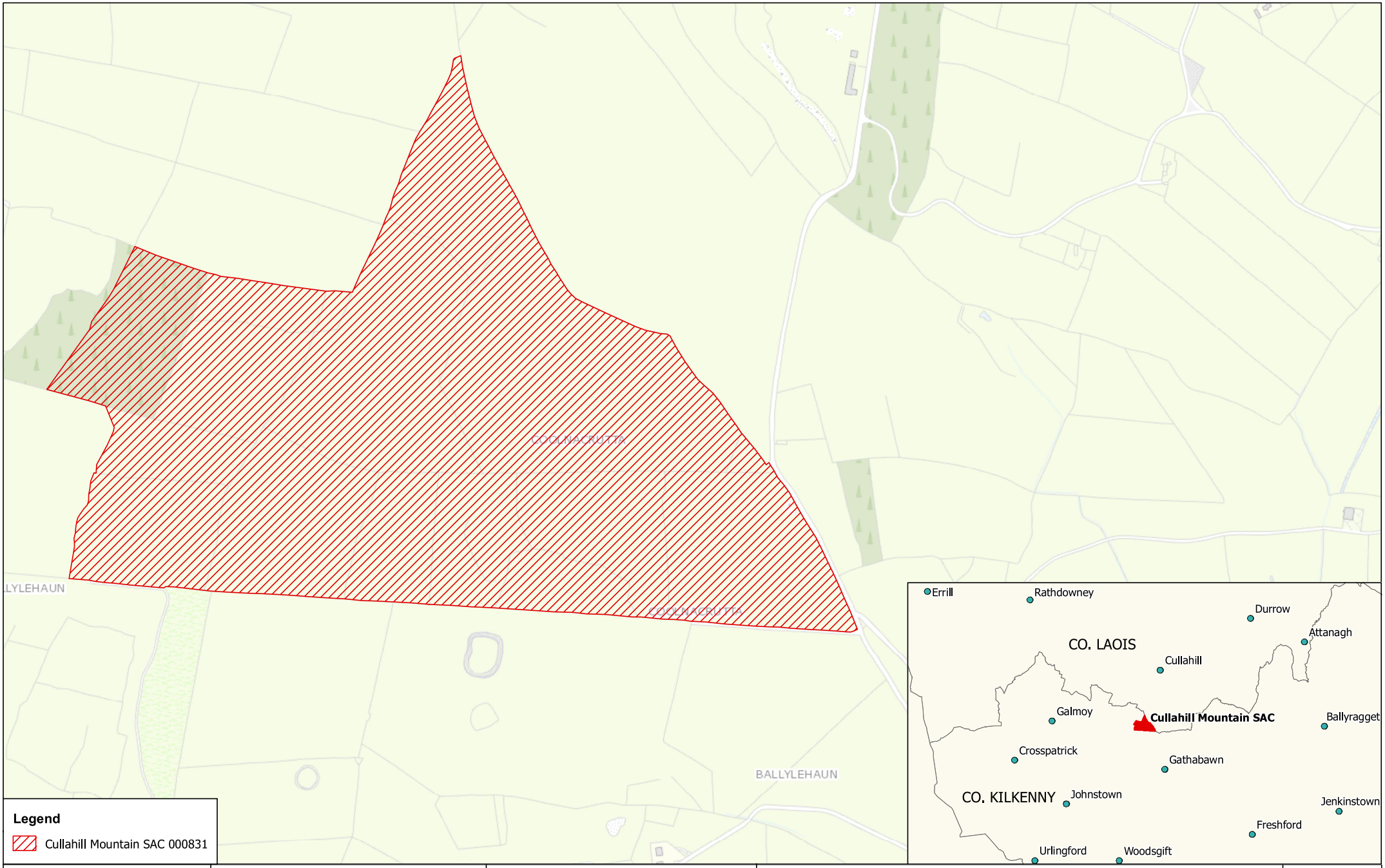
Year :	2018
Title :	Grasslands Monitoring Survey 2015-2017
GIS Operations :	Dataset clipped to the SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	6210 (map 2)

6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

To restore the favourable conservation condition of Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) in Cullahill Mountain SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) in Cullahill Mountain SAC was surveyed as part of the Irish Semi-natural Grasslands Survey (ISGS; O'Neill et al., 2013) and also as part of the Grassland Monitoring Survey (GMS; Martin et al., 2018) in the sub-site Coolnacrutta (ISGS/GMS site code 2500). The habitat had previously been surveyed as part of the Grassland Monitoring Project 2006 (Dwyer et al., 2007). The GMS (Martin et al., 2018) mapped 6.7ha of species-rich calcareous grassland within the SAC. It is important to note that further unsurveyed areas of the habitat may be present within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 2 for the grassland areas surveyed by Martin et al. (2018)	Distribution based on the GMS (Martin et al., 2018). Note that further unsurveyed areas of the habitat may be present within the SAC
Vegetation composition: positive indicator species	Number at a representative number of 2m x 2m monitoring stops; within 20m surrounding area of monitoring stops	At least 7 positive indicator species present in monitoring stop or, if 5–6 present in stop, additional species within 20m of stop; this includes at least two 'high quality' positive indicator species present in stop or within 20m of stop	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the lists of positive indicator species, including high quality indicators, are also presented. These documents should be consulted for further details. High quality indicators recorded in the habitat in the SAC include mountain everlasting (*Antennaria dioica*), spring sedge (*Carex caryophyllea*), fairy flax (*Linum catharticum*), carline thistle (*Carlina vulgaris*) and quaking-grass (*Briza media*) and a variety of orchids, including early-purple orchid (*Orchis mascula*), frog orchid (*Coeloglossum viride*), common spotted-orchid (*Dactylorhiza fuchsii*), common twayblade (*Neottia ovata*) and greater butterfly orchid (*Platanthera chlorantha*) (NPWS internal files; Dwyer et al., 2007; O'Neill et al., 2013; Martin et al., 2018)
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Negative indicator species collectively not more than 20% cover, with cover of an individual species not more than 10%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the list of negative indicator species is presented
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation composition: woody species and bracken	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of woody species (except certain listed species) and bracken (*Pteridium aquilinum*) not more than 5%	Woody species that can occur above 5% cover are juniper (*Juniperus communis*), burnet rose (*Rosa spinosissima*), mountain avens (*Dryas octopetala*) and hoary rock-rose (*Helianthemum oelandicum*). However, cover of these species above 25% may indicate transition to another Annex I habitat such as Alpine and Boreal heaths (4060) or *Juniperus communis* formations (5130). Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). Bracken and scrub have been noted as common in the habitat (Martin et al., 2018; NPWS internal files)

Vegetation structure: broadleaf herb:grass ratio	Percentage at a representative number of 2m x 2m monitoring stops	Broadleaf herb component of vegetation between 40% and 90%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). Broadleaf herb component of vegetation between 30% and 40% may be allowed to pass on expert judgement (Martin et al., 2018). Particularly high herb cover is a feature over much of this site (NPWS internal files)
Vegetation structure: sward height	Percentage at a representative number of 2m x 2m monitoring stops	At least 30% of sward between 5cm and 40cm tall	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation structure: litter	Percentage cover at a representative number of 2m x 2m monitoring stops	Litter cover not more than 25%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Physical structure: bare soil	Percentage cover at a representative number of 2m x 2m monitoring stops	Not more than 10% bare soil	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Physical structure: grazing or disturbance	Area in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m²	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)



An Roinn Tithíochta, Rialtais Áitiúil agus Oidhreachta
Department of Housing, Local Government and Heritage

MAP 1:
CULLAHILL MOUNTAIN SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SAC 000831; version 3.
CO. KILKENNY

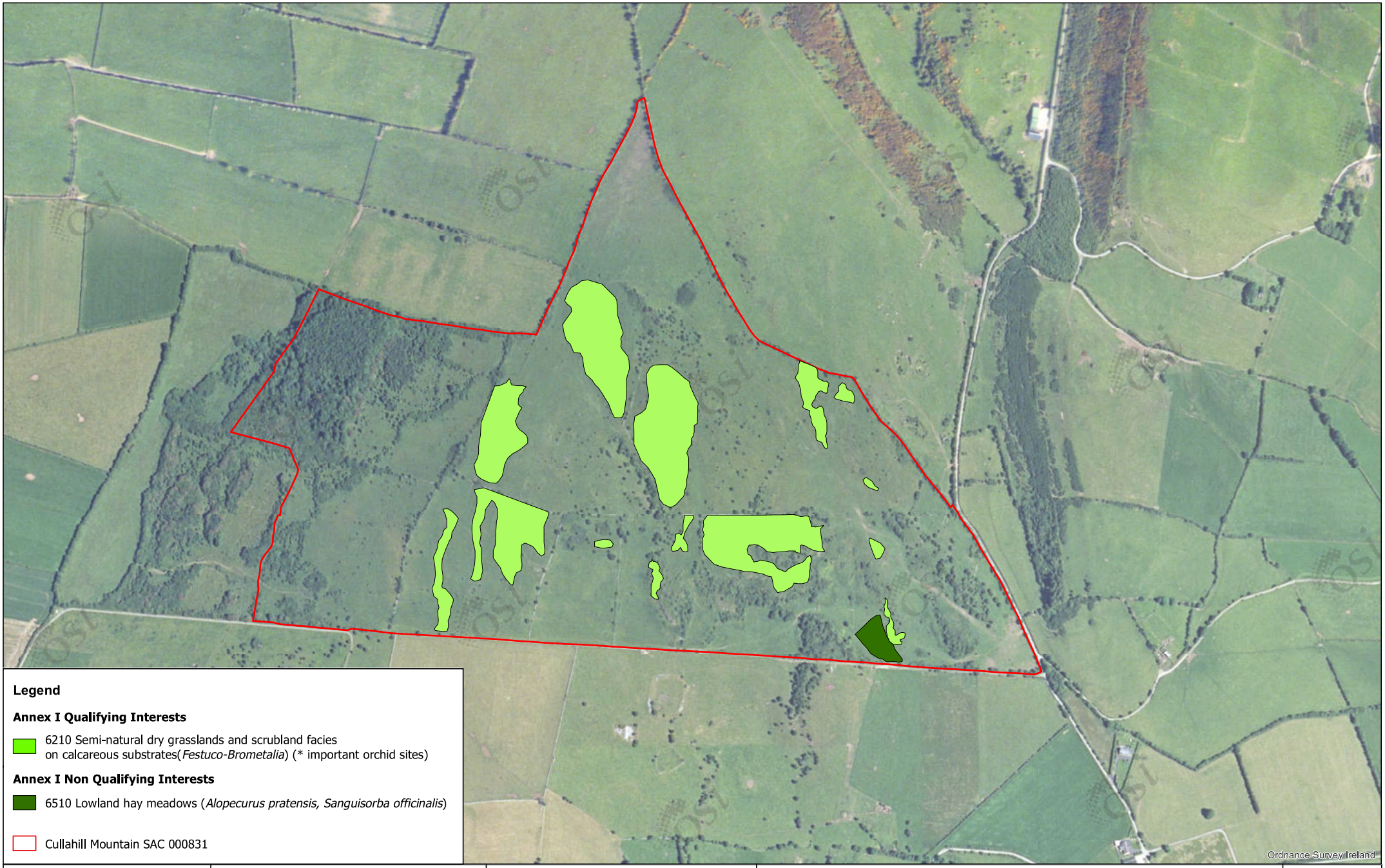
0 0.05 0.1 0.2 Kilometres

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
Ordnance Survey of Ireland Licence No OSI-NMA-014. © Ordnance Survey of Ireland Government of Ireland

Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann

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Date: October 2021



An Roinn Tithíochta, Rialtais Áitiúil agus Oidhreachta
Department of Housing, Local Government and Heritage

MAP 2:
CULLAHILL MOUNTAIN SAC
CONSERVATION OBJECTIVES
GRASSLAND HABITATS

Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SAC 000831; version 3.
CO. KILKENNY

0 0.05 0.1 0.2 Kilometres

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann

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Date: October 2021

APPENDIX TO SCREENING FOR
APPROPRIATE ASSESSMENT REPORT

APPENDIX G3: CULLAHILL MOUNTAIN SAC CONSERVATION MEASURES

Site name: **Cullahill Mountain SAC 000831**
County: **Kilkenny**

Site Specific Conservation Objective (SSCO) Ecological Attributes

[6210] Semi natural dry grasslands and scrubland facies on calcareous substrates Festuco Brometalia important orchid sites

1	Habitat area
2	Habitat distribution
3.1	Vegetation composition: positive indicator species
3.2	Vegetation composition: negative indicator species
3.3	Vegetation composition: non-native species
3.4	Vegetation composition: woody species and bracken
4.1	Vegetation structure: broadleaf herb:grass ratio
4.2	Vegetation structure: sward height
4.3	Vegetation structure: litter
5.1	Physical structure: bare soil
5.2	Physical structure: grazing or disturbance

Site name: Cullahill Mountain SAC 000831
Habitat/Species: [6210] Semi-natural dry grasslands
Site Specific Conservation Objectives (SSCO): To restore the favourable conservation condition of [6210] in SAC 000831

No.	Ecological Requirements (Attributes as per SSCO)	Pressure /Threat (EU Code 2025)	Pressure/ Threat Ranking	EU Conservation Measure Type (EU Code 2019-2024)	Measure Category	Conservation Measure	Delivery mechanism	Public Authority with statutory responsibility	Implementation timeframe	Integration with high level plans/policy:
1	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	PA08 Extensive grazing or undergrazing by livestock	Low	MA05 Adapt mowing, grazing and other equivalent agricultural activities (e.g. burning);	Statutory	Consent is required for digging, ploughing, harrowing or otherwise disturbing soil or substrate, if not covered by other regulations. [Consent is not required for these activities on established reseeded grassland or cultivated land provided it is greater than 50m from a river, stream, floodplain, wetland, lake, turlough or pond.]	European Union Habitats (Cullahill Mountain Special Area of Conservation 000831) Regulations 2016	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
2	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	PI02 Other invasive alien species (other than species of Union concern)	Low	MI03 Management, control or eradication of other invasive alien species	Statutory	Consent is required for the planting of trees or multi-annual bioenergy crops, if not covered by other regulations.	European Union Habitats (Cullahill Mountain Special Area of Conservation 000831) Regulations 2016	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
3	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	PA08 Extensive grazing or undergrazing by livestock	Low	MA05 Adapt mowing, grazing and other equivalent agricultural activities (e.g. burning);	Statutory	Consent is required for significant changes in livestock density (including introduction of grazing), changes in livestock type or grazing season, other than on established reseeded grassland, if not covered by other regulations. [Consent is not required for changes of less than 20% in livestock density unless notice has been given that a lower percentage is applicable to a particular site.]	European Union Habitats (Cullahill Mountain Special Area of Conservation 000831) Regulations 2016	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
4	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	PC01 Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell)	Low	MC01 Adapt/manage extraction of non-energy resources	Statutory	Consent is required for blasting, drilling, dredging or otherwise removing or disturbing fossils, rock, minerals, mud, sand, gravel or other sediment, if not covered by other regulations.	European Union Habitats (Cullahill Mountain Special Area of Conservation 000831) Regulations 2016	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
5	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA - Measures related to agricultural practices and agriculture-related habitats	Contractual	25% uptake of eligible participants (8) in the voluntary Agri-Climate Rural Environment Scheme (ACRES).	Agri-Climate Rural Environment Scheme (ACRES)	Department of Agriculture, Food and the Marine (DAFM)	2022	CAP Strategic Plan
6	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA03 Maintain existing extensive agricultural practices and agricultural landscape features	Contractual	Traditional Dry Stone Wall Maintenance (<450 metres) as part of the Agri-Climate Rural Environment Scheme (ACRES).	Agri-Climate Rural Environment Scheme (ACRES)	Department of Agriculture, Food and the Marine (DAFM)	2022	CAP Strategic Plan

Site name: Cullahill Mountain SAC 000831
Habitat/Species: [6210] Semi-natural dry grasslands
Site Specific Conservation Objectives (SSCO): To restore the favourable conservation condition of [6210] in SAC 000831

No.	Ecological Requirements (Attributes as per SSCO)	Pressure /Threat (EU Code 2025)	Pressure/ Threat Ranking	EU Conservation Measure Type (EU Code 2019-2024)	Measure Category	Conservation Measure	Delivery mechanism	Public Authority with statutory responsibility	Implementation timeframe	Integration with high level plans/policy:
7	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA - Measures related to agricultural practices and agriculture-related habitats	Contractual	Production of an accredited Farm Sustainability Plan by 100% of participants in the Agri-Climate Rural Environmental Scheme (ACRES).	Agri-Climate Rural Environment Scheme (ACRES)	Department of Agriculture, Food and the Marine (DAFM)	2022	CAP Strategic Plan
8	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA - Measures related to agricultural practices and agriculture-related habitats	Administrative	Monitoring and reporting of relevant farm activity at the SAC. Direct inspections for DAFM Conditionality compliance or via other state Authorities (via Cross Reporting) to Integrated Controls Division in DAFM.	DAFM BISS Conditionality Farm inspection's - NPWS Conservation Ranger Site monitoring. (Cross Compliance).	Department of Agriculture, Food and the Marine (DAFM)	2022+	CAP Strategic Plan
9	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA05 Adapt mowing, grazing and other equivalent agricultural activities (e.g. burning);	Administrative	Development of a Conservation Grazing Programme on the site (2025+) which includes the introduction of Dexter cattle and drinking points throughout site to encourage movement.	NPWS Conservation Measure	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
10	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA05 Adapt mowing, grazing and other equivalent agricultural activities (e.g. burning)	Administrative	Monitoring by regional staff at this SAC between 3/4 times per year. Site is fully fenced and managed by NPWS staff.	NPWS Conservation Measure	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
11	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA05 Adapt mowing, grazing and other equivalent agricultural activities (e.g. burning)	Administrative	Scrub and bracken encroachment by cattle and mechanical means approx. 2Ha cleared mechanically.	NPWS Conservation Measure	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
12	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MI05 Management of problematic native species	Administrative	Report into Developing a Sustainable Deer Management Strategy for Ireland.	Deer Management Strategy	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	2023	All government plans and policy documents are cognisant of these protections.

Site name: Cullahill Mountain SAC 000831
Habitat/Species: [6210] Semi-natural dry grasslands
Site Specific Conservation Objectives (SSCO): To restore the favourable conservation condition of [6210] in SAC 000831

No.	Ecological Requirements (Attributes as per SSCO)	Pressure /Threat (EU Code 2025)	Pressure/ Threat Ranking	EU Conservation Measure Type (EU Code 2019-2024)	Measure Category	Conservation Measure	Delivery mechanism	Public Authority with statutory responsibility	Implementation timeframe	Integration with high level plans/policy:
13	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MH03 Reduce impact of other specific human activities	Statutory	Control of activities, if not covered by other regulations, which could negatively impact on this SAC.	European Union Habitats (Cullahill Mountain Special Area of Conservation 000831) Regulations 2016	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
14	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MJ01 Implement climate change mitigation measures, MJ02 Implement climate change adaptation measures	Administrative	A roadmap of actions to assist in the achievement of climate change objectives by no later than the end of the year 2050.	Ireland's Climate Action Plan	All Government Departments	2019+	Climate Action and Low Carbon Development (Amendment) Act 2021
15	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MF08 Manage changes in hydrological and coastal systems and regimes for construction and development (incl. restoration of habitats.	Statutory	Regulation controlling unconsented development at this site.	Planning and Development Act 2000, as amended.	Local Authority/An Coimisiún Pleanála	2000+	All government plans and policy documents are cognisant of these protections

APPENDIX TO SCREENING FOR
APPROPRIATE ASSESSMENT REPORT

APPENDIX H1: RIVER NORE SPA SITE SYNOPSIS

SITE SYNOPSIS

SITE NAME: RIVER NORE SPA

SITE CODE: 004233

The River Nore SPA is a long, linear site that includes the following river sections: the River Nore from the bridge at Townparks, (north-west of Borris in Ossory) to Coolnamuck (approximately 3 km south of Inistioge) in Co. Kilkenny; the Delour River from its junction with the River Nore to Derrynaseera bridge (west of Castletown) in Co. Laois; the Erkina River from its junction with the River Nore at Durrow Mills to Boston Bridge in Co. Laois; a 1.5 km stretch of the River Goul upstream of its junction with the Erkina River; the Kings River from its junction with the River Nore to a bridge at Mill Island, Co. Kilkenny. The site includes the river channel and marginal vegetation.

For a large part of its course the River Nore traverses Carboniferous limestone plains; it passes over a narrow band of Old Red Sandstone rocks below Thomastown.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive of special conservation interest for the following species: Kingfisher.

A survey in 2010 recorded 22 pairs of Kingfisher (based on 16 probable and 6 possible territories) within the SPA. Other species which occur within the site include Mute Swan (35), Mallard (267), Cormorant (14), Grey Heron (45), Moorhen (14), Snipe (17) and Sand Martin (1,029) – all figures are peak counts recorded during the 2010 survey.

The River Nore SPA is of high ornithological importance as it supports a nationally important population of Kingfisher, a species that is listed on Annex I of the E.U. Birds Directive.

13.9.2011

APPENDIX TO SCREENING FOR APPROPRIATE ASSESSMENT REPORT

APPENDIX H2: RIVER NORE SPA CONSERVATION OBJECTIVES SERIES

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

River Nore SPA 004233



National Parks and Wildlife Service,
Department of Housing, Local Government and Heritage,

90 King Street North, Dublin 7, D07 N7CV, Ireland.

Web: www.npws.ie
E-mail: natureconservation@npws.gov.ie

Citation:

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Series Editors: Maria Long and Colin Heaslip
ISSN 2009-4086

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- 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, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

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

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

004233	River Nore SPA
A229	Kingfisher *Alcedo atthis*

Please note that this SPA overlaps with River Barrow and River Nore SAC (002162). The conservation objectives for this site should be used in conjunction with those for the overlapping site as appropriate.

Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	2008
Title :	Waterways Bird Survey 2008
Author :	Crowe, O.; Webb, G.; Collins, E.; Smiddy, P.
Series :	A report commissioned by the National Parks and Wildlife Service and the Office of Public Works, and prepared by BirdWatch Ireland
Year :	2010
Title :	Assessment of the distribution and abundance of Kingfisher *Alcedo atthis* and other riparian birds on six SAC river systems in Ireland
Author :	Cummins, S.; Fisher, J.; Gaj McKeever, R.; McNaghten, l.; Crowe, O.
Series :	V1
Year :	2013
Title :	A review of the SPA network of sites in the Republic of Ireland
Author :	NPWS
Series :	Unpublished Report

Other References

Year :	1977
Title :	Breeding, Mortality and Movements of Kingfishers
Author :	Morgan, R.; Glue, D.
Series :	Bird Study, 24(1), 15–24
Year :	1982
Title :	The Kingfisher
Author :	Boag, D.
Series :	Blandford Press, Dorset
Year :	1985
Title :	The birds of the Western Palaearctic- Volume IV
Author :	Cramp, S.
Series :	Oxford University Press, Oxford
Year :	1993
Title :	Birds as indicators of changes in water quality
Author :	Ormerod, S.J.; Tyler, S.J.
Series :	In: Furness RW, Greenwood JJD, editors. Birds as monitors of environmental change. Chapman & Hall, London
Year :	1994
Title :	Birds in Europe: their conservation status
Author :	Tucker, G.M.; Heath, M.F.
Series :	BirdLife International, Cambridge, U.K.
Year :	1996
Title :	Foods brought to the nest by breeding Kingfishers *Alcedo atthis* in the New Forest of southern England
Author :	Reynolds S.J.; Hinge M.D.C.
Series :	Bird Study 43: 96–102

Year :	1997
Title :	The Birds of the Western Palearctic Concise Edition. Vol. 1 Non-Passerines
Author :	Snow, D.W.; Perrins, C.M.
Series :	Oxford University Press
Year :	2001
Title :	Family Acedinidae (Kingfishers)
Author :	Woodall, P.F.
Series :	In: del Hoyo, J., Elliott, A. and Christie, D.A. (eds), Handbook of the Birds of the World. Volume 6: Mousebirds to Hornbills: 130–249
Year :	2010
Title :	An assessment of the current distribution and status of the Kingfisher *Alcedo atthis* in Ireland
Author :	Crowe, O.; Cummins, S.; Gilligan, N.; Smiddy, P.; Tierney, T.D.
Series :	Irish Birds 9: 41-54
Year :	2011
Title :	Diet of the Common Kingfisher (*Alcedo atthis*) in relation to habitat type: a summary of results from the Czech Republic
Author :	Čech M.; Čech P.
Series :	Sylvia 47: 33–47
Year :	2012
Title :	Fish prey selection by the Common Kingfisher *Alcedo atthis* in Northern Iberia
Author :	Vilches A.; Miranda R.; Arizaga J.
Series :	Acta Ornithologica 47(2): 167-175
Year :	2012
Title :	Habitat selection by breeding Common Kingfishers (*Alcedo atthis* L.) in rivers from Northern Iberia
Author :	Vilches, A.; Miranda, R.; Arizaga, J.; Galicia, D.
Series :	In Annales de Limnologie-International Journal of Limnology (Vol. 48, No. 3, pp. 289-294). EDP Sciences
Year :	2019
Title :	Annex B – Bird species' status and trends report format (Article 12) for the period 2013 – 2018
Author :	NPWS
Series :	Birds Directive - Article 12 Reporting
Year :	2019
Title :	Report under the Article 12 of the Birds Directive Period 2008-2012
Author :	EEA
Series :	European Environment Agency. European Topic Centre on Biological Diversity. Pp 1-9
Year :	2020
Title :	Extreme breeding effort of Common Kingfisher (*Alcedo atthis*)
Author :	Rubáčová, L.; Melišková, M.
Series :	Tichodroma 32: 43-46
Year :	2021
Title :	Using miniaturized GPS archival tags to assess home range features of a small plunge-diving bird: the European Kingfisher (*Alcedo atthis*)
Author :	Musseau, R.; Bastianelli, M.; Bely, C.; Rouselle, C.; Dehorter, O.
Series :	Avian Research, 12(1):30

Year :	2022
Title :	Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species
Author :	Goodship, N.M.; Furness, R.W. (MacArthur Green)
Series :	NatureScot Research Report 1283
Year :	2023
Title :	Sensitivity of the European Kingfisher (*Alcedo atthis*) to global change: evidence from home range features and contaminations by trace elements and organic pollutants, a case study in the marshes of Western Europe
Author :	Musseau, R.; Angelier, F.; Bichet, C.; Millet, M.; Rousselle, C.; Moreau, J.; Bustamante, P.
Series :	4th international Kingfisher conferencen, Biology, ecology & conservation, Wdecki Landscape Parc, Sep 2023, Tleń, Poland
Year :	2024
Title :	EPA River Quality Surveys: Biological
Author :	EPA
Series :	Enviornmenal Protection Agency Online Resource

Conservation Objectives for : River Nore SPA [004233]

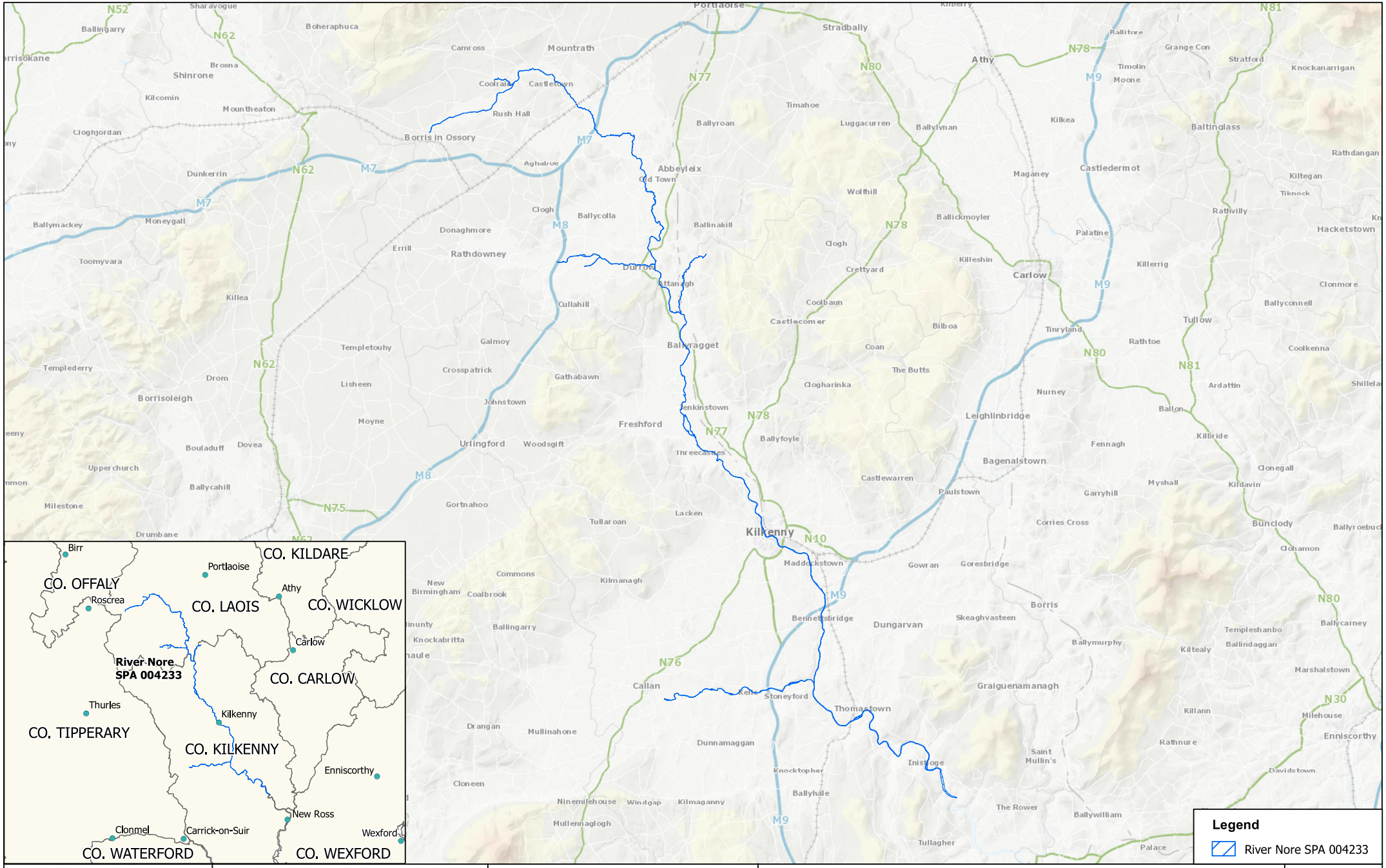
A229 Kingfisher *Alcedo atthis*

To maintain the Favourable conservation condition of Kingfisher in River Nore SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population size	Number of breeding territories/pairs	No significant decline in the long term	Kingfisher is a small plunge-diving bird, largely resident and monogamous in the breeding season, found typically along shallow freshwater systems, with some local movement to coastal areas in winter (Snow and Perrins, 1997; Crowe et al., 2010). Almost two-thirds of recoveries in Britain refer to movements of less than 9km (Morgan and Glue, 1977). Widespread in Ireland (NPWS, 2019), it requires slow-moving water that contains thriving prey populations of small fish, and look-out perches from which it can hunt (Snow and Perrins, 1997). The all-Ireland population is estimated at 1,300-2,100 pairs (NPWS, 2013). A survey of six SAC river catchments in 2010 identified this SPA as supporting 16-22 breeding territories/pairs, or up to 1.7% of the all-Ireland population. The measure 'breeding territories' is as per Cummins et al. (2010) and these were estimated based on registrations of birds, birds' activities, and nest holes seen, primarily on the first two survey visits (out of three)
Productivity rate	Number of fledged young per confirmed breeding pair	Sufficient productivity to maintain the population trend as stable or increasing	Generally, the setting of a minimum level of productivity to ensure a stable and/or increasing population at a given site ought to be informed by robust estimates of: post-fledging survival; adult survival; and immigration and emigration rates. A lack of comprehensive Irish data precludes the identification of a minimum productivity rate for this species at this site and at the national level. An analysis of available British nest records by Morgan and Glue (1977) estimated that 76 young must survive to breed for every 100 Kingfisher alive at the start of the year, in order to maintain population stability and offset high adult mortality. Typically one to two broods are reared (Snow and Perrins, 1997), though in Central Europe, up to five breeding attempts have been recorded in a single season in Slovakia (Rubáčová and Melišková, 2020)
Spatial distribution of territories	Numbers and distribution of occupied territories across site	No significant loss of distribution in the long term, other than that occurring due to natural patterns of variation	Distribution encapsulates the number of locations and areas of potentially suitable habitat for Kingfisher and its availability for use. The suitability and availability of habitats are likely to vary through the season, for example, due to water level changes (due to rainfall, natural variation and other factors). These will affect the spatio-temporal patterns of use of the SPA by the breeding population. Optimal resilience depends on Kingfisher utilising the suitable extent of habitat in the SPA to the maximum extent possible. In 2010, densities of 0.10-0.14 territories/km length of channel were recorded for this site (Cummins et al., 2010), and these were the highest territory abundance recorded in surveys, with the lowest densities (0.04-0.08 territories/km) found on the Barrow and the Munster Blackwater systems (0.05 territories/km). A study of 16 GPS-tagged adult Kingfisher in France (Musseau et al., 2023), estimated mean home range size at 2.5ha (0.25km2)

Extent and quality of nesting banks and other suitable nesting features	Hectares; condition assessment	Sufficient area of high quality nesting habitat to support the population target	Nesting from March to July in Britain, Boag (1982) detailed Kingfisher breeding habitat as being limited by the amount of prey, and the availability of suitable nest sites. Slow-flowing, shallow watercourses with cover along the banks are preferred. In Ireland, they nest in relatively short stretches of suitable banks of less than 10m high (Crowe et al., 2010), but are reliant on suitable fishing conditions (water depth, clarity, and speed of flow). Suitable sand/loam/mud banks (vertical/overhanging) for nesting are necessary to support breeding pairs (Snow and Perrins, 1997; Crowe et al., 2010). Holes in walls, rotten tree stumps, concrete tunnels in canal banks, or burrows of Sand Martin (*Riparia riparia*) are also used. Suitable nest sites located away from the river channel are likely less frequently encountered, but records located over 250m from foraging waters occur (Crowe et al., 2010) and often in a stream or tributary of the main watercourse (Morgan and Glue, 1977)
Forage spatial distribution, extent, abundance and availability	Location, hectares, and forage biomass	Sufficient number of locations, area of suitable forage habitat and available forage biomass to support the population target	Kingfisher occur in many wetland habitats, including smaller types (e.g. ditches, ponds, streams), that provide necessary trophic resources and are ecologically connected (Musseau et al., 2021). Kingfisher diet consists predominantly of small fish/aquatic invertebrates which are captured by plunge-diving, typically over shallow freshwater or estuarine waters (Snow and Perrins, 1997). Pelagic and benthic fish species can be taken (Cramp, 1985) e.g. Three-spined Stickleback (*Gasterosteus aculeatus*), Minnow (*Phoxinus phoxinus*), Bullhead (*Cottus gobio*) and Brown Trout (*Salmo trutta*). Kingfisher prey mostly on small-sized fish, typically 40-70mm in length (Reynolds and Hinge, 1996; Čech and Čech, 2011; Vilches et al., 2012). Availability of suitable fishing perches, along shallow stretches of water from which Kingfisher can hunt (Vilches et al., 2012), is also a key requirement
Water quality	Water quality indicators	Both biotic (i.e. Q-value) and abiotic indices reflect overall good-high quality status	Given that Kingfisher occupy wetlands ecologically connected to the wider landscape, habitat destruction, degradation via pollution (e.g. agricultural run-off; pesticides; increased turbidity) and/or poor management of watercourses (EEA, 2019; Crowe et al., 2010) are a concern. Data are limited for Kingfisher, but Dipper (*Cinclus cinclus*), an exclusively riparian bird, is less abundant where stream acidity and aluminium concentrations increase; its territories are longer at low pH, and clutch and brood sizes are significantly lower (Ormerod and Tyler, 1993). Thus, minimum water quality standards for the site should be met, as set out by the "River Quality Surveys" (Environmental Protection Agency, 2024). Q-values of ≥4 represent satisfactory water quality for Kingfisher. Values are based primarily on the relative proportions of 'pollution sensitive to tolerant macroinvertebrates'. These macroinvertebrates are eaten by both Kingfisher and their prey species (e.g. Brown Trout)

Barriers to connectivity	Number, location, shape and hectares	No significant increase	An adult male Kingfisher is territorial and usually defends its territory from the previous summer (Snow and Perrins, 1997), including necessary access to forage in freshwater habitats ecologically connected to their territory. Along other river systems monitored in 2008, i.e. the River Boyne system, Kingfisher were observed flying out of grass on banks (often short grass) and into fields for 150-200m, where they would disappear out of view (Crowe et al., 2008). Barriers limiting access to this SPA or ecologically important sites outside the SPA will ultimately affect the achievement of targets for population size and/or spatial distribution. Factors such as the number, location, shape and area of potential barriers must be taken into account to determine their potential impact
Disturbance to breeding sites	Intensity, frequency, timing and duration	Disturbance occurs at levels that do not significantly impact upon breeding Kingfisher	The impact of any significant disturbance on the SPA's breeding population will ultimately be manifested in the targets, which relate to population demographics (i.e. population size, productivity rate) and the distribution of territories along the linear river catchments. Canalisation of streams and clearance of emergent vegetation to improve drainage result in loss of nesting and feeding habitat and declines in fish numbers (Tucker and Heath, 1994). In Britain, Kingfisher have been known to be at risk locally from human persecution to protect fish stocks (Woodall, 2001), but no evidence of this threat has been reported in Ireland. Likely disturbance distances in relation to human activities are set out in Goodship and Furness (MacArthur Green) (2022). Factors such as intensity, frequency, timing and duration of a (direct or indirect) disturbance source must be taken into account to determine the potential impact upon the targets for population demographics



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MAP 1:
RIVER NORE SPA
CONSERVATION OBJECTIVES
SPA DESIGNATION

Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SPA 004233; version 3
CO. KILKENY, LAOIS

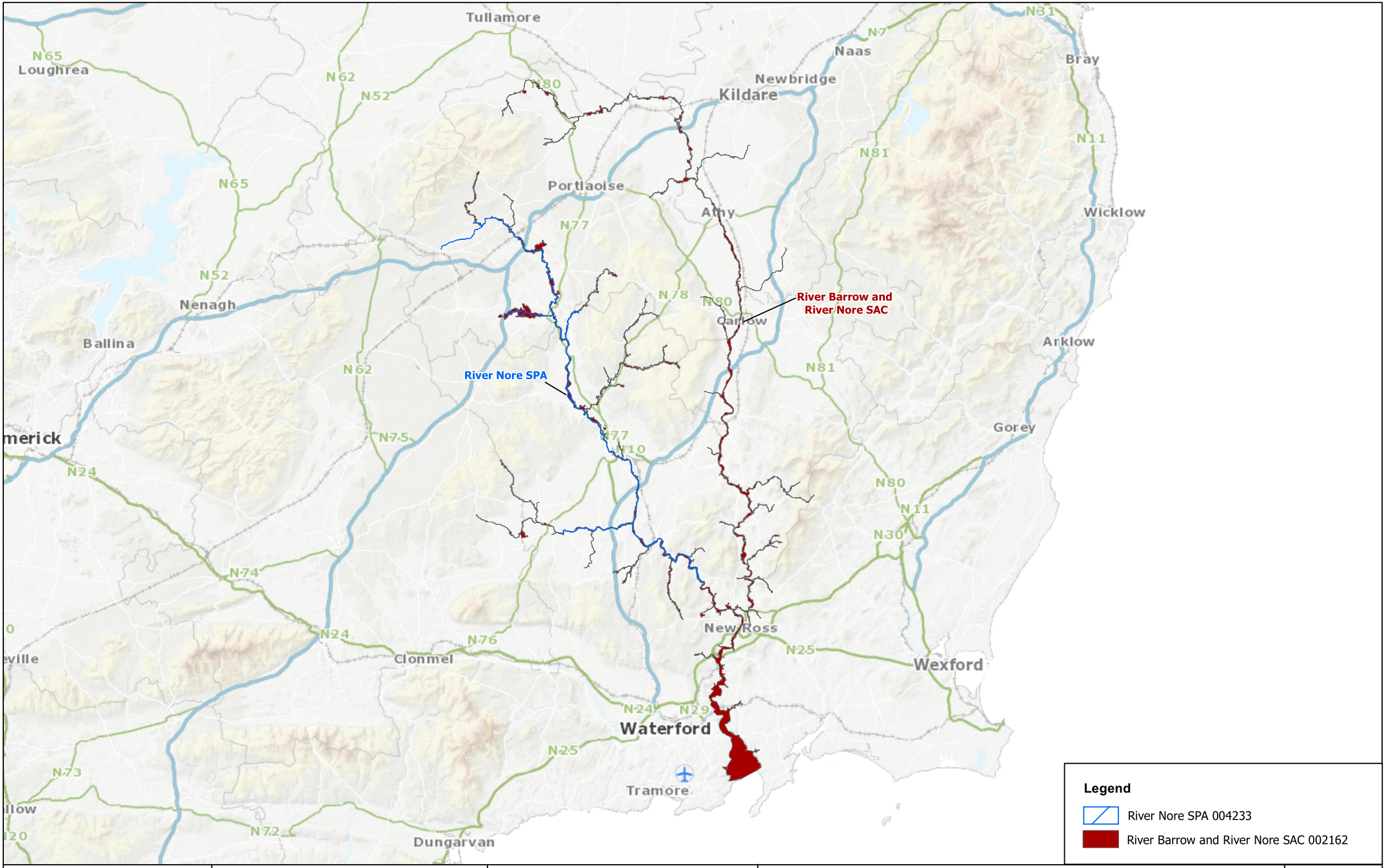
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The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
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arna ataírgeadh faoin rannán mapála Náisiúnta d'uimhir cheadúnais Tailte Éireann CYAL50351092

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Map version 1
Date: May 2024



NPWS An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra National Parks and Wildlife Service

MAP 2:
RIVER NORE SPA
CONSERVATION OBJECTIVES
OVERLAPPING AND ADJACENT SITES

Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SPA 004233; version 3
CO. KILKENNY, LAOIS

0 5 10 20 Kilometres

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
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Nil sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. © Folaíonn sé rannán Náisiúnta Mapála de shonraí Tailte Éireann
arna atáirgeadh faoin rannán mapála Náisiúnta d'uimhir cheadúnais Tailte Éireann CYAL50351092

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Map version 1
Date: May 2024

APPENDIX TO SCREENING FOR
APPROPRIATE ASSESSMENT REPORT

APPENDIX G1: CULLAHILL MOUNTAIN SAC SITE SYNOPSIS

SITE SYNOPSIS

Site Name: Cullahill Mountain SAC

Site Code: 000831

Cullahill Mountain SAC lies on a western outlier of the Castlecomer plateau, 6 km north-east of Johnstown in Co. Kilkenny. In this area, the underlying limestone has been exposed relatively recently by erosion of the higher shales. The rock is in the form of an escarpment, with a steep side facing the central plain (and the Cork-Dublin road) and more gradual slopes to the south-east where the shale soon appears.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[6210] Orchid-rich Calcareous Grassland*

The vegetation of most of the site comprises a herb-rich grassland over limestone. Grasses found include Quaking-grass (*Briza media*), Crested Dog's-tail (*Cynosurus cristatus*), Sheep's-fescue (*Festuca ovina*), Downy Oat-grass (*Avenula pubescens*) and Yellow Oat-grass (*Trisetum flavescens*). Amongst these grasses Mouse-ear Hawkweed (*Hieracium pilosella*), Wild Thyme (*Thymus praecox*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Lady's Bedstraw (*Galium verum*), Carline Thistle (*Carlina vulgaris*), Mountain Everlasting (*Antennaria dioica*), Fairy Flax (*Linum catharticum*) and eyebrighta (*Euphrasia* spp.) grow, while a number of smaller annual species are associated with rock outcrops. The orchid flora of the grassland is notably rich, with Common Twayblade (*Listera ovata*), Frog Orchid (*Coeloglossum viride*), Bee Orchid (*Ophrys apifera*), Early-purple Orchid (*Orchis mascula*) and Green-winged Orchid (*Orchis morio*) occurring. Green-winged Orchid is an uncommon species and the site is particularly notable for the abundance of this species (some 350 individuals were recently recorded from the site).

On its west side, the site extends downslope to some Ash (*Fraxinus excelsior*)/Hazel (*Corylus avellana*) woodland which is regenerating well and spreading on the hill. Some of the trees grow out of moss-covered rocks and although the ground flora is as yet fairly sparse, most of the expected species occur within the wood. Woodland on limestone is quite rare in the midlands and is distinct from adjacent Hazel stands on shale, such as at Spahill.

This site is of conservation importance due to the presence of a priority-listed Annex I habitat type (orchid-rich calcareous grassland), as well as the occurrence of a large population of the rare plant species, Green-winged Orchid.

APPENDIX TO SCREENING FOR APPROPRIATE ASSESSMENT REPORT

APPENDIX G2: CULLAHILL MOUNTAIN SAC CONSERVATION OBJECTIVES SERIES

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Cullahill Mountain SAC 000831

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

National Parks and Wildlife Service,
Department of Housing, Local Government and Heritage,

90 King Street North, Dublin 7, D07 N7CV, Ireland.

Web: www.npws.ie
E-mail: natureconservation@housing.gov.ie

Citation:

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Series Editors: Rebecca Jeffrey and Christina Campbell
ISSN 2009-4086

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- 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, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

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

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

000831	Cullahill Mountain SAC
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	2007
Title :	Grasslands monitoring project 2006
Author :	Dwyer, R.; Crowley, W.; Wilson, F.
Series :	Unpublished report to NPWS
Year :	2013
Title :	Irish semi-natural grasslands survey 2007-2012
Author :	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
Series :	Irish Wildlife Manuals, No. 78
Year :	2018
Title :	The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats
Author :	Martin, J.R.; O'Neill, F.H.; Daly, O.H.
Series :	Irish Wildlife Manuals, No. 102

Spatial data sources

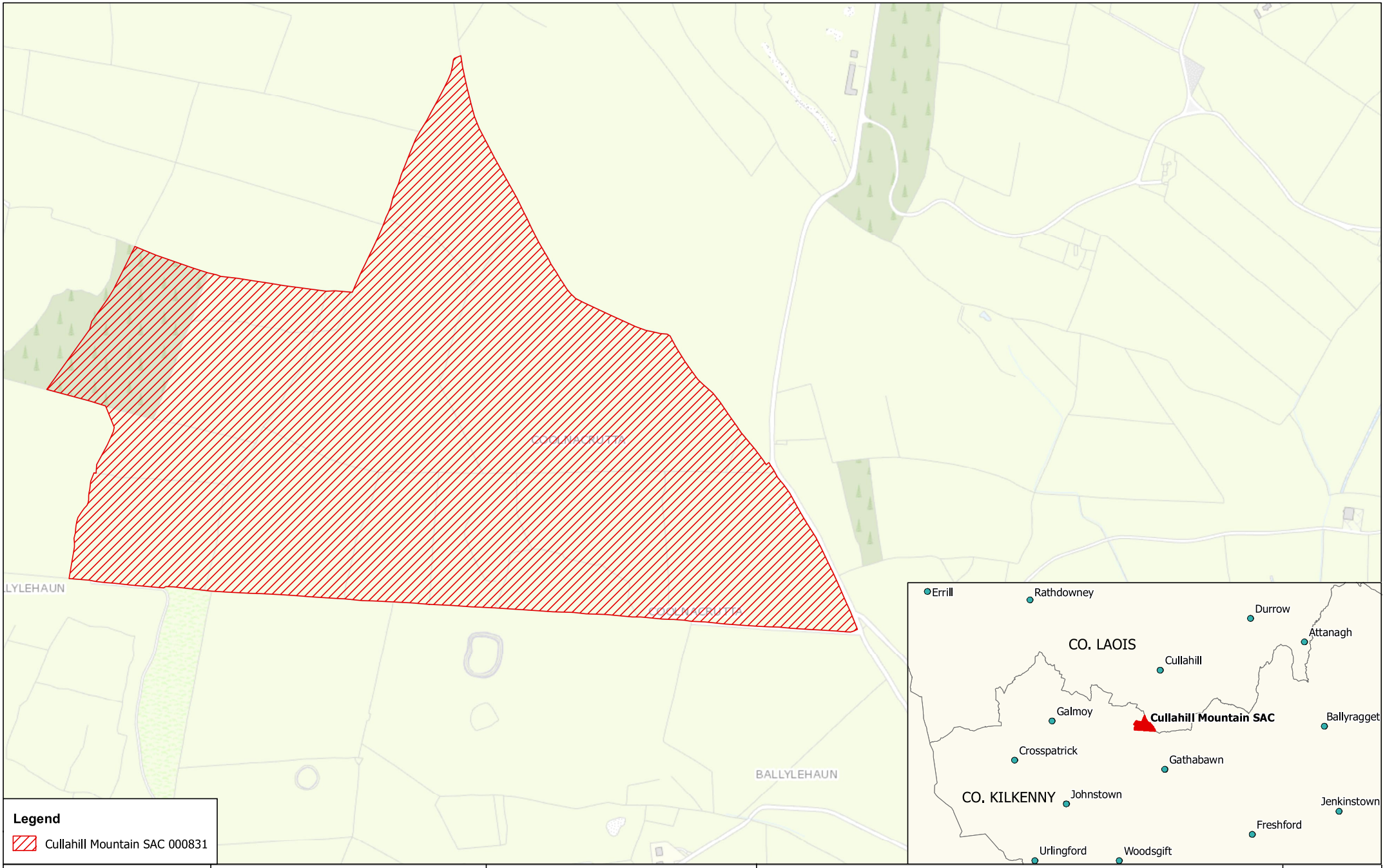
Year :	2018
Title :	Grasslands Monitoring Survey 2015-2017
GIS Operations :	Dataset clipped to the SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	6210 (map 2)

6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

To restore the favourable conservation condition of Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) in Cullahill Mountain SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) in Cullahill Mountain SAC was surveyed as part of the Irish Semi-natural Grasslands Survey (ISGS; O'Neill et al., 2013) and also as part of the Grassland Monitoring Survey (GMS; Martin et al., 2018) in the sub-site Coolnacrutta (ISGS/GMS site code 2500). The habitat had previously been surveyed as part of the Grassland Monitoring Project 2006 (Dwyer et al., 2007). The GMS (Martin et al., 2018) mapped 6.7ha of species-rich calcareous grassland within the SAC. It is important to note that further unsurveyed areas of the habitat may be present within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 2 for the grassland areas surveyed by Martin et al. (2018)	Distribution based on the GMS (Martin et al., 2018). Note that further unsurveyed areas of the habitat may be present within the SAC
Vegetation composition: positive indicator species	Number at a representative number of 2m x 2m monitoring stops; within 20m surrounding area of monitoring stops	At least 7 positive indicator species present in monitoring stop or, if 5–6 present in stop, additional species within 20m of stop; this includes at least two 'high quality' positive indicator species present in stop or within 20m of stop	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the lists of positive indicator species, including high quality indicators, are also presented. These documents should be consulted for further details. High quality indicators recorded in the habitat in the SAC include mountain everlasting (*Antennaria dioica*), spring sedge (*Carex caryophyllea*), fairy flax (*Linum catharticum*), carline thistle (*Carlina vulgaris*) and quaking-grass (*Briza media*) and a variety of orchids, including early-purple orchid (*Orchis mascula*), frog orchid (*Coeloglossum viride*), common spotted-orchid (*Dactylorhiza fuchsii*), common twayblade (*Neottia ovata*) and greater butterfly orchid (*Platanthera chlorantha*) (NPWS internal files; Dwyer et al., 2007; O'Neill et al., 2013; Martin et al., 2018)
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Negative indicator species collectively not more than 20% cover, with cover of an individual species not more than 10%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the list of negative indicator species is presented
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation composition: woody species and bracken	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of woody species (except certain listed species) and bracken (*Pteridium aquilinum*) not more than 5%	Woody species that can occur above 5% cover are juniper (*Juniperus communis*), burnet rose (*Rosa spinosissima*), mountain avens (*Dryas octopetala*) and hoary rock-rose (*Helianthemum oelandicum*). However, cover of these species above 25% may indicate transition to another Annex I habitat such as Alpine and Boreal heaths (4060) or *Juniperus communis* formations (5130). Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). Bracken and scrub have been noted as common in the habitat (Martin et al., 2018; NPWS internal files)

Vegetation structure: broadleaf herb:grass ratio	Percentage at a representative number of 2m x 2m monitoring stops	Broadleaf herb component of vegetation between 40% and 90%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). Broadleaf herb component of vegetation between 30% and 40% may be allowed to pass on expert judgement (Martin et al., 2018). Particularly high herb cover is a feature over much of this site (NPWS internal files)
Vegetation structure: sward height	Percentage at a representative number of 2m x 2m monitoring stops	At least 30% of sward between 5cm and 40cm tall	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation structure: litter	Percentage cover at a representative number of 2m x 2m monitoring stops	Litter cover not more than 25%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Physical structure: bare soil	Percentage cover at a representative number of 2m x 2m monitoring stops	Not more than 10% bare soil	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Physical structure: grazing or disturbance	Area in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m²	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)



An Roinn Tithíochta, Rialtais Áitiúil agus Oidhreachta
Department of Housing, Local Government and Heritage

MAP 1:
CULLAHILL MOUNTAIN SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SAC 000831; version 3.
CO. KILKENNY

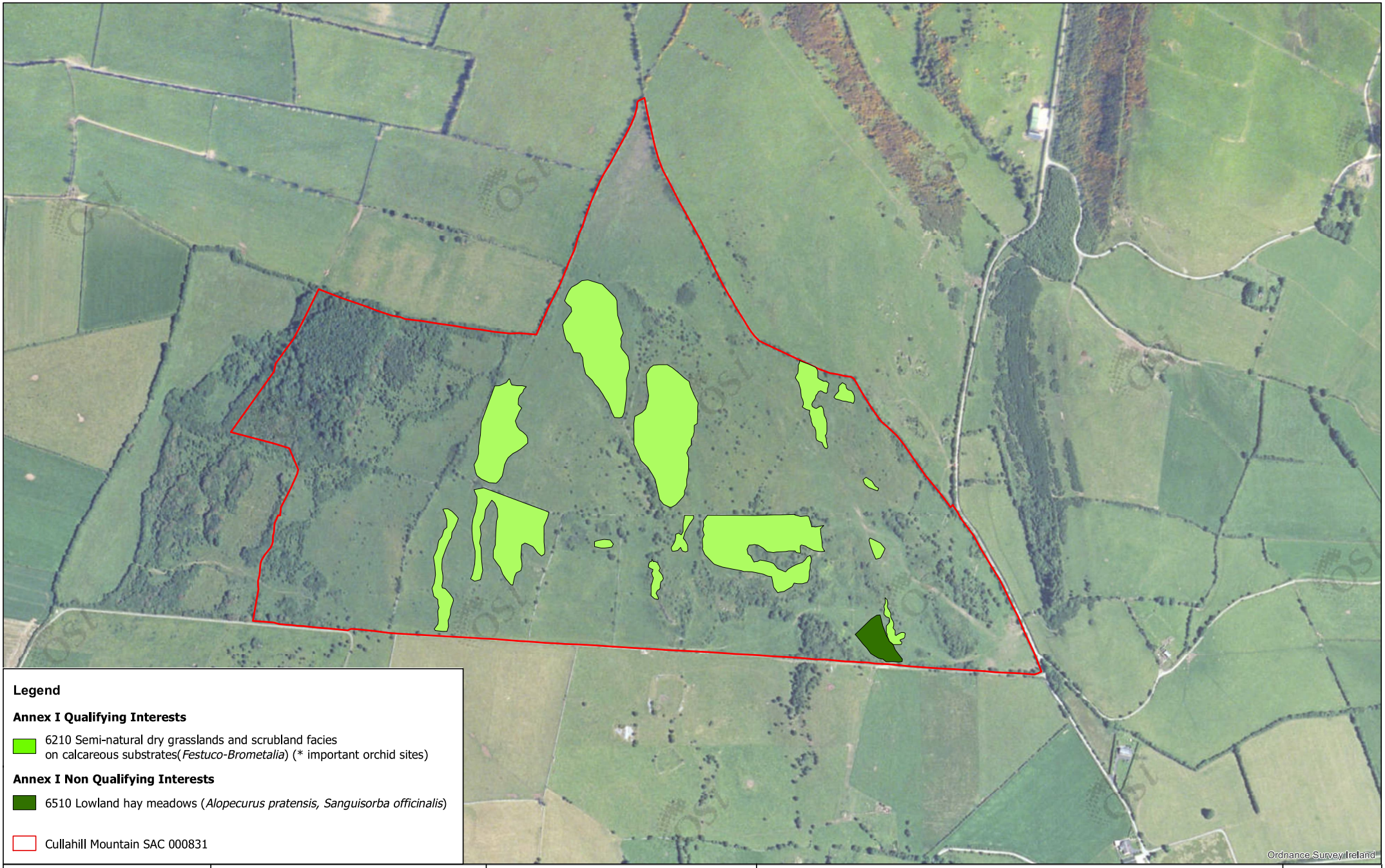
0 0.05 0.1 0.2 Kilometres

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann

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Date: October 2021



An Roinn Tithíochta, Rialtais Áitiúil agus Oidhreachta
Department of Housing, Local Government and Heritage

MAP 2:
CULLAHILL MOUNTAIN SAC
CONSERVATION OBJECTIVES
GRASSLAND HABITATS

Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SAC 000831; version 3.
CO. KILKENNY

0 0.05 0.1 0.2 Kilometres

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann

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Date: October 2021

APPENDIX TO SCREENING FOR
APPROPRIATE ASSESSMENT REPORT

APPENDIX G3: CULLAHILL MOUNTAIN SAC CONSERVATION MEASURES

Site name: **Cullahill Mountain SAC 000831**
County: **Kilkenny**

Site Specific Conservation Objective (SSCO) Ecological Attributes

[6210] Semi natural dry grasslands and scrubland facies on calcareous substrates Festuco Brometalia important orchid sites

1	Habitat area
2	Habitat distribution
3.1	Vegetation composition: positive indicator species
3.2	Vegetation composition: negative indicator species
3.3	Vegetation composition: non-native species
3.4	Vegetation composition: woody species and bracken
4.1	Vegetation structure: broadleaf herb:grass ratio
4.2	Vegetation structure: sward height
4.3	Vegetation structure: litter
5.1	Physical structure: bare soil
5.2	Physical structure: grazing or disturbance

Site name: Cullahill Mountain SAC 000831
Habitat/Species: [6210] Semi-natural dry grasslands
Site Specific Conservation Objectives (SSCO): To restore the favourable conservation condition of [6210] in SAC 000831

No.	Ecological Requirements (Attributes as per SSCO)	Pressure /Threat (EU Code 2025)	Pressure/ Threat Ranking	EU Conservation Measure Type (EU Code 2019-2024)	Measure Category	Conservation Measure	Delivery mechanism	Public Authority with statutory responsibility	Implementation timeframe	Integration with high level plans/policy:
1	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	PA08 Extensive grazing or undergrazing by livestock	Low	MA05 Adapt mowing, grazing and other equivalent agricultural activities (e.g. burning);	Statutory	Consent is required for digging, ploughing, harrowing or otherwise disturbing soil or substrate, if not covered by other regulations. [Consent is not required for these activities on established reseeded grassland or cultivated land provided it is greater than 50m from a river, stream, floodplain, wetland, lake, turlough or pond.]	European Union Habitats (Cullahill Mountain Special Area of Conservation 000831) Regulations 2016	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
2	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	PI02 Other invasive alien species (other than species of Union concern)	Low	MI03 Management, control or eradication of other invasive alien species	Statutory	Consent is required for the planting of trees or multi-annual bioenergy crops, if not covered by other regulations.	European Union Habitats (Cullahill Mountain Special Area of Conservation 000831) Regulations 2016	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
3	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	PA08 Extensive grazing or undergrazing by livestock	Low	MA05 Adapt mowing, grazing and other equivalent agricultural activities (e.g. burning);	Statutory	Consent is required for significant changes in livestock density (including introduction of grazing), changes in livestock type or grazing season, other than on established reseeded grassland, if not covered by other regulations. [Consent is not required for changes of less than 20% in livestock density unless notice has been given that a lower percentage is applicable to a particular site.]	European Union Habitats (Cullahill Mountain Special Area of Conservation 000831) Regulations 2016	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
4	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	PC01 Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell)	Low	MC01 Adapt/manage extraction of non-energy resources	Statutory	Consent is required for blasting, drilling, dredging or otherwise removing or disturbing fossils, rock, minerals, mud, sand, gravel or other sediment, if not covered by other regulations.	European Union Habitats (Cullahill Mountain Special Area of Conservation 000831) Regulations 2016	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
5	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA - Measures related to agricultural practices and agriculture-related habitats	Contractual	25% uptake of eligible participants (8) in the voluntary Agri-Climate Rural Environment Scheme (ACRES).	Agri-Climate Rural Environment Scheme (ACRES)	Department of Agriculture, Food and the Marine (DAFM)	2022	CAP Strategic Plan
6	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA03 Maintain existing extensive agricultural practices and agricultural landscape features	Contractual	Traditional Dry Stone Wall Maintenance (<450 metres) as part of the Agri-Climate Rural Environment Scheme (ACRES).	Agri-Climate Rural Environment Scheme (ACRES)	Department of Agriculture, Food and the Marine (DAFM)	2022	CAP Strategic Plan

Site name: Cullahill Mountain SAC 000831
Habitat/Species: [6210] Semi-natural dry grasslands
Site Specific Conservation Objectives (SSCO): To restore the favourable conservation condition of [6210] in SAC 000831

No.	Ecological Requirements (Attributes as per SSCO)	Pressure /Threat (EU Code 2025)	Pressure/ Threat Ranking	EU Conservation Measure Type (EU Code 2019-2024)	Measure Category	Conservation Measure	Delivery mechanism	Public Authority with statutory responsibility	Implementation timeframe	Integration with high level plans/policy:
7	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA - Measures related to agricultural practices and agriculture-related habitats	Contractual	Production of an accredited Farm Sustainability Plan by 100% of participants in the Agri-Climate Rural Environmental Scheme (ACRES).	Agri-Climate Rural Environment Scheme (ACRES)	Department of Agriculture, Food and the Marine (DAFM)	2022	CAP Strategic Plan
8	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA - Measures related to agricultural practices and agriculture-related habitats	Administrative	Monitoring and reporting of relevant farm activity at the SAC. Direct inspections for DAFM Conditionality compliance or via other state Authorities (via Cross Reporting) to Integrated Controls Division in DAFM.	DAFM BISS Conditionality Farm inspection's - NPWS Conservation Ranger Site monitoring. (Cross Compliance).	Department of Agriculture, Food and the Marine (DAFM)	2022+	CAP Strategic Plan
9	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA05 Adapt mowing, grazing and other equivalent agricultural activities (e.g. burning);	Administrative	Development of a Conservation Grazing Programme on the site (2025+) which includes the introduction of Dexter cattle and drinking points throughout site to encourage movement.	NPWS Conservation Measure	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
10	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA05 Adapt mowing, grazing and other equivalent agricultural activities (e.g. burning)	Administrative	Monitoring by regional staff at this SAC between 3/4 times per year. Site is fully fenced and managed by NPWS staff.	NPWS Conservation Measure	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
11	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MA05 Adapt mowing, grazing and other equivalent agricultural activities (e.g. burning)	Administrative	Scrub and bracken encroachment by cattle and mechanical means approx. 2Ha cleared mechanically.	NPWS Conservation Measure	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
12	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MI05 Management of problematic native species	Administrative	Report into Developing a Sustainable Deer Management Strategy for Ireland.	Deer Management Strategy	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	2023	All government plans and policy documents are cognisant of these protections.

Site name: Cullahill Mountain SAC 000831
Habitat/Species: [6210] Semi-natural dry grasslands
Site Specific Conservation Objectives (SSCO): To restore the favourable conservation condition of [6210] in SAC 000831

No.	Ecological Requirements (Attributes as per SSCO)	Pressure /Threat (EU Code 2025)	Pressure/ Threat Ranking	EU Conservation Measure Type (EU Code 2019-2024)	Measure Category	Conservation Measure	Delivery mechanism	Public Authority with statutory responsibility	Implementation timeframe	Integration with high level plans/policy:
13	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MH03 Reduce impact of other specific human activities	Statutory	Control of activities, if not covered by other regulations, which could negatively impact on this SAC.	European Union Habitats (Cullahill Mountain Special Area of Conservation 000831) Regulations 2016	Department of Housing, Local Government and Heritage (DHLGH)/National Parks and Wildlife Service (NPWS)	1997+	All government plans and policy documents are cognisant of these protections
14	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MJ01 Implement climate change mitigation measures, MJ02 Implement climate change adaptation measures	Administrative	A roadmap of actions to assist in the achievement of climate change objectives by no later than the end of the year 2050.	Ireland's Climate Action Plan	All Government Departments	2019+	Climate Action and Low Carbon Development (Amendment) Act 2021
15	1. Habitat area, 2. Habitat distribution, 3.1. Vegetation composition: positive indicator species, 3.2. Vegetation composition: negative indicator species, 3.3. Vegetation composition: non-native species, 3.4 Vegetation composition: woody species and bracken, 4.1. Vegetation structure: broadleaf herb:grass ratio, 4.2. Vegetation structure: sward height, 4.3. Vegetation structure: litter, 5.1. Physical structure: bare soil, 5.2. Physical structure: grazing or disturbance.	All/Other Relevant Threats and Pressures	N/A	MF08 Manage changes in hydrological and coastal systems and regimes for construction and development (incl. restoration of habitats.	Statutory	Regulation controlling unconsented development at this site.	Planning and Development Act 2000, as amended.	Local Authority/An Coimisiún Pleanála	2000+	All government plans and policy documents are cognisant of these protections

APPENDIX TO SCREENING FOR
APPROPRIATE ASSESSMENT REPORT

APPENDIX H1: RIVER NORE SPA SITE SYNOPSIS

SITE SYNOPSIS

SITE NAME: RIVER NORE SPA

SITE CODE: 004233

The River Nore SPA is a long, linear site that includes the following river sections: the River Nore from the bridge at Townparks, (north-west of Borris in Ossory) to Coolnamuck (approximately 3 km south of Inistioge) in Co. Kilkenny; the Delour River from its junction with the River Nore to Derrynaseera bridge (west of Castletown) in Co. Laois; the Erkina River from its junction with the River Nore at Durrow Mills to Boston Bridge in Co. Laois; a 1.5 km stretch of the River Goul upstream of its junction with the Erkina River; the Kings River from its junction with the River Nore to a bridge at Mill Island, Co. Kilkenny. The site includes the river channel and marginal vegetation.

For a large part of its course the River Nore traverses Carboniferous limestone plains; it passes over a narrow band of Old Red Sandstone rocks below Thomastown.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive of special conservation interest for the following species: Kingfisher.

A survey in 2010 recorded 22 pairs of Kingfisher (based on 16 probable and 6 possible territories) within the SPA. Other species which occur within the site include Mute Swan (35), Mallard (267), Cormorant (14), Grey Heron (45), Moorhen (14), Snipe (17) and Sand Martin (1,029) – all figures are peak counts recorded during the 2010 survey.

The River Nore SPA is of high ornithological importance as it supports a nationally important population of Kingfisher, a species that is listed on Annex I of the E.U. Birds Directive.

13.9.2011

APPENDIX TO SCREENING FOR APPROPRIATE ASSESSMENT REPORT

APPENDIX H2: RIVER NORE SPA CONSERVATION OBJECTIVES SERIES

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

River Nore SPA 004233



National Parks and Wildlife Service,
Department of Housing, Local Government and Heritage,

90 King Street North, Dublin 7, D07 N7CV, Ireland.

Web: www.npws.ie
E-mail: natureconservation@npws.gov.ie

Citation:

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Series Editors: Maria Long and Colin Heaslip
ISSN 2009-4086

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- 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, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

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

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

004233	River Nore SPA
A229	Kingfisher *Alcedo atthis*

Please note that this SPA overlaps with River Barrow and River Nore SAC (002162). The conservation objectives for this site should be used in conjunction with those for the overlapping site as appropriate.

Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	2008
Title :	Waterways Bird Survey 2008
Author :	Crowe, O.; Webb, G.; Collins, E.; Smiddy, P.
Series :	A report commissioned by the National Parks and Wildlife Service and the Office of Public Works, and prepared by BirdWatch Ireland
Year :	2010
Title :	Assessment of the distribution and abundance of Kingfisher *Alcedo atthis* and other riparian birds on six SAC river systems in Ireland
Author :	Cummins, S.; Fisher, J.; Gaj McKeever, R.; McNaghten, l.; Crowe, O.
Series :	V1
Year :	2013
Title :	A review of the SPA network of sites in the Republic of Ireland
Author :	NPWS
Series :	Unpublished Report

Other References

Year :	1977
Title :	Breeding, Mortality and Movements of Kingfishers
Author :	Morgan, R.; Glue, D.
Series :	Bird Study, 24(1), 15–24
Year :	1982
Title :	The Kingfisher
Author :	Boag, D.
Series :	Blandford Press, Dorset
Year :	1985
Title :	The birds of the Western Palaearctic- Volume IV
Author :	Cramp, S.
Series :	Oxford University Press, Oxford
Year :	1993
Title :	Birds as indicators of changes in water quality
Author :	Ormerod, S.J.; Tyler, S.J.
Series :	In: Furness RW, Greenwood JJD, editors. Birds as monitors of environmental change. Chapman & Hall, London
Year :	1994
Title :	Birds in Europe: their conservation status
Author :	Tucker, G.M.; Heath, M.F.
Series :	BirdLife International, Cambridge, U.K.
Year :	1996
Title :	Foods brought to the nest by breeding Kingfishers *Alcedo atthis* in the New Forest of southern England
Author :	Reynolds S.J.; Hinge M.D.C.
Series :	Bird Study 43: 96–102

Year :	1997
Title :	The Birds of the Western Palearctic Concise Edition. Vol. 1 Non-Passerines
Author :	Snow, D.W.; Perrins, C.M.
Series :	Oxford University Press
Year :	2001
Title :	Family Acedinidae (Kingfishers)
Author :	Woodall, P.F.
Series :	In: del Hoyo, J., Elliott, A. and Christie, D.A. (eds), Handbook of the Birds of the World. Volume 6: Mousebirds to Hornbills: 130–249
Year :	2010
Title :	An assessment of the current distribution and status of the Kingfisher *Alcedo atthis* in Ireland
Author :	Crowe, O.; Cummins, S.; Gilligan, N.; Smiddy, P.; Tierney, T.D.
Series :	Irish Birds 9: 41-54
Year :	2011
Title :	Diet of the Common Kingfisher (*Alcedo atthis*) in relation to habitat type: a summary of results from the Czech Republic
Author :	Čech M.; Čech P.
Series :	Sylvia 47: 33–47
Year :	2012
Title :	Fish prey selection by the Common Kingfisher *Alcedo atthis* in Northern Iberia
Author :	Vilches A.; Miranda R.; Arizaga J.
Series :	Acta Ornithologica 47(2): 167-175
Year :	2012
Title :	Habitat selection by breeding Common Kingfishers (*Alcedo atthis* L.) in rivers from Northern Iberia
Author :	Vilches, A.; Miranda, R.; Arizaga, J.; Galicia, D.
Series :	In Annales de Limnologie-International Journal of Limnology (Vol. 48, No. 3, pp. 289-294). EDP Sciences
Year :	2019
Title :	Annex B – Bird species' status and trends report format (Article 12) for the period 2013 – 2018
Author :	NPWS
Series :	Birds Directive - Article 12 Reporting
Year :	2019
Title :	Report under the Article 12 of the Birds Directive Period 2008-2012
Author :	EEA
Series :	European Environment Agency. European Topic Centre on Biological Diversity. Pp 1-9
Year :	2020
Title :	Extreme breeding effort of Common Kingfisher (*Alcedo atthis*)
Author :	Rubáčová, L.; Melišková, M.
Series :	Tichodroma 32: 43-46
Year :	2021
Title :	Using miniaturized GPS archival tags to assess home range features of a small plunge-diving bird: the European Kingfisher (*Alcedo atthis*)
Author :	Musseau, R.; Bastianelli, M.; Bely, C.; Rouselle, C.; Dehorter, O.
Series :	Avian Research, 12(1):30

Year :	2022
Title :	Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species
Author :	Goodship, N.M.; Furness, R.W. (MacArthur Green)
Series :	NatureScot Research Report 1283
Year :	2023
Title :	Sensitivity of the European Kingfisher (*Alcedo atthis*) to global change: evidence from home range features and contaminations by trace elements and organic pollutants, a case study in the marshes of Western Europe
Author :	Musseau, R.; Angelier, F.; Bichet, C.; Millet, M.; Rousselle, C.; Moreau, J.; Bustamante, P.
Series :	4th international Kingfisher conferencen, Biology, ecology & conservation, Wdecki Landscape Parc, Sep 2023, Tleń, Poland
Year :	2024
Title :	EPA River Quality Surveys: Biological
Author :	EPA
Series :	Enviornmenal Protection Agency Online Resource

Conservation Objectives for : River Nore SPA [004233]

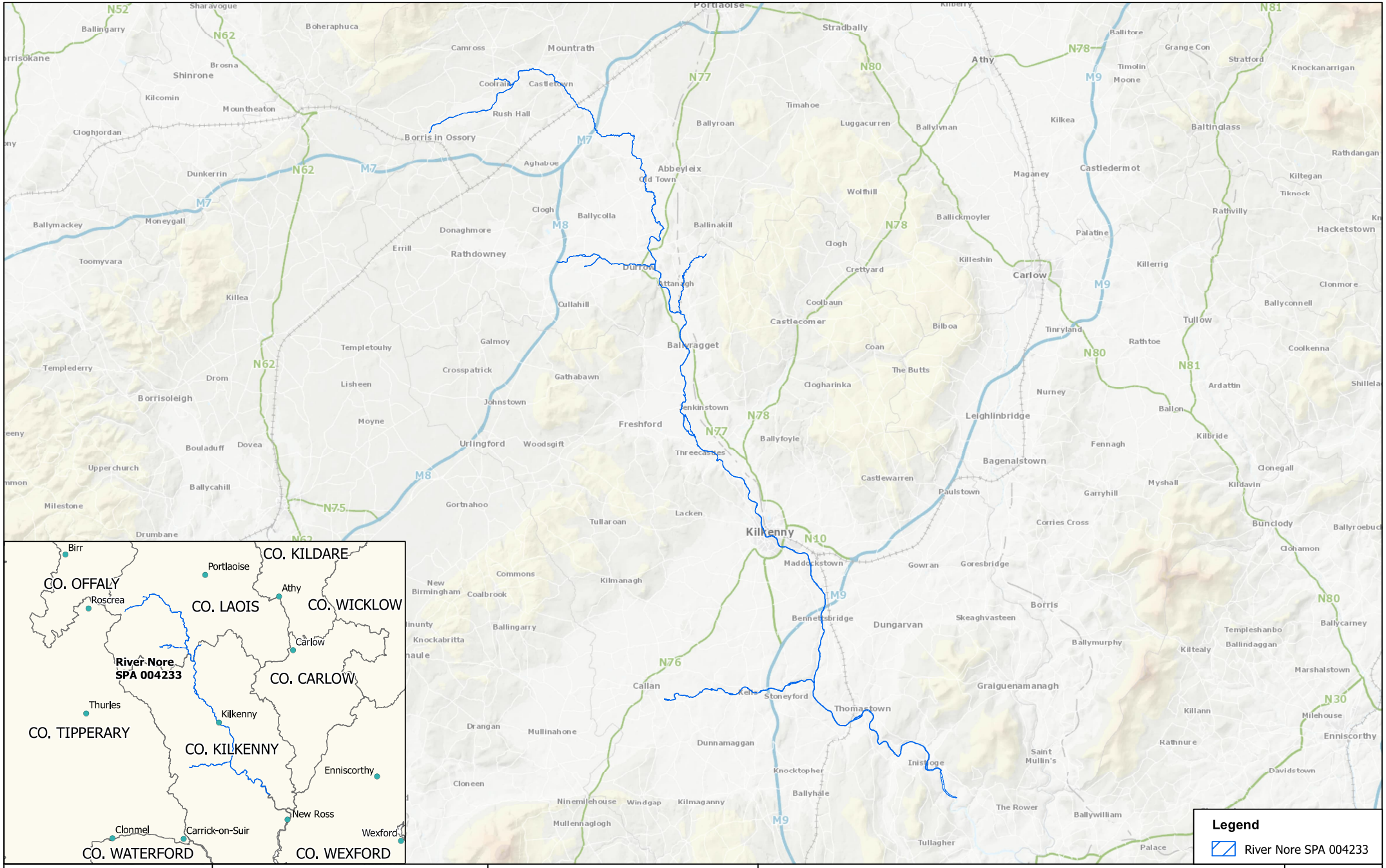
A229 Kingfisher *Alcedo atthis*

To maintain the Favourable conservation condition of Kingfisher in River Nore SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population size	Number of breeding territories/pairs	No significant decline in the long term	Kingfisher is a small plunge-diving bird, largely resident and monogamous in the breeding season, found typically along shallow freshwater systems, with some local movement to coastal areas in winter (Snow and Perrins, 1997; Crowe et al., 2010). Almost two-thirds of recoveries in Britain refer to movements of less than 9km (Morgan and Glue, 1977). Widespread in Ireland (NPWS, 2019), it requires slow-moving water that contains thriving prey populations of small fish, and look-out perches from which it can hunt (Snow and Perrins, 1997). The all-Ireland population is estimated at 1,300-2,100 pairs (NPWS, 2013). A survey of six SAC river catchments in 2010 identified this SPA as supporting 16-22 breeding territories/pairs, or up to 1.7% of the all-Ireland population. The measure 'breeding territories' is as per Cummins et al. (2010) and these were estimated based on registrations of birds, birds' activities, and nest holes seen, primarily on the first two survey visits (out of three)
Productivity rate	Number of fledged young per confirmed breeding pair	Sufficient productivity to maintain the population trend as stable or increasing	Generally, the setting of a minimum level of productivity to ensure a stable and/or increasing population at a given site ought to be informed by robust estimates of: post-fledging survival; adult survival; and immigration and emigration rates. A lack of comprehensive Irish data precludes the identification of a minimum productivity rate for this species at this site and at the national level. An analysis of available British nest records by Morgan and Glue (1977) estimated that 76 young must survive to breed for every 100 Kingfisher alive at the start of the year, in order to maintain population stability and offset high adult mortality. Typically one to two broods are reared (Snow and Perrins, 1997), though in Central Europe, up to five breeding attempts have been recorded in a single season in Slovakia (Rubáčová and Melišková, 2020)
Spatial distribution of territories	Numbers and distribution of occupied territories across site	No significant loss of distribution in the long term, other than that occurring due to natural patterns of variation	Distribution encapsulates the number of locations and areas of potentially suitable habitat for Kingfisher and its availability for use. The suitability and availability of habitats are likely to vary through the season, for example, due to water level changes (due to rainfall, natural variation and other factors). These will affect the spatio-temporal patterns of use of the SPA by the breeding population. Optimal resilience depends on Kingfisher utilising the suitable extent of habitat in the SPA to the maximum extent possible. In 2010, densities of 0.10-0.14 territories/km length of channel were recorded for this site (Cummins et al., 2010), and these were the highest territory abundance recorded in surveys, with the lowest densities (0.04-0.08 territories/km) found on the Barrow and the Munster Blackwater systems (0.05 territories/km). A study of 16 GPS-tagged adult Kingfisher in France (Musseau et al., 2023), estimated mean home range size at 2.5ha (0.25km2)

Extent and quality of nesting banks and other suitable nesting features	Hectares; condition assessment	Sufficient area of high quality nesting habitat to support the population target	Nesting from March to July in Britain, Boag (1982) detailed Kingfisher breeding habitat as being limited by the amount of prey, and the availability of suitable nest sites. Slow-flowing, shallow watercourses with cover along the banks are preferred. In Ireland, they nest in relatively short stretches of suitable banks of less than 10m high (Crowe et al., 2010), but are reliant on suitable fishing conditions (water depth, clarity, and speed of flow). Suitable sand/loam/mud banks (vertical/overhanging) for nesting are necessary to support breeding pairs (Snow and Perrins, 1997; Crowe et al., 2010). Holes in walls, rotten tree stumps, concrete tunnels in canal banks, or burrows of Sand Martin (*Riparia riparia*) are also used. Suitable nest sites located away from the river channel are likely less frequently encountered, but records located over 250m from foraging waters occur (Crowe et al., 2010) and often in a stream or tributary of the main watercourse (Morgan and Glue, 1977)
Forage spatial distribution, extent, abundance and availability	Location, hectares, and forage biomass	Sufficient number of locations, area of suitable forage habitat and available forage biomass to support the population target	Kingfisher occur in many wetland habitats, including smaller types (e.g. ditches, ponds, streams), that provide necessary trophic resources and are ecologically connected (Musseau et al., 2021). Kingfisher diet consists predominantly of small fish/aquatic invertebrates which are captured by plunge-diving, typically over shallow freshwater or estuarine waters (Snow and Perrins, 1997). Pelagic and benthic fish species can be taken (Cramp, 1985) e.g. Three-spined Stickleback (*Gasterosteus aculeatus*), Minnow (*Phoxinus phoxinus*), Bullhead (*Cottus gobio*) and Brown Trout (*Salmo trutta*). Kingfisher prey mostly on small-sized fish, typically 40-70mm in length (Reynolds and Hinge, 1996; Čech and Čech, 2011; Vilches et al., 2012). Availability of suitable fishing perches, along shallow stretches of water from which Kingfisher can hunt (Vilches et al., 2012), is also a key requirement
Water quality	Water quality indicators	Both biotic (i.e. Q-value) and abiotic indices reflect overall good-high quality status	Given that Kingfisher occupy wetlands ecologically connected to the wider landscape, habitat destruction, degradation via pollution (e.g. agricultural run-off; pesticides; increased turbidity) and/or poor management of watercourses (EEA, 2019; Crowe et al., 2010) are a concern. Data are limited for Kingfisher, but Dipper (*Cinclus cinclus*), an exclusively riparian bird, is less abundant where stream acidity and aluminium concentrations increase; its territories are longer at low pH, and clutch and brood sizes are significantly lower (Ormerod and Tyler, 1993). Thus, minimum water quality standards for the site should be met, as set out by the "River Quality Surveys" (Environmental Protection Agency, 2024). Q-values of ≥4 represent satisfactory water quality for Kingfisher. Values are based primarily on the relative proportions of 'pollution sensitive to tolerant macroinvertebrates'. These macroinvertebrates are eaten by both Kingfisher and their prey species (e.g. Brown Trout)

Barriers to connectivity	Number, location, shape and hectares	No significant increase	An adult male Kingfisher is territorial and usually defends its territory from the previous summer (Snow and Perrins, 1997), including necessary access to forage in freshwater habitats ecologically connected to their territory. Along other river systems monitored in 2008, i.e. the River Boyne system, Kingfisher were observed flying out of grass on banks (often short grass) and into fields for 150-200m, where they would disappear out of view (Crowe et al., 2008). Barriers limiting access to this SPA or ecologically important sites outside the SPA will ultimately affect the achievement of targets for population size and/or spatial distribution. Factors such as the number, location, shape and area of potential barriers must be taken into account to determine their potential impact
Disturbance to breeding sites	Intensity, frequency, timing and duration	Disturbance occurs at levels that do not significantly impact upon breeding Kingfisher	The impact of any significant disturbance on the SPA's breeding population will ultimately be manifested in the targets, which relate to population demographics (i.e. population size, productivity rate) and the distribution of territories along the linear river catchments. Canalisation of streams and clearance of emergent vegetation to improve drainage result in loss of nesting and feeding habitat and declines in fish numbers (Tucker and Heath, 1994). In Britain, Kingfisher have been known to be at risk locally from human persecution to protect fish stocks (Woodall, 2001), but no evidence of this threat has been reported in Ireland. Likely disturbance distances in relation to human activities are set out in Goodship and Furness (MacArthur Green) (2022). Factors such as intensity, frequency, timing and duration of a (direct or indirect) disturbance source must be taken into account to determine the potential impact upon the targets for population demographics



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MAP 1:
RIVER NORE SPA
CONSERVATION OBJECTIVES
SPA DESIGNATION

Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SPA 004233; version 3
CO. KILKENY, LAOIS

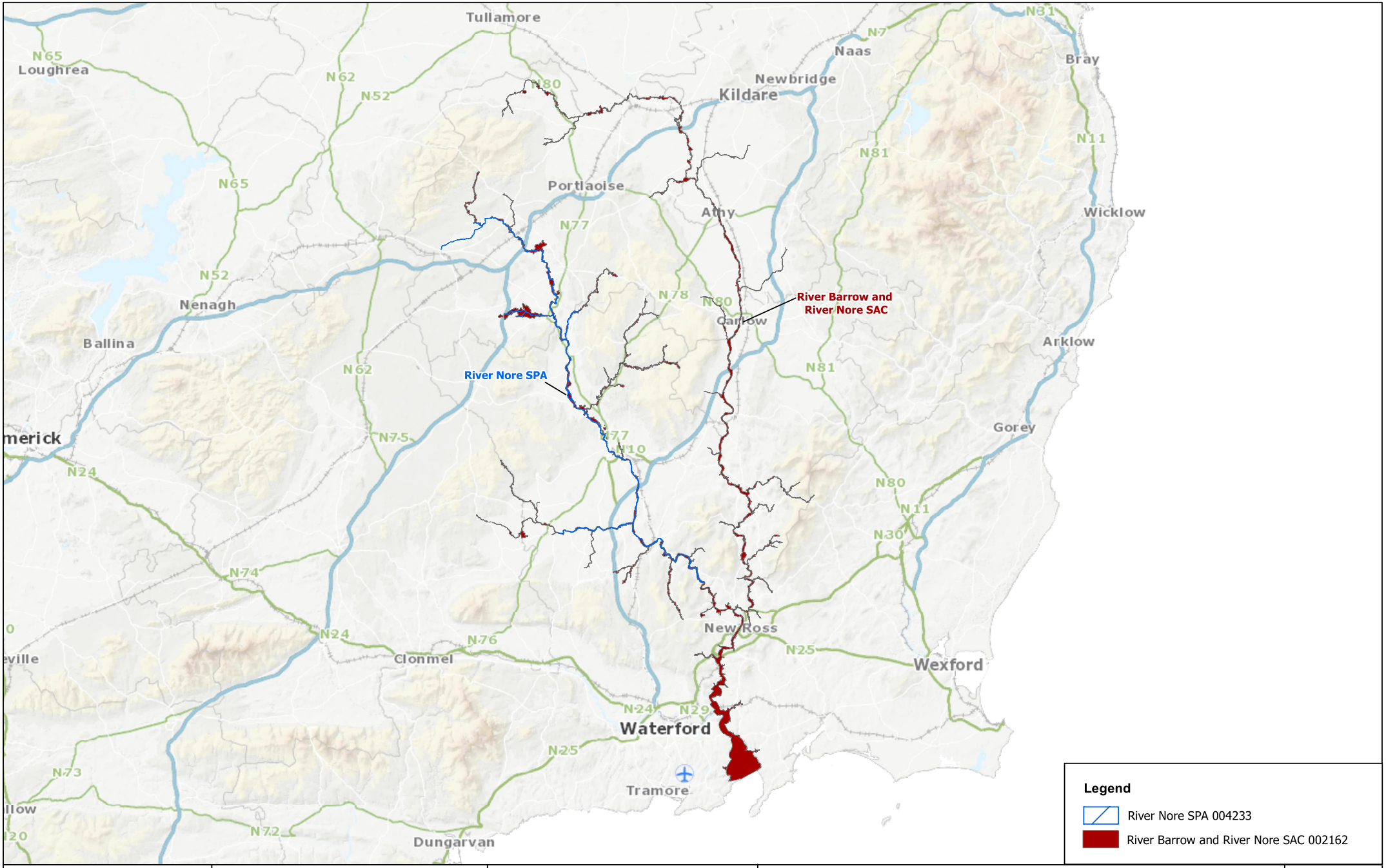
0 2 4 8 Kilometres

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
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arna ataírgeadh faoin rannán mapála Náisiúnta d'uimhir cheadúnais Tailte Éireann CYAL50351092

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Map version 1
Date: May 2024



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MAP 2:
RIVER NORE SPA
CONSERVATION OBJECTIVES
OVERLAPPING AND ADJACENT SITES

Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SPA 004233; version 3
CO. KILKENNY, LAOIS

0 5 10 20 Kilometres

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
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Nil sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. © Folaíonn sé rannán Náisiúnta Mapála de shonraí Tailte Éireann
arna atáirgeadh faoin rannán mapála Náisiúnta d'uimhir cheadúnais Tailte Éireann CYAL50351092

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Map version 1
Date: May 2024

APPENDIX TO SCREENING FOR APPROPRIATE ASSESSMENT REPORT

APPENDIX I1:RIVER BARROW AND RIVER NORE SAC SITE SYNOPSIS

SITE SYNOPSIS

Site Name: River Barrow and River Nore SAC

Site Code: 002162

This site consists of the freshwater stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains, and it also includes the tidal elements and estuary as far downstream as Creadun Head in Waterford. The site passes through eight counties – Offaly, Kildare, Laois, Carlow, Kilkenny, Tipperary, Wexford and Waterford. Major towns along the edge of the site include Mountmellick, Portarlington, Monasterevin, Stradbally, Athy, Carlow, Leighlinbridge, Graiguenamanagh, New Ross, Inistioge, Thomastown, Callan, Bennettsbridge, Kilkenny and Durrow. The larger of the many tributaries include the Lerr, Fushoge, Mountain, Aughavaud, Owenass, Boherbaun and Stradbally Rivers of the Barrow, and the Delour, Dinin, Erkina, Owveg, Munster, Arrigle and King's Rivers on the Nore.

Both rivers rise in the Old Red Sandstone of the Slieve Bloom Mountains before passing through a band of Carboniferous shales and sandstones. The Nore, for a large part of its course, traverses limestone plains and then Old Red Sandstone for a short stretch below Thomastown. Before joining the Barrow it runs over intrusive rocks poor in silica. The upper reaches of the Barrow also run through limestone. The middle reaches and many of the eastern tributaries, sourced in the Blackstairs Mountains, run through Leinster Granite. The southern end, like the Nore runs over intrusive rocks poor in silica. Waterford Harbour is a deep valley excavated by glacial floodwaters when the sea level was lower than today. The coast shelves quite rapidly along much of the shore.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1130] Estuaries
[1140] Tidal Mudflats and Sandflats
[1170] Reefs
[1310] *Salicornia* Mud
[1330] Atlantic Salt Meadows
[1410] Mediterranean Salt Meadows
[3260] Floating River Vegetation
[4030] Dry Heath
[6430] Hydrophilous Tall Herb Communities
[7220] Petrifying Springs*

[91A0] Old Oak Woodlands
[91E0] Alluvial Forests*

[1016] Desmoulin's Whorl Snail (*Vertigo moulinsiana*)
[1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
[1092] White-clawed Crayfish (*Austropotamobius pallipes*)
[1095] Sea Lamprey (*Petromyzon marinus*)
[1096] Brook Lamprey (*Lampetra planeri*)
[1099] River Lamprey (*Lampetra fluviatilis*)
[1103] Twaite Shad (*Alosa fallax*)
[1106] Atlantic Salmon (*Salmo salar*)
[1355] Otter (*Lutra lutra*)
[1421] Killarney Fern (*Trichomanes speciosum*)

Good examples of alluvial forest (a priority habitat on Annex I of the E.U. Habitats Directive) are seen at Rathsnagadan, Murphy's of the River, in Abbeyleix estate and along other shorter stretches of both the tidal and freshwater elements of the site. Typical species seen include Almond Willow (*Salix triandra*), White Willow (*S. alba*), Rusty Willow (*S. cinerea* subsp. *oleifolia*), Crack Willow (*S. fragilis*) and Osier (*S. viminalis*), along with Iris (*Iris pseudacorus*), Hemlock Water-dropwort (*Oenanthe crocata*), Wild Angelica (*Angelica sylvestris*), Thin-spiked Wood-sedge (*Carex strigosa*), Pendulous Sedge (*C. pendula*), Meadowsweet (*Filipendula ulmaria*), Common Valerian (*Valeriana officinalis*) and the Red Data Book species Nettle-leaved Bellflower (*Campanula trachelium*).

A good example of petrifying springs with tufa formations occurs at Dysart Wood along the Nore. This is a rare habitat in Ireland and one listed with priority status on Annex I of the E.U. Habitats Directive. These hard water springs are characterised by lime encrustations, often associated with small waterfalls. A rich bryophyte flora is typical of the habitat and two diagnostic species, *Palustriella commutata* and *Eucladium verticillatum*, have been recorded.

The best examples of old oak woodlands are seen in the ancient Park Hill woodland in the estate at Abbeyleix; at Kyleadohir, on the Delour, Forest Wood House, Kylecorragh and Brownstown Woods on the Nore; and at Cloghristic Wood, Drummond Wood and Borris Demesne on the Barrow, though other patches occur throughout the site. Abbeyleix Woods is a large tract of mixed deciduous woodland which is one of the only remaining true ancient woodlands in Ireland. Historical records show that Park Hill has been continuously wooded since the 16th century and has the most complete written record of any woodland in the country. It supports a variety of woodland habitats and an exceptional diversity of species including 22 native trees, 44 bryophytes and 92 lichens. It also contains eight indicator species of ancient woodlands. Park Hill is also the site of two rare plants, Nettle-leaved

Bellflower and the moss *Leucodon sciuroides.* The rare Myxomycete fungus, *Licea minima* has been recorded from woodland at Abbeyleix.

Oak woodland covers parts of the valley side south of Woodstock and is well developed at Brownsford where the Nore takes several sharp bends. The steep valley side is covered by oak (*Quercus* spp.), Holly (*Ilex aquifolium*), Hazel (*Corylus avellana*) and Downy Birch (*Betula pubescens*), with some Beech (*Fagus sylvatica*) and Ash (*Fraxinus excelsior*). All the trees are regenerating through a cover of Bramble (*Rubus fruticosus* agg.), Foxglove (*Digitalis purpurea*), Great Wood-rush (*Luzula sylvatica*) and Broad Buckler-fern (*Dryopteris dilatata*).

On the steeply sloping banks of the River Nore, about 5 km west of New Ross, in Co. Kilkenny, Kylecorragh Woods form a prominent feature in the landscape. This is an excellent example of relatively undisturbed, relict oak woodland with a very good tree canopy. The wood is quite damp and there is a rich and varied ground flora. At Brownstown, a small, mature oak dominated woodland occurs on a steep slope. There is younger woodland to the north and east of it. Regeneration throughout is evident. The understorey is similar to the woods at Brownsford. The ground flora of this woodland is developed on acidic, brown earth type soil and comprises a thick carpet of Bilberry (*Vaccinium myrtillus*), Heather (*Calluna vulgaris*), Hard Fern (*Blechnum spicant*), Common Cow-wheat (*Melampyrum pratense*) and Bracken (*Pteridium aquilinum*).

Borris Demesne contains a very good example of a semi-natural broadleaved woodland in very good condition. There is quite a high degree of natural re-generation of oak and Ash through the woodland. At the northern end of the estate oak species predominate. Drummond Wood, also on the Barrow, consists of three blocks of deciduous woods situated on steep slopes above the river. The deciduous trees are mostly oak species. The woods have a well-established understorey of Holly, and the herb layer is varied, with Bramble abundant. The whitebeam *Sorbus devoniensis* has also been recorded here.

Eutrophic tall herb vegetation occurs in association with the various areas of alluvial forest and elsewhere where the floodplain of the river is intact. Characteristic species of the habitat include Meadowsweet, Purple Loosestrife (*Lythrum salicaria*), Marsh Ragwort (*Senecio aquaticus*), Ground Ivy (*Glechoma hederacea*) and Hedge Bindweed (*Calystegia sepium*). Indian Balsam (*Impatiens glandulifera*), an introduced and invasive species, is abundant in places.

Floating river vegetation is well represented in the Barrow and in the many tributaries of the site. In the Barrow the species found include water-starworts (*Callitriche* spp.), Canadian Pondweed (*Elodea canadensis*), Bulbous Rush (*Juncus bulbosus*), water-milfoils (*Myriophyllum* spp.), the pondweed *Potamogeton* x *nitens*, Broad-leaved Pondweed (*P. natans*), Fennel Pondweed (*P. pectinatus*), Perfoliated Pondweed (*P. perfoliatus*) and crowfoots (*Ranunculus* spp.). The water quality of the Barrow has improved since the vegetation survey was carried out (EPA, 1996).

Dry heath at the site occurs in pockets along the steep valley sides of the rivers especially in the Barrow Valley and along the Barrow tributaries where they occur in the foothills of the Blackstairs Mountains. The dry heath vegetation along the slopes of the river bank consists of Bracken and Gorse (*Ulex europaeus*) with patches of acidic grassland vegetation. Additional typical species include Heath Bedstraw (*Galium saxatile*), Foxglove, Common Sorrel (*Rumex acetosa*) and Creeping Bent (*Agrostis stolonifera*). On the steep slopes above New Ross the Red Data Book species Greater Broomrape (*Orobanche rapum-genistae*) has been recorded. Where rocky outcrops are shown on the maps Bilberry and Great Wood-rush are present. At Ballyhack a small area of dry heath is interspersed with patches of lowland dry grassland. These support a number of clover species, including the legally protected Clustered Clover (*Trifolium glomeratum*) - a species known from only one other site in Ireland. This grassland community is especially well developed on the west side of the mud-capped walls by the road. On the east of the cliffs a group of rock-dwelling species occur, i.e. English Stonecrop (*Sedum anglicum*), Sheep's-bit (*Jasione montana*) and Wild Madder (*Rubia peregrina*). These rocks also support good lichen and moss assemblages with *Ramalina subfarinacea* and *Hedwigia ciliata*.

Dry heath at the site generally grades into wet woodland or wet swamp vegetation lower down the slopes on the river bank. Close to the Blackstairs Mountains, in the foothills associated with the Aughnabrisky, Aughavaud and Mountain Rivers there are small patches of wet heath dominated by Purple Moor-grass (*Molinia caerulea*) with Heather, Tormentil (*Potentilla erecta*), Carnation Sedge (*Carex panicea*) and Bell Heather (*Erica cinerea*).

Salt meadows occur at the southern section of the site in old meadows where the embankment has been breached, along the tidal stretches of in-flowing rivers below Stokestown House, in a narrow band on the channel side of Common Reed (*Phragmites australis*) beds and in narrow fragmented strips along the open shoreline. In the larger areas of salt meadow, notably at Carrickcloney, Ballinlaw Ferry and Rochestown on the west bank; Fisherstown, Alderton and Great Island to Dunbrody on the east bank, the Atlantic and Mediterranean sub types are generally intermixed. At the upper edge of the salt meadow in the narrow ecotonal areas bordering the grasslands where there is significant percolation of salt water, the legally protected species Borrer's Saltmarsh-grass (*Puccinellia fasciculata*) and Meadow Barley (*Hordeum secalinum*) are found. The very rare and also legally protected Divided Sedge (*Carex divisa*) is also found. Sea Rush (*Juncus maritimus*) is also present. Other plants recorded and associated with salt meadows include Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea Couch (*Elymus pycnanthus*), Spear-leaved Orache (*Atriplex prostrata*), Lesser Sea-spurrey (*Spergularia marina*), Sea Arrowgrass (*Triglochin maritima*) and Sea Plantain (*Plantago maritima*).

Glassworts (*Salicornia* spp.) and other annuals colonising mud and sand are found in the creeks of the saltmarshes and at the seaward edges of them. The habitat also occurs in small amounts on some stretches of the shore free of stones.

The estuary and the other E.U. Habitats Directive Annex I habitats within it form a large component of the site. Extensive areas of intertidal flats, comprised of substrates ranging from fine, silty mud to coarse sand with pebbles/stones are present. Good quality intertidal sand and mudflats have developed on a linear shelf on the western side of Waterford Harbour, extending for over 6 km from north to south between Passage East and Creadaun Head, and in places are over 1 km wide. The sediments are mostly firm sands, though grade into muddy sands towards the upper shore. They have a typical macro-invertebrate fauna, characterised by polychaetes and bivalves. Common species include *Arenicola marina*, *Nephtys hombergii*, *Scoloplos armiger*, *Lanice conchilega* and *Cerastoderma edule*. An extensive area of honey-comb worm biogenic reef occurs adjacent to Duncannon, Co. Wexford on the eastern shore of the estuary. It is formed by the polychaete worm *Sabellaria alveolata.* This intertidal *Sabellaria alveolata* reef is formed as a sheet of interlocking tubes over a considerable area of exposed bedrock. This polychaete species constructs tubes, composed of aggregated sand grains, in tightly packed masses with a distinctive honeycomb-like appearance. These can be up to 25cm proud of the substrate and form hummocks, sheets or more massive formations. A range of species are reported from these reefs including: *Enteromorpha* sp.; *Ulva* sp.; *Fucus vesiculosus*; *Fucus serratus*; *Polysiphonia* sp.; *Chondrus crispus*; *Palmaria palmate*; *Coralinus officialis*; *Nemertea* sp.; *Actinia equine*; *Patella vulgate*; *Littorina littorea*; *Littorina obtusata* and *Mytilus edulis*.

The western shore of the harbour is generally stony and backed by low cliffs of glacial drift. At Woodstown there is a sandy beach, now much influenced by recreation pressure and erosion. Behind it a lagoonal marsh has been impounded which runs westwards from Gaultiere Lodge along the course of a slow stream. An extensive reedbed occurs here. At the edges is a tall fen dominated by sedges (*Carex* spp.), Meadowsweet, willowherbs (*Epilobium* spp.) and rushes (*Juncus* spp.). Wet woodland also occurs.

The dunes which fringe the strand at Duncannon are dominated by Marram (*Ammophila arenaria*) towards the sea. Other species present include Wild Clary/Sage (*Salvia verbenaca*), a rare Red Data Book species. The rocks around Duncannon ford have a rich flora of seaweeds typical of a moderately exposed shore and the cliffs themselves support a number of coastal species on ledges, including Thrift, Rock Samphire (*Crithmum maritimum*) and Buck's-horn Plantain (*Plantago coronopus*).

Other habitats which occur throughout the site include wet grassland, marsh, reedswamp, improved grassland, arable land, quarries, coniferous plantations, deciduous woodland, scrub and ponds.

Seventeen Red Data Book plant species have been recorded within the site, most in the recent past. These are Killarney Fern (*Trichomanes speciosum*), Divided Sedge, Clustered Clover, Basil Thyme (*Acinos arvensis*), Red Hemp-nettle (*Galeopsis angustifolia*), Borrer's Saltmarsh-grass, Meadow Barley, Opposite-leaved Pondweed (*Groenlandia densa*), Meadow Saffron/Autumn Crocus (*Colchicum autumnale*), Wild Clary/Sage, Nettle-leaved Bellflower, Saw-wort (*Serratula tinctoria*), Bird Cherry

(*Prunus padus*), Blue Fleabane (*Erigeron acer*), Fly Orchid (*Ophrys insectifera*), Ivy Broomrape (*Orobanche hederae*) and Greater Broomrape. Of these, the first nine are protected under the Flora (Protection) Order, 2015. Divided Sedge was thought to be extinct but has been found in a few locations in the site since 1990. In addition plants which do not have a very wide distribution in the country are found in the site including Thin-spiked Wood-sedge, Field Garlic (*Allium oleraceum*) and Summer Snowflake. Six rare lichens, indicators of ancient woodland, are found including *Lobaria laetevirens* and *L. pulmonaria.* The rare moss *Leucodon sciuroides* also occurs.

The site is very important for the presence of a number of E.U. Habitats Directive Annex II animal species including Freshwater Pearl Mussel (*Margaritifera margaritifera*), White-clawed Crayfish, Salmon, Twaite Shad, three lamprey species – Sea Lamprey, Brook Lamprey and River Lamprey, the tiny whorl snail *Vertigo moulinsiana* and Otter. This is one of only a handful of spawning grounds in the country for Twaite Shad. The freshwater stretches of the River Nore main channel is a designated salmonid river. The Barrow/Nore is mainly a grilse fishery though spring salmon fishing is good in the vicinity of Thomastown and Inistioge on the Nore. The upper stretches of the Barrow and Nore, particularly the Owenass River, are very important for spawning.

The site supports many other important animal species. Those which are listed in the Irish Red Data Book include Daubenton's Bat, Badger, Irish Hare and Common Frog. The rare Red Data Book fish species Smelt (*Osmerus eperlanus*) occurs in estuarine stretches of the site. In addition to the Freshwater Pearl Mussel, the site also supports two other freshwater mussel species, *Anodonta anatina* and *A. cygnea*.

Three rare invertebrates have been recorded in alluvial woodland at Murphy's of the River. These are: *Neoascia obliqua* (Order Diptera: Syrphidae), *Tetanocera freyi* (Order Diptera: Sciomyzidae) and *Dictya umbrarum* (Order Diptera: Sciomyzidae). The rare invertebrate, *Mitostoma chrysomelas* (Order Arachnida), occurs in the old oak woodland at Abbeyleix and only two other sites in the country. Two flies (Order Diptera) *Chrysogaster virescens* and *Hybomitra muhlfeldi* also occur at this woodland.

The site is of ornithological importance for a number of E.U. Birds Directive Annex I species, including Greenland White-fronted Goose, Whooper Swan, Bewick's Swan, Bar-tailed Godwit, Peregrine and Kingfisher. Nationally important numbers of Golden Plover and Bar-tailed Godwit are found during the winter. Wintering flocks of migratory birds are seen in Shanahoe Marsh and the Curragh and Goul Marsh, both in Co. Laois, and also along the Barrow Estuary in Waterford Harbour. There is also an extensive autumnal roosting site in the reedbeds of the Barrow Estuary used by Swallows before they leave the country. The old oak woodland at Abbeyleix has a typical bird fauna including Jay, Long-eared Owl and Raven. The reedbed at Woodstown supports populations of typical waterbirds including Mallard, Snipe, Sedge Warbler and Water Rail.

Land use at the site consists mainly of agricultural activities – mostly intensive in nature and principally grazing and silage production. Slurry is spread over much of

the area. Arable crops are also grown. The spreading of slurry and fertiliser poses a threat to the water quality of the salmonid river and to the populations of E.U. Habitats Directive Annex II animal species within the site. Many of the woodlands along the rivers belong to old estates and support many non-native species. Little active woodland management occurs. Fishing is a main tourist attraction along stretches of the main rivers and their tributaries and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. There is net fishing in the estuary and a mussel bed also. Other recreational activities such as boating, golfing and walking, particularly along the Barrow towpath, are also popular. There is a golf course on the banks of the Nore at Mount Juliet and GAA pitches on the banks at Inistioge and Thomastown. There are active and disused sand and gravel pits throughout the site. Several industrial developments, which discharge into the river, border the site. New Ross is an important shipping port. Shipping to and from Waterford and Belview ports also passes through the estuary.

The main threats to the site and current damaging activities include high inputs of nutrients into the river system from agricultural run-off and several sewage plants, over-grazing within the woodland areas, and invasion by non-native species, for example Cherry Laurel (*Prunus laurocerasus*) and Rhododendron (*Rhododendron ponticum*). The water quality of the site remains vulnerable. Good quality water is necessary to maintain the populations of the Annex II animal species listed above. Good quality is dependent on controlling fertilisation of the grasslands, particularly along the Nore. It also requires that sewage be properly treated before discharge. Drainage activities in the catchment can lead to flash floods which can damage the many Annex II species present. Capital and maintenance dredging within the lower reaches of the system pose a threat to migrating fish species such as lamprey and shad. Land reclamation also poses a threat to the salt meadows and the populations of legally protected species therein.

Overall, the site is of considerable conservation significance for the occurrence of good examples of habitats and of populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats Directive. Furthermore it is of high conservation value for the populations of bird species that use it. The occurrence of several Red Data Book plant species including three rare plants in the salt meadows add further interest to this site.

APPENDIX TO SCREENING FOR APPROPRIATE ASSESSMENT REPORT

APPENDIX I2: RIVER BARROW AND RIVER NORE SAC CONSERVATION OBJECTIVES SERIES

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

River Barrow and River Nore SAC 002162



National Parks and Wildlife Service,
Department of Housing, Local Government and Heritage,

90 King Street North, Dublin 7, D07 N7CV, Ireland.

Web: www.npws.ie
E-mail: natureconservation@npws.gov.ie

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Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- 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, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

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

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

** indicates a priority habitat under the Habitats Directive*

002162 River Barrow and River Nore SAC

1016	Desmoulin's Whorl Snail *Vertigo moulinsiana*
1029	Freshwater Pearl Mussel *Margaritifera margaritifera*
1092	White-clawed Crayfish *Austropotamobius pallipes*
1095	Sea Lamprey *Petromyzon marinus*
1096	Brook Lamprey *Lampetra planeri*
1099	River Lamprey *Lampetra fluviatilis*
1103	Twaite Shad *Alosa fallax fallax*
1106	Salmon *Salmo salar*
1130	Estuaries
1140	Mudflats and sandflats not covered by seawater at low tide
1170	Reefs
1310	*Salicornia* and other annuals colonising mud and sand
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
1355	Otter *Lutra lutra*
1410	Mediterranean salt meadows (Juncetalia maritimi)
1421	Killarney Fern *Trichomanes speciosum*
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
4030	European dry heaths
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
7220	Petrifying springs with tufa formation (Cratoneurion)*
91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)*

Please note that this SAC is adjoins Lower River Suir SAC (002137), Blackstairs Mountains SAC (000770), Slieve Bloom Mountains SAC (000412) and overlaps with River Nore SPA (004233) and Slieve Bloom Mountains SPA (004160). See map 1a. The conservation objectives for this site should be used in conjunction with those for overlapping and adjoining site(s) as appropriate. IMPORTANT: This 'Version 2' document includes 1 additional QI (1170), 3 updates to existing QIs (1029/1130/1140) and 1 QI removal (1990). The conservation objectives for other pre-existing QIs have generally not been updated.

Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	1995
Title :	Mapping of proposed SAC rivers for *Margaritifera margaritifera*. A report for the National Parks and Wildlife Service on work carried out from August to October 1995 (in two volumes). Volume 1
Author :	Moorkens, E.
Series :	Unpublished report to NPWS
Year :	1998
Title :	Conservation management of the white-clawed crayfish, *Austropotamobius pallipes*
Author :	Reynolds, J.D.
Series :	Irish Wildlife Manuals, No. 1
Year :	2006
Title :	The distribution of Lamprey in the River Barrow SAC
Author :	King, J.J.
Series :	Irish Wildlife Manual No. 21
Year :	2006
Title :	Otter survey of Ireland 2004/2005
Author :	Bailey, M.; Rochford, J.
Series :	Irish Wildlife Manuals, No. 23
Year :	2006
Title :	Initiation of a monitoring program for the freshwater pearl mussel, *Margaritifera margaritifera* (L.) in the Mountain River (Barrow)
Author :	Ross, E.
Series :	Unpublished report to National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin
Year :	2007
Title :	A survey of juvenile lamprey populations in the Corrib and Suir catchments
Author :	O'Connor, W.
Series :	Irish Wildlife Manuals, No. 26
Year :	2008
Title :	All Ireland Species Action Plan - Killarney Fern
Author :	NPWS ; EHS-NI
Series :	Species Action Plan
Year :	2008
Title :	National survey of native woodlands 2003-2008
Author :	Perrin, P.M.; Martin, J.; Barron, S.; O'Neill, F.H.; McNutt, K.E.; Delaney, A.
Series :	Unpublished report to NPWS
Year :	2009
Title :	NS II Freshwater Pearl Mussel Sub-basin Management Plan: Fisheries Survey. Stage 1 Report
Author :	Johnston and Associates, P.
Series :	Unpublished Report to the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin

Year :	2009
Title :	NS II Freshwater Pearl Mussel Sub-basin Management Plans: Monitoring of the Freshwater Pearl Mussel in the Ballymurphy
Author :	Moorkens, E.A.
Series :	Department of the Environment, Heritage and Local Government, Dublin
Year :	2009
Title :	NS II Freshwater Pearl Mussel Sub-basin Management Plans: Monitoring of the Freshwater Pearl Mussel in the Mountain
Author :	Moorkens, E.A.
Series :	Department of the Environment, Heritage and Local Government, Dublin
Year :	2009
Title :	NS II Freshwater Pearl Mussel Sub-basin Management Plans: Monitoring of the Freshwater Pearl Mussel in the Nore
Author :	Moorkens, E.A.
Series :	Department of the Environment, Heritage and Local Government, Dublin
Year :	2010
Title :	A provisional inventory of ancient and long-established woodland in Ireland
Author :	Perrin, P.M.; Daly, O.H.
Series :	Irish Wildlife Manuals, No. 46
Year :	2010
Title :	Irish semi-natural grasslands survey. Annual report No.3: Counties Donegal, Dublin, Kildare and Sligo
Author :	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; McNutt, K.E.; Perrin, P.M.; Delaney, A.
Series :	Unpublished report to NPWS
Year :	2010
Title :	Second Draft Nore Freshwater Pearl Mussel Sub-basin Management Plan (2009-2015)
Author :	DEHLG
Series :	Unpublished Report to NPWS
Year :	2010
Title :	Second Draft Ballymurphy Freshwater Pearl Mussel Sub-basin Management Plan (2009-2015)
Author :	DEHLG
Series :	National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland
Year :	2010
Title :	Second Draft Mountain Freshwater Pearl Mussel Sub-basin Management Plan (2009-2015)
Author :	DEHLG
Series :	National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland
Year :	2011
Title :	River Barrow and River Nore SAC (002162): Conservation objectives supporting document - coastal habitats [Version 1]
Author :	NPWS
Series :	Conservation objectives supporting document
Year :	2011
Title :	River Barrow and River Nore SAC (002162): Conservation objectives supporting document - marine habitats [Version 1]
Author :	NPWS
Series :	Conservation objectives supporting document

Year :	2011
Title :	River Barrow and River Nore SAC (002162): Conservation objectives supporting document - woodland habitats [Version 1]
Author :	NPWS
Series :	Conservation objectives supporting document
Year :	2012
Title :	Monitoring Populations of the Freshwater Pearl Mussel *Margaritifera margaritifera* - A condition assessment survey of the freshwater pearl mussel in the Nore River, Counties Laois and Kilkenny. Spring 2012
Author :	Moorkens, E.A.
Series :	Department of Arts, Heritage and the Gaeltacht, Dublin
Year :	2014
Title :	Report on assisted breeding of the Nore pearl mussel
Author :	Moorkens, E.A.
Series :	Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland
Year :	2016
Title :	Population genetic analyses of the endangered freshwater pearl mussel (*Margaritifera margaritifera*) in Ireland
Author :	Feind, S.; Kuehn, R.; Geist, J.; Moorkens, E.A.; Killeen, I.J.
Series :	Unpublished report for the National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
Year :	2017
Title :	Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Mountain River, County Carlow
Author :	Moorkens, E.
Series :	Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland
Year :	2017
Title :	Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Nore River, County Laois
Author :	Moorkens, E.
Series :	Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland
Year :	2018
Title :	Electrofishing survey to identify fish hosts for the freshwater pearl mussel Margaritifera margaritifera in 12 populations in the Republic of Ireland. 2017 Survey
Author :	Johnston, P.M.; Moorkens, E.A.
Series :	Unpublished Report to the National Parks and Wildlife Service, DCHG, Dublin.
Year :	2020
Title :	Monitoring Populations of the Freshwater Pearl Mussel, Margaritifera margaritifera, Stage 3 and Stage 4 Survey
Author :	Moorkens, E.A. & Killeen, I.J.
Series :	Irish Wildlife Manuals No. 122
Year :	2020
Title :	2019 Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Nore River, County Laois
Author :	Moorkens, E.A.
Series :	Department of Culture, Heritage and the Gaeltacht, Ireland
Year :	2023
Title :	2022 Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Ballymurphy River, County Carlow
Author :	Wetland Surveys Ireland
Series :	Department of Housing, Local Government and Heritage, Dublin

Year :	2025
Title :	River Barrow and River Nore SAC (site code 2162). Conservation objectives supporting document - marine habitats [Version 2].
Author :	NPWS
Series :	Conservation objectives supporting document

Other References

Year :	1982
Title :	Otter survey of Ireland
Author :	Chapman, P.J.; Chapman, L.L.
Series :	Unpublished report to Vincent Wildlife Trust
Year :	1991
Title :	The spatial organization of otters (*Lutra lutra*) in Shetland
Author :	Kruuk, H.; Moorhouse, A.
Series :	Journal of Zoology, 224: 41-57
Year :	1991
Title :	The freshwater pearl mussels *Margaritifera margaritifera* in the South East of Ireland
Author :	Moorkens, E.A.
Series :	MSc Thesis, University of Dublin, Trinity College
Year :	1994
Title :	Imminent extinction of the Nore freshwater pearl mussel (Margaritifera durrovensis) Phillips: a species unique to Ireland
Author :	Moorkens, E.A.; Costello, M.J.
Series :	Aquatic Conservation: Marine and Freshwater Ecosystems 4,363-365
Year :	1996
Title :	Studies on the biology and ecology of *Margaritifera* in Ireland
Author :	Moorkens, E.
Series :	Unpublished Ph.D. thesis, University of Dublin, Trinity College
Year :	1999
Title :	Diet of otters (*Lutra lutra*) on Inishmore, Aran Islands, west coast of Ireland
Author :	Kingston, S.; O'Connell, M.; Fairley, J.S.
Series :	Biology and Environment: Proceedings of the Royal Irish Academy, 99B: 173-182
Year :	2000
Title :	A survey of broadleaf woodlands in 3 SACs: Barrow-Nore, River Unshin & Lough Forbes
Author :	Browne, A.; Dunne, F.; Roche, N.
Series :	Unpublished Report to NPWS
Year :	2002
Title :	Reversing the habitat fragmentation of British woodlands
Author :	Peterken, G.
Series :	WWF-UK, London
Year :	2002
Title :	A survey of the white-clawed crayfish, *Austropotamobius pallipes* (Lereboullet), and of water quality in two catchments of eastern Ireland
Author :	Demers, A.; Reynolds, J.D.
Series :	Bulletin Francais de la Peche et de la Pisciculture, 367: 729-740

Year :	2003
Title :	Monitoring the river, brook and sea lamprey, *Lampetra fluviatilis*, *L. planeri* and *Petromyzon marinus*
Author :	Harvey, J.; Cowx, I.
Series :	Conserving Natura 2000 Rivers Monitoring Series No. 5. English Nature, Peterborough
Year :	2003
Title :	Ecology of watercourses characterised by Ranunculion fluitantis and Callitricho-Batrachion vegetation
Author :	Hatton-Ellis, T.W.; Grieve, N.
Series :	Conserving Natura 2000 Rivers Ecology Series No. 11. English Nature, Peterborough
Year :	2003
Title :	Ecology of the allis and twaite shad
Author :	Maitland, P.S.; Hatton-Ellis, T.W.
Series :	Conserving Natura 2000 Rivers Ecology Series No. 3. English Nature, Peterborough
Year :	2004
Title :	Pilot Project for Monitoring Populations of the Freshwater Pearl Mussel. Baseline survey of the Nore River SAC, Counties Laois and Kilkenny
Author :	Moorkens, E.
Series :	Unpublished Report to NPWS
Year :	2004
Title :	A survey of freshwater pearl mussels in the south eastern river basin district
Author :	Moorkens, E.A.; Killeen, I.; Kurz, I.
Series :	Unpublished report for the Heritage Council
Year :	2005
Title :	The ecology and conservation of the gametophyte generation of the Killarney Fern (Trichomanes speciosum Willd.) in Ireland
Author :	Kingston, N.; Hayes, C.
Series :	Biology and Environment: Proceedings of the Royal Irish Academy 105B(2): 71-79
Year :	2006
Title :	Otters - ecology, behaviour and conservation
Author :	Kruuk, H.
Series :	Oxford University Press
Year :	2006
Title :	The status of host fish populations and fish species richness in European freshwater pearl mussel (*Margaritifera margaritifera*) streams
Author :	Geist, J.; Porkka, M.; Kuehn, R.
Series :	Aquatic Conservation: Marine and Freshwater Ecosystems, 16: 251-266
Year :	2007
Title :	Assessment of fish passage and the ecological impact of migration barriers on the River Nore catchment
Author :	Sullivan, A.
Series :	Nore Suir Rivers Trust & OPW
Year :	2008
Title :	A survey of mudflats and sandflats in Ireland. An intertidal soft sediment survey of Waterford Estuary
Author :	Aquatic Services Unit
Series :	Unpublished Report to Marine Institute & NPWS

Year :	2008
Title :	Benthic Biotope classification of subtidal sedimentary habitats in the Lower River Suir candidate Special Area of Conservation and the River Nore and River Barrow candidate Special Area of Conservation
Author :	ARMS
Series :	Unpublished Report to NPWS
Year :	2008
Title :	Poor water quality constrains the distribution and movements of twaite shad (*Alosa fallax fallax*, Lacepede, 1803) in the watershed of river Scheldt
Author :	Maas, J.; Stevens, M.; Breine, J.
Series :	Hydrobiologia, 602: 129-143
Year :	2008
Title :	Assessment of the Risk of Barriers to Fish Migration in the Nore Catchment, Southern Regional Fisheries Board
Author :	CFB; Compass Informatics
Series :	Unpublished Report to CFB
Year :	2009
Title :	The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. [S.I. 296 of 2009]
Author :	Government of Ireland
Series :	Irish Statute Book
Year :	2010
Title :	Report of the standing scientific committee to the DCENR. The status of Irish salmon stocks in 2010 and precautionary catch advice for 2011
Author :	SSC
Series :	Unpublished Report to DCENR
Year :	2010
Title :	Site investigations for Sabellaria alveolata (Honey-comb worm) biogenic reefs in Ireland
Author :	NPWS
Series :	Unpublished Report to NPWS
Year :	2010
Title :	Addressing the conservation and rehabilitation of *Margaritifera margaritifera* populations in the Republic of Ireland within the framework of the habitats and species directive
Author :	Moorkens, E.
Series :	Journal of Conchology, 40: 339
Year :	2014
Title :	Assessing near-bed velocity in a recruiting population of the endangered freshwater pearl mussel (*Margaritifera margaritifera*) in Ireland
Author :	Moorkens, E.; Killeen, I.
Series :	Aquatic Conservation: Marine and Freshwater Ecosystems, 24(6): 853-862
Year :	2017
Title :	Water quality – Guidance standard on monitoring freshwater pearl mussels (*Margaritifera margaritifera*) populations and their environment
Author :	NSAI
Series :	I.E. EN 16859:2017
Year :	2018
Title :	Genetic structure of Irish freshwater pearl mussels (*Margaritifera margaritifera* and *Margaritifera durrovensis*): Validity of subspecies, roles of host fish, and conservation implications
Author :	Geist, J.; Moorkens, E.; Killeen, I.; Feind, S.; Stoeckle, B.C.; O Connor, Á.; Kuehn, R.
Series :	Aquatic Conservation: Marine and Freshwater Ecosystems, 28: 923-933

Year :	2019
Title :	The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019. [S.I. No. 77 of 2019]
Author :	Government of Ireland
Series :	Irish Statute Book

Spatial data sources

Year :	Revision 2025
Title :	Margaritifera Sensitive Areas data
GIS Operations :	Relevant catchment boundaries identified. Expert opinion used as necessary to resolve any issues arising
Used For :	1029
Year :	2010
Title :	EPA transitional waterbody data
GIS Operations :	Clipped to SAC boundary
Used For :	1130 (map 2)
Year :	Interpolated 2011 and 2025
Title :	Intertidal and subtidal surveys 2008, 2010 and 2024
GIS Operations :	Polygon feature classes from marine community types base data sub-divided based on interpolation of marine survey data
Used For :	Marine community types, 1140, 1170 (maps 3, 4 and 4a)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; Saltmarsh and Sand Dune datasets erased out if applicable
Used For :	Marine community types base data (map 4a)
Year :	Revision 2010
Title :	Saltmarsh Monitoring Project 2007-2008. Version 1
GIS Operations :	QIs selected; clipped to SAC boundary; overlapping regions with Sand Dune data investigated and resolved with expert opinion used
Used For :	1310, 1330, 1410 (map 5)
Year :	Derived 2011
Title :	Internal NPWS files
GIS Operations :	Dataset created from spatial reference contained in files
Used For :	7220 (map 6)
Year :	Revision 2010
Title :	National Survey of Native Woodlands 2003-2008. Version 1
GIS Operations :	QIs selected; clipped to SAC boundary
Used For :	91A0, 91E0 (map 6)
Year :	2011 and 2025
Title :	NPWS rare and threatened species database
GIS Operations :	Dataset created from spatial references in database records
Used For :	1016, 1092, 1421, 1029 (maps 7 and 8)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	Creation of an 80m buffer on the marine side of the high water mark (HWM); creation of a 10m buffer on the terrestrial side of the HWM; combination of 80m and 10m HWM buffer datasets; creation of a 10m buffer on the landward side of the river banks data; creation of a 20m buffer applied to river centerline and stream data; combination of 10m river banks and 20m river and stream centerline buffer datasets; combined river and stream buffer dataset clipped to HWM; combination of HWM buffer dataset with river and stream buffer dataset; overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary
Used For :	1355 (no map)

1130 Estuaries

To maintain the favourable conservation condition of Estuaries in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 2	Habitat area was estimated using OSI data and the defined Transitional Water Body area under the Water Framework Directive as 3856ha. See marine supporting document for further details
Community distribution	Hectares	Conserve the following community types in a natural condition: Muddy estuarine community complex; Sand to muddy fine sand community complex; Fine sand with *Fabulina fabula* community; Sheltered to moderately exposed intertidal reef community complex. See map 4a	The likely area of sediment community types was derived from a combination of intertidal and subtidal surveys undertaken in 2008, 2009, 2010 and 2024. See marine supporting document for further details
Community structure: extent	Hectares and distribution	Conserve the extent of *Sabellaria alveolata* reef community, subject to natural processes. See map 4a	Based on site-specific surveys undertaken in 2010 and 2024 (NPWS internal files), most of the suitable habitat was colonised overlying the rocky substrate. See the marine supporting document for further details
Community structure: quality	Honeycomb reef structure	Conserve the high quality of the *Sabellaria alveolata* reef community, subject to natural processes. See map 4a	Based on site-specific surveys in 2010 and 2024 (NPWS internal files), there was a high percentage of clearly defined and intact honeycomb reef structures. See the marine supporting document for further details

1140 Mudflats and sandflats not covered by seawater at low tide

To maintain the Favourable conservation condition of the Mudflats and sandflats not covered by seawater at low tide in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated using OSI data as 926ha. See marine supporting document for further details
Community distribution	Hectares	Conserve the following community types in a natural condition: Muddy estuarine community complex; Sand to muddy fine sand community complex. See map 4a	The likely area of sediment communities was derived from a combination of intertidal and subtidal surveys undertaken in 2008 (ARMS, 2008; ASU, 2008). See marine supporting document for further details

1170 Reefs

To maintain the Favourable conservation condition of Reefs in River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent area is stable or increasing, subject to natural processes. See map 4	Habitat area estimated as 17.20ha based on information from site-specific survey in February 2024 (NPWS internal files) and orthophotography. See the River Barrow and River Nore SAC conservation objectives supporting document for marine habitats and species for further details
Distribution	Occurrence	The distribution of reefs is stable or increasing, subject to natural processes. See map 4	Based on information from a site-specific survey in February 2024 and orthophotography. Map 4a shows the mapped geological features, which are used as indicators of the distribution of the reefs habitat. See the marine supporting document for further details
Community extent	Hectares	Conserve the following community type in a natural condition: Sheltered to moderately exposed intertidal reef community complex in a natural condition, subject to natural processes. See map 4a	Based on a site-specific survey undertaken in February 2024. See the marine supporting document for further details
Community structure: extent	Hectares and distribution	Conserve the extent of *Sabellaria alveolata* reef community, subject to natural processes. See map 4a	Based on site-specific surveys undertaken in 2010 and 2024 (NPWS internal files), most of the suitable habitat was colonised overlying the rocky substrate. See the marine supporting document for further details
Community structure: quality	Honeycomb reef structure	Conserve the high quality of the *Sabellaria alveolata* reef community, subject to natural processes. See map 4a	Based on site-specific surveys in 2010 and 2024 (NPWS internal files), there was a high percentage of clearly defined and intact honeycomb reef structures. See the marine supporting document for further details

1310 *Salicornia* and other annuals colonising mud and sand

To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For the one sub-site mapped: Ringville - 0.03ha. See map 5	Based on data from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). The Ringville sub-site was mapped and no additional areas of potential Salicornia mudflat were identified from an examination of aerial photographs, giving a total estimated area of 0.03ha. NB futher unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5	See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession. See map 5	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated.	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009).	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species: *Spartina anglica*	Hectares	No significant expansion of *Spartina*. No new sites for this species and an annual spread of less than 1% where it is already known to occur	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details

1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)

To restore the Favourable conservation condition of Atlantic salt meadows in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Dunbrody Abbey - 1.25ha, Killowen - 2.59ha, Rochestown - 17.50ha, Ringville - 6.70ha. See map 5	Based on data from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). Four sub-sites were mapped and additional areas of potential saltmarsh were identified from an examination of aerial photographs, giving a total estimated area of Atlantic salt meadow of 35.07ha. NB futher unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5	See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession. See map 5	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species: *Spartina anglica*	Hectares	No significant expansion of *Spartina*. No new sites for this species and an annual spread of less than 1% where it is already known to occur	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details

1410 Mediterranean salt meadows (Juncetalia maritimi)

To restore the favourable conservation condition of Mediterranean salt meadows in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Dunbrody Abbey - 0.08ha, Rochestown - 0.04ha, Ringville - 6.70ha. See map 5	Based on data from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). Three sub-sites were mapped and no additional areas of potential saltmarsh were identified from an examination of aerial photoraphs, giving a total estimated area of Mediterranean salt meadow of 6.82ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5	See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession. See map 5	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated.	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species: *Spartina anglica*	Hectares	No significant expansion of *Spartina*. No new sites for this species and an annual spread of less than 1% where it is already known to occur	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details

3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

To maintain the Favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	No decline, subject to natural processes	The full distribution of this habitat and its sub-types in this site is currently unknown. The basis of the selection of the SAC for the habitat is the presence of an excellent example of the vegetation community (nutrient-rich type) associated with extensive tufa deposits on the river bed in the Kings tributary of the Nore (Heuff, 1987). Other examples of this or other sub-types may be present within the SAC
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	The full extent of this habitat in this site is currently unknown. See above
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	Due to regular disturbance (through variations in flow), river macrophytes rarely reach a climax condition but frequently occur as transient communities. A natural (relatively unmodified) flow regime is required for both plant communities and channel geomorphology to be in favourable condition, exhibiting typical dynamics for the river type (Hatton-Ellis and Grieve, 2003). For most of the sub-types of this habitat, high flows are required to maintain the substratum (see below) necessary fo
Hydrological regime: groundwater discharge	Metres per second	The groundwater flow to the habitat should be permanent and sufficient to maintain tufa formation	This attribute refers to sub-types with tufa formations. Groundwater discharges to this habitat throughout the year
Substratum composition: particle size range	Millimetres	The substratum should be dominated by large particles and free from fine sediments	The tufaceous sub-types develop on relatively stable substrata such as bedrock, boulders and cobbles, where tufa can deposit and accumulate. Tufa deposition is believed to be biologically mediated, by algae and bryophytes. The substratum must remain free of fine sediments such as clay, silt and fine sand, which would adversely affect the growth of algae and mosses
Water chemistry: minerals	Milligrammes per litre	The groundwater and surface water should have sufficient concentrations of minerals to allow deposition and persistence of tufa deposits	The tufaceous sub-types require mineral- (typically calcium-) rich groundwaters to allow deposition of tufa. Surface water must also be sufficiently base-rich to prevent chemical erosion. Alkalinity and/or total hardness data may also be relevant
Water quality: suspended sediment	Milligrammes per litre	The concentration of suspended solids in the water column should be sufficiently low to prevent excessive deposition of fine sediments	See substratum composition above. Turbidity data may also be relevant
Water quality: nutrients	Milligrammes per litre	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition	Phosphorus (MRP) is typically the limiting nutrient, however increased nitrogen (NO3-) negatively impacts upon the N-fixing blue-green algal communities that frequently contribute to tufa deposition. Nutrient enrichment of the habitat typically leads to increased filamentous-green-algal biomass, and consequent changes in other algae, bryophyte and macrophyte species composition and abundance. Water quality should reach a minimum of Water Framework Directive good status, in terms of n

Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub-type should be present and in good condition	The sub-types of this habitat are poorly understood and their typical species have not yet been defined. Typical species and appropriate targets may emerge to be site-specific. The typical species of the tufaceous sub-type in the Kings tributary of the Nore are identified in Heuff (1987). The typical species may include higher plants, bryophytes, macroalgae and microalgae
Floodplain connectivity	Area	The area of active floodplain at and upstream of the habitat should be maintained	River connectivity with the floodplain is essential for the functioning of this habitat. The site of the tufaceous sub-type in the King's River is within an area of floodplain, with further large floodplains upstream. Floodplains regulatefine sediment deposition within the channel. See substratum composition above

4030 European dry heaths

To maintain the favourable conservation condition of European dry heaths in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	No decline from current habitat distribution, subject to natural processes	Spatial extent currently unmapped but indicated as occurring on the steep, free-draining, river valley sides especially the Barrow and tributaries in the foothills of the Blackstairs Mountains (based on NPWS NHA Survey - 1997/98 Site Notes; Natura 2000 Form Explanatory Notes - May 2006; The above NHA survey was prior to the extensions to the SAC that included river habitat and estuary at Ballyhack which may have incorporated additional dry heath habitat)
Habitat area	Hectares	Area stable or increasing, subject to natural processes. Habitat area is not known but estimated as less than 400ha of the area of the SAC, occurring in dispersed locations	Based on NPWS NHA Survey Site Notes (1997/98); Natura 2000 Form Explanatory Notes - May 2006
Physical structure: free-draining, acid, low nutrient soil; rock outcrops	Occurrence	No significant change in soil nutrient status, subject to natural processes. No increase or decrease in area of natural rock outcrop	Based on NPWS NHA Survey Site Notes - 1997/98; Natura 2000 Form Explanatory Notes - May 2006
Vegetation structure: sub-shrub indicator species	Percentage cover	Cover of characteristic sub-shrub indicator species at least 25%: gorse (*Ulex europaeus*) and where rocky outcrops occur bilberry (*Vaccinium myrtillus)* and woodrush (*Luzula sylvatica*). Some rock outcrops support English stonecrop (*Sedum anglicum*), sheep's bit (*Jasione montana*) and wild madder (*Rubia peregrina*) as well as important moss and lichen assemblages	Dry heath in this SAC occurs on free-draining nutrient poor soils and is often characterised by gorse and open acid grassland areas. A characteristic coastal dry heath of the southeast also occurs. Several rare plants occur including two species listed in the Red Data Book (Curtis and McGough, 1988). The species occurring on the site are listed in NPWS NHA Survey Site Notes - 1997/98. A brief overview of the principal characteristics of the dry heath habitat of this SAC is given in t
Vegetation structure: senescent gorse	Percentage cover	Cover of senescent gorse less than 50%	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath condition assessment methodology of Perrin et al. (2010)
Vegetation structure: browsing	Percentage cover	Long shoots of bilberry with signs of browsing collectively less than 33%	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath condition assessment methodology of Perrin et al. (2010)
Vegetation structure: native trees and shrubs	Percentage cover	Cover of scattered native trees and shrub less than 20%	Based on NPWS NHA Survey Site Notes - 1997/98; Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010). From the NHA survey notes the main threats appear to be reclamation or invasion by scrub woodland
Vegetation composition: positive indicator species	Number	Number of positive indicator species at least 2 e.g. gorse and associated dry heath/ acid grassland flora	Dry heath in this SAC occurs on free-draining nutrient poor soils and is characterised by gorse and acid grassland areas. It corresponds to Annex I sub-type "heaths rich in gorse (*Ulex*) of the Atlantic margins" (European Commission, 2007). Based on NPWS NHA Survey Site Notes -1997/98; Natura 2000 Form Explanatory Notes - May 2006 and a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010)

Vegetation structure: positive indicator species	Percentage cover	Cover of positive indicator species at least 60%. This should include plant species characterisitic of dry heath in this SAC including gorse, bilberry and associated acid grassland flora	Dry heath in this SAC is characterised by gorse and acid grassland areas and locally bilberry and woodrush. Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation composition: bryophyte and non-crustose lichen species	Number	Number of bryophyte or non-crustose lichen species present at least 2	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. 2010
Vegetation composition: bracken (*Pteridium aquilinum*)	Percentage cover	Cover of bracken less than 10% - however see 'Notes'	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010). Bracken appears to be quite dense in places and before any management action is considered its rate of spread needs to be established as well as its threat, if any, to other dry heath species and its potential value to important fauna (e.g. Twite)
Vegetation structure: weedy negative indicator species	Percentage cover	Cover of agricultural weed species (negative indicator species) less than 1%	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation composition: non-native species	Percentage cover	Cover of non-native species less than 1%.	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation composition: rare/scarce heath species	Location, area and number	No decline in distribution or population sizes of rare, threatened or scarce species, including Greater Broomrape (*Orobanche rapum-genistae)* and the legally protected clustered clover (*Trifolium glomeratum*)	Broomrape is dependent on gorse at this site as it is parasitic on gorse roots. It is recorded as occurring on steep slopes above New Ross. A small area of excellent dry coastal heath at Ballyhack is interspersed with patches rock and of dry lowland grassland and has a high species diversity. Notably there is an excellent range of Clover (*Trifolium*) species including the legally protected clustered clover, a species known only from one other site in Ireland. Also *T*
Vegetation structure: disturbed bare ground	Percentage cover	Cover of disturbed bare ground less than 10% (but if peat soil less than 5%)	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified verison of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation structure: burning	Occurrence	No signs of burning within sensitive areas	Perrin et al. (2010) defines sensitive areas

6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution of this habitat in this site is currently unknown. Considered to occur in association with some riverside woodlands, unmanaged river islands and in narrow bands along the floodplain of slow-flowing stretches of river (Natura 2000 Form Explanatory Notes)
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Extent of this habitat in this site is currently unknown. See above
Hydrological regime: flooding depth/height of water table	Metres	Maintain appropriate hydrological regimes	This habitat requires winter inundation, which results in deposition of naturally nutrient-rich sediment
Vegetation structure:sward height	Centimetres	30-70% of sward is between 40 and 150cm in height	Bare ground, due to natural indundation processes, may often be present. Attribute and target based on the Irish Semi-natural Grassland Survey (O'Neill et al., 2010)
Vegetation composition: broadleaf herb: grass ratio	Percentage	Broadleaf herb component of vegetation between 40 and 90%	Attribute and target based on O'Neill et al. (2010)
Vegetation composition: typical species	Number	At least 5 positive indicator species present	List of positive indicator species identified by O'Neill et al. (2010)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control- NB Indian balsam (*Impatiens glandulifera*), monkeyflower (*Mimulus guttatus*), Japanese knotweed (*Fallopia japonica*) and giant hogweed (*Heracleum mantegazzianum*)	Species listed as being present in the site (Natura 2000 Form Explanatory Notes)

7220 Petrifying springs with tufa formation (Cratoneurion)*

To maintain the Favourable conservation condition of Petrifying springs with tufa formation (*Cratoneurion*) in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Square metres	Area stable or increasing, subject to natural processes	Extent of this habitat in this site is currently unknown. An area ("Tens of square metres") has been described at one location (Natura 2000 Form Explanatory Notes; internal NPWS files), see below
Habitat distribution	Occurrence	No decline. See map 6 for recorded location	Full distribution of this habitat in this site is currently unknown. It has been described in woodlands at Dysart, between Thomastown and Inistioge (Natura 2000 Form Explanatory Notes; internal NPWS files). NB futher areas are likely to occur within the site
Hydrological regime: height of water table; water flow	Metres; metres per second	Maintain appropriate hydrological regimes	Current hydrological regimes are unknown. Petrifying springs rely on permanent irrigation, usually from upwelling groundwater sources or seepage sources
Water quality	Water chemistry measures	Maintain oligotrophic and calcareous conditions	Water chemistry is currently unknown. Water supply to petrifying springs is characteristically oligotrophic and calcareous
Vegetation composition: typical species	Occurrence	Maintain typical species	The bryophytes *Cratoneuron commutatum* and *Eucladium verticillatum* are diagnostic of this habitat. Both are found at the location described above. Natura 2000 Form Explanatory Notes and internal NPWS files also list other typical species

91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

To restore the favourable conservation condition of Old oak woodland with Ilex and Blechnum in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 85.08ha for sub-sites surveyed: see map 6	Minimum area, based on 13 sites surveyed by Perrin et al. (2008) - site codes 14, 20, 49, 73, 125, 508, 509, 510, 514, 515, 518, 519, 521, and other sources. NB further unsurveyed areas maybe present within the site
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 6	Distribution based on Perrin et al. (2008). NB further unsurveyed areas maybe present within the site
Woodland size	Hectares	Area stable of increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The sizes of at least some of the existing woodlands need to be increased in order to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). Topographical and land ownership constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008); Browne et al. (2000). See woodland habitats supporting document for further details
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008); Browne et al. (2000). See woodland habitats supporting document for further details
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Oak regenerates poorly. In suitable sites ash can regenerate in large numbers although few seedlings reach pole size
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least $30m^3$/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem.
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local disctinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-listed and other rare or localised species. Perrin and Daly (2010) list sites 14, 20, 73, 125, 508, 509, 510, 514, 515, 518, 521 as potential ancient/long established woodlands
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008); Browne et al. (2000)
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including oak (*Quercus petraea*) and birch (*Betula pubescens*)	Species reported in Perrin et al. (2008); Browne et al. (2000)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common invasive species in this woodland type: beech (*Fagus sylvatica*), rhododendron (*Rhododendron ponticum*), cherry laurel (*Prunus laurocerasus*)

91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)*

To restore the Favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 181.54ha for sites surveyed: see map 6	Minimum area, based on 16 sites surveyed by Perrin et al. (2008) - site codes 10, 15, 17, 126, 127, 262, 282, 287, 511, 516, 517, 518, 520, 608, 1021; Coillte LIFE project and other sources. NB further unsurveyed areas maybe present within the SAC
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 6	Distribution based on Perrin et al. (2008). NB further unsurveyed areas maybe present within the site
Woodland size	Hectares	Area stable of increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The sizes of at least some of the existing woodlands need to be increased in order to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). Topographical and land ownership constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008); Browne et al. (2000). See woodland habitats supporting document for further details
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008); Browne et al. (2000). See woodland habitats supporting document for further details
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Alder and oak regenerate poorly. Ash often regenerates in large numbers although few seedlings reach pole size
Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river flood plains but not for woodland around springs/seepage areas
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least $30m^3$/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local disctinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-listed and other rare or localised species. Perrin and Daly (2010) list sites 10, 15, 17, 127, 282, 516, 517, 518, 608 as potential ancient/long established woodlands
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008); Browne et al. (2000)

Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including ash (*Fraxinus excelsior*) alder (*Alnus glutinosa*), willows (*Salix* spp) and locally, oak (*Quercus robur*)	Species reported in Perrin et al. (2008); Browne et al. (2000)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common invasive species in this woodland type: sycamore (*Acer pseudoplatanus*), beech (*Fagus sylvatica*), rhododendron (*Rhododendron ponticum*), cherry laurel (*Prunus laurocerasus*), dogwood (*Cornus sericea*), Himalayan honeysuckle (*Leycesteria formosa*) and Himalayan balsam (*Impatiens grandiflora*)

1016 Desmoulin's Whorl Snail *Vertigo moulinsiana*

To maintain the Favourable conservation condition of Desmoulin's whorl snail in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: occupied sites	Number	No decline. Two known sites: Borris Bridge, Co. Carlow S711503; Boston Bridge, Kilnaseer S338774, Co. Laois. See map 7	Data from NPWS rare and threatened species database
Population size: adults	Number per positive sample	At least 5 adults snails in at least 50% of samples	Attribute and target from Moorkens and Killeen (2011)
Population density	Percentage positive samples	Adult snails present in at least 60% of samples per site	Attribute and target from Moorkens and Killeen (2011)
Area of occupancy	Hectares	Minimum of 1ha of suitable habitat per site	Attribute and target from Moorkens and Killeen (2011)
Habitat quality: vegetation	Percentage of samples with suitable vegetation	90% of samples in habitat classes I and II as defined in Moorkens & Killeen (2011)	Attribute and target from Moorkens and Killeen (2011)
Habitat quality: soil moisture levels	Percentage of samples with appropriate soil moisture levels	90% of samples in moisture class 3-4 as defined in Moorkens & Killeen (2011)	Attribute and target from Moorkens and Killeen (2011)

1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

To restore the Favourable conservation condition of the Freshwater pearl mussel (*Margaritifera margaritifera*) in River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: Ballymurphy	Kilometres	Restore distribution at 3.91km. See map 8	The conservation objective applies to the Ballymurphy, Mountain and Nore freshwater pearl mussel populations, which are listed on the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (Statutory Instrument No. 296 of 2009). The target is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems (see further information below and, for all attributes, Moorkens and Killeen, 2020). The Ballymurphy population is confined to the Ballymurphy (or Ballyroughan Little) River, a tributary of the Barrow River. The population is distributed from above Earl's Bridge down to the bridge at Clashganna. Given the severe decline since 2004 and the scattered distribution it is highly likely the species range has contracted. See DEHLG (2010) and Wetland Surveys Ireland (2023) for further information
Distribution: Mountain	Kilometres	Restore distribution at 9.45km. See map 8	The conservation objective applies to the Ballymurphy, Mountain and Nore freshwater pearl mussel populations, which are listed on the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (Statutory Instrument No. 296 of 2009). The target is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems (see further information below and, for all attributes, Moorkens and Killeen, 2020). The Mountain population is confined to the Mountain River, a tributary of the Barrow River. The population is distributed from just upstream of its confluence with the Kiledmond River down to where the Mountain joins the main channel of the Barrow River. The best habitat for the species is upstream of Borris. Given the continuing decline in mussel numbers it is highly likely that there has been an upstream contraction. See DEHLG (2010) for further information
Distribution: Nore	Kilometres	Restore distribution at 21.13km. See map 8	The conservation objective applies to the Ballymurphy, Mountain and Nore freshwater pearl mussel populations, which are listed on the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (Statutory Instrument No. 296 of 2009). The target is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems (see further information below and, for all attributes, Moorkens and Killeen, 2020). The Nore population stretches from Poorman’s Bridge to Lismaine Bridge, with most of the population found between Poorman’s Bridge and the just upstream of the bridge at Ballyragget (Moorkens, 1996). However, given the severe decline upstream of New Bridge, it is more likely that the range has contracted (Moorkens, 2016). See DEHLG (2010) for further information

Population size: Ballymurphy	Number of adult mussels	Restore Ballymurphy population to at least 1,000 adult mussels	Mussels were first recorded from the Ballymurphy by Moorkens (1991) and were found to be common (301-1,500 per 100m). A detailed survey in 2004 counted a total of 183 adult mussels (Moorkens, Killeen and Kurz, 2004). The population estimate in 2009 was less than 300 mussels (DEHLG, 2010). In 2022, the population within a section was recounted and the total number of mussels recorded was 14 adults, 89% less than that recorded in 2009 (Wetland Surveys Ireland, 2023). The population in 2024 was estimated to be 30 adult mussels. The target is for the species to be sufficiently abundant to maintain itself on a long-term basis as a viable component of the Ballymurphy system
Population size: Mountain	Number of adult mussels	Restore Mountain population to at least 4,000 adult mussels	A 3km stretch of the Mountain from the ford adjacent to the ruins of Kiltennell Church downstream to the bridge near Brook Lodge was estimated in 1995 as having a population of 4,000 adult mussels (Moorkens, 1995). Ross (2006) estimated that the population in the entire Mountain system was 1,898 adult mussels. In 2009, the Mountain population was estimated as 740 - 1,000 adult mussels (DEHLG, 2010). The 2016 survey revealed that the adult population had declined by at least 50% since 2009. The continual decline in numbers and no evidence of recruitment together with the 2016 monitoring results suggests that the population in the Mountain is unlikely to exceed 200 individual mussels in 2024. The target is for the species to be sufficiently abundant to maintain itself on a long-term basis as a viable component of the Mountain system
Population size: Nore	Number of adult mussels	Restore Nore population to at least 5,000 adult mussels	Genetic research has placed the Nore population (formerly *Margaritifera durrovensis*, Species code 1990) within the *Margaritifera margaritifera* taxon (Feind et al., 2016; Geist et al., 2018). Surveys carried out since 2010 show that the number of individuals has declined dramatically (Moorkens, 2012, 2014, 2017 and 2020). The total counts from all post-2014 surveys estimate the freshwater pearl mussel population in the Nore at 100 individuals, unless some of the short term captive bred individuals released in 2014 have survived (Moorkens, 2017 and 2020). The target is for the species to be sufficiently abundant to maintain itself on a long-term basis as a viable component of the Nore system
Population structure: recruitment	Percentage per size class	Restore to at least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length	Mussels of no more than 65mm are 'young mussels' and may be found buried in the substratum and/or beneath adult mussels. Mussels of no more than 30mm are 'juvenile mussels' and are always buried in the substratum. See the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 and I.S. EN 16859:2017. A profile created from 362 dead shells collected from the Ballymurphy in 2004 had no mussels ≤70mm in length (Moorkens et al., 2004). No mussels ≤65mm were found in the Mountain River in either 2009 or 2016 (DEHLG, 2010; Moorkens, 2017). The species is known not to have reproduced successfully in the River Nore since 1970 (Moorkens and Costello, 1994; Moorkens, 2004, 2012, 2017, 2020). These three populations are unsustainable owing to lack of survival of juvenile mussels. The target is for sufficient juvenile recruitment to allow the species to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems

Population structure: adult mortality. Ballymurphy	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of the population as dead shells is considered to be indicative of natural losses. The target is for sufficient survival of adults to allow the species to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems. The Ballymurphy failed the live adult target in 2009, with a c.15% loss in surveyed sections of the main population area compared to the 2004 survey. The number of living mussels had declined by a further 91% in 2022 to just 10 individuals based on repeated counts of 100m of approximately the same section of river (Wetland Survey Ireland, 2023). The Ballymurphy failed the target for dead shells in 2009 with hundreds of dead shells on the river bed (DEHLG, 2010) and again in 2022 when a further 44 dead shells were recorded
Population structure: adult mortality. Mountain	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of the population as dead shells is considered to be indicative of natural losses. The target is for sufficient survival of adults to allow the species to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems. The Mountain failed the live adult target as the population declined by up to 61% in stretches of the Mountain between 2006 and 2009 (DEHLG, 2010), and by >50% between 2009 and 2016 (Moorkens, 2017) based on repeated counts of a 100m section. The Mountain failed the target for dead shells in 2009 (DEHLG, 2010) but passed in 2016 (Moorkens, 2017)
Population structure: adult mortality. Nore	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of the population as dead shells is considered to be indicative of natural losses. The target is for sufficient survival of adults to allow the species to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems. The Nore failed the live adult target as the population declined by between 23% and 67% in stretches between 2004 and 2009 (Moorkens, 2009). No discernible decline in number was observed in 2011 or 2016, however no live mussel was observed in the 2019 (Moorkens, 2012, 2017 and 2020). The Nore failed the target for dead shells in 2009 (DEHLG, 2010) but it was unknown if the dead shells observed belonged to mussels that recently died or to mussels that died several years earlier because, as the Nore River water is highly calcareous, the dead shells do not erode quickly
Suitable habitat: extent	Kilometres	Restore suitable habitat in more than 3.91km in the Ballymurphy, 5.3km in the Mountain and 16.72km in the Nore system (see map 8) and any additional stretches necessary for salmonid spawning	The habitat for the species is currently unsuitable for the survival of adult mussels or the recruitment of juveniles (DEHLG, 2010; Moorkens, 2009, 2012, 2017, 2020; Wetland Survey Ireland, 2023). Mussel habitat in the Ballymurphy, Mountain and Nore Rivers is impacted from catchment-wide intensification of agriculture and forestry, with multiple severe pressures that result in negative cumulative effects on hydromorphology, sedimentation and nutrient enrichment. While, the Mountain River was found to have extensive areas of physically good juvenile habitat, it is intermittently compromised by siltation to the extent that juveniles are killed and adults are stressed (Moorkens, 2017). The target is for the species' habitat to be sufficiently widespread to allow the species to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems

Suitable habitat: condition	Kilometres	Restore condition of suitable habitat	The species' habitat is a combination of the area of 1) habitat adult and juvenile mussels can occupy; 2) spawning and nursery habitats host fish can occupy. Fish nursery and mussel habitat typically overlap. Fish spawning habitat is generally adjacent to mussel habitat, but may lie upstream of the generalised mussel distribution. Only spawning areas that regularly contribute juvenile fish to adult mussel habitat should be considered. Mussel and fish habitat availability is determined by flow and substratum conditions, and is sensitive to hydromorphological, sedimentation and enrichment pressures from throughout the catchment. The target is based on the stretches of river identified as having habitat for the species however further habitat characterisation and condition mapping is recommended. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems
Water quality: macroinvertebrates and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality- macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5); phytobenthos: EQR greater than 0.93	These EQR correspond to high ecological status for these two Water Framework Directive biological quality elements. They represent high water quality with low nutrient concentrations (oligotrophic conditions). Reaching these targets does not, however, guarantee achieving the targets for the other attributes. See also The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019, DEHLG, 2010 and EPA sources for further information. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems
Substratum quality: filamentous algae (macroalgae); macrophytes (rooted higher plants)	Percentage	Restore substratum quality- filamentous algae: absent or trace (less than 5%); macrophytes: absent or trace (less than 5%)	The habitat in the Ballymurphy River passed the macroalgae standard during 2009 sampling for the sub-basin management plans (DEHLG, 2010) but failed both macroalgae and macrophyte standards in 2022 (Wetlands Survey Ireland, 2023). The habitat in the Mountain River passed the macroalgae standard but failed the macrophyte standard in both 2009 and 2016 (DEHLG, 2010; Moorkens, 2017). Macrophyte cover was up to 70% in the Mountain during the 2017 assessment. The habitat in the Nore River passed the macroalgae standard but failed the macrophyte standard in 2012, 2016 and 2019 (Moorkens, 2012, 2017 and 2020); macrophytes occurred in 56% of quadrats and with up to 100% cover in the open centre of the channel. High abundance of macroalgae was recorded during 2009 sampling (DEHLG, 2010). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems

Substratum quality: sediment	Occurrence	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	The habitat for the species in the Ballymurphy, Mountain and Nore systems is currently unsuitable for the recruitment of juveniles owing to sedimentation of the substratum and significant cover of silt. In many locations, it is also unsuitable for the survival of adult mussels. Significant sedimentation has been recorded during all recent mussel monitoring surveys in the Ballymurphy, Mountain, and Nore systems (Moorkens et al., 2004; Ross, 2006; DEHLG, 2010; Moorkens, 2004, 2012, 2017, 2020; Wetlands Survey Ireland, 2023). In the Mountain, 48% of the quadrats contained habitat suitable for juvenile mussels but while the physical habitat is still present the habitat is intermittently impacted by sedimentation preventing survival of juvenile mussels (Moorkens, 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	Differences in redox potential between the water column and the substrate correlate with differences in oxygen levels. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. See I.S. EN 16859:2017. The redox potential loss at 5cm depth in the Ballymurphy in 2009 was 31.75% (DEHLG, 2010); the Mountain in 2009 was 40% and 17-28% in 2016 (DEHLG, 2010; Moorkens 2017); and the Nore in 2009 was 58-64%, in 2011 was 24-34%, in 2016 was 16-22% and in 2019 was 11-31% (DEHLG, 2010; Moorkens, 2012, 2017, 2019). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems
Hydrological regime: flow variability	Metres per second	Restore appropriate hydrological regime	The availability of suitable freshwater pearl mussel habitat is largely determined by flow (catchment geology is the other key factor). In order to restore the habitat for the species, flow variability over the annual cycle must be such that: 1) high flows can wash fine sediments from the substratum; 2) high flows are not artificially increased so as to cause excessive scour of mussel habitat; 3) low flows do not exacerbate the deposition of fine sediments or growth of algae/macrophytes and 4) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle. Groundwater inflow to a river contributes to water-cycling. See Moorkens and Killeen (2014) and I.S. EN 16859:2017 for further information. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of Ballymurphy, Mountain and Nore systems

Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval stage of the freshwater pearl mussel and thus, they are essential to completion of the life cycle. 0+ and 1+ fish are typically used, both because of habitat overlaps and the development of immunity with age in fish. Fish presence is considered sufficient, as higher densities and biomass is indicative of enriched conditions in mussel rivers. Geist et al. (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality and a lack of pearl mussel recruitment, while significantly lower densities and biomass of host fish were associated with high juvenile mussel numbers. Fish movements must be such that 0+ fish remain in the mussel habitat until their 1+ summer. No fish stocking should occur within the mussel habitat, nor any works that may change the salmonid balance or residency time. Encystment on trout was recorded in the Mountain and Nore Rivers, but on neither salmonid in the Ballymurphy system
Fringing habitat: area and condition	Hectares	Restore the area and condition of fringing habitats necessary to support the population	Semi-natural and natural riparian habitats, even where they do not form part of a natural floodplain, are an integral part of the structure and functioning of river systems. Open wetlands, such as wet heath and blanket bog, are particularly critical to the hydrological regime of mussel rivers. Fringing habitats assist in the settlement of fine suspended material, protect banks from erosion and contribute to nutrient cycling, as well as contributing to the aquatic food web (e.g. allochthonous matter from poor fens and flushes) and providing habitat (refuge and resources) for life-stages of fish, birds and aquatic invertebrates. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Ballymurphy, Mountain and Nore systems

1092 White-clawed Crayfish *Austropotamobius pallipes*

To maintain the Favourable conservation condition of White-clawed crayfish in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Occurrence	No reduction from baseline. See map 7	The crayfish is present almost throughout this SAC. The records extend as far downstream as Thomastown on the Nore and Graiguenamanagh on the Barrow
Population structure: recruitment	Percentage occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in at least 50% of positive samples	See Reynolds et al. (2010) for further details
Negative indicator species	Occurrence	No alien crayfish species	Alien crayfish species are identified as major direct threat to this species and as disease vector. See Reynolds (1998) for further details
Disease	Occurrence	No instances of disease	Disease is identified as major threat and has occurred in Ireland even in the absence of alien vectors. See Reynolds (1998) for further details
Water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA	Target taken from Demers and Reynolds (2002). Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)
Habitat quality: heterogeneity	Occurrence of positive habitat features	No decline in heterogeneity or habitat quality	Crayfish need high habitat heterogeneity. Larger crayfish must have stones to hide under, or an earthen bank in which to burrow. Hatchlings shelter in vegetation, gravel and among fine tree-roots. Smaller crayfish are typically found among weed and debris in shallow water. Larger juveniles in particular may also be found among cobbles and detritus such as leaf litter. These conditions must be available on the whole length of occupied habitat

1095 Sea Lamprey *Petromyzon marinus*

To restore the Favourable conservation condition of Sea lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information on artificial barriers
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor, (2007). King (2007) provides survey information for the Barrow
Juvenile density in fine sediment	Juveniles/m²	Juvenile density at least 1/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003)
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). Lampreys spawn in clean gravels. Artificial barriers are currently preventing lamprey from accessing suitable spawning habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Artificial barriers are currently preventing juvenile lampreys from accessing the full extent of suitable habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information

1096 Brook Lamprey *Lampetra planeri*

To restore the favourable conservation condition of Brook lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	% of river accessible	Access to all watercourses down to first order streams	Artificial barriers can block lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information on artifical barriers
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Attribute and target based on data from Harvey and Cowx (2003). King (2007) provides survey information for the Barrow. It is impossible to distinguish between brook and river lamprey juveniles in the field, hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m² in optimal conditions and more than 2/m² on a catchment basis
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). Lampreys spawn in clean gravels. Artificial barriers are currently preventing lamprey from accessing suitable spawning habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Artificial barriers are currently preventing juvenile lampreys from accessing the full extent of suitable habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information

1099 River Lamprey *Lampetra fluviatilis*

To restore the Favourable conservation condition of River lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem and major tributaries down to second order accessible from estuary	Artificial barriers can block lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information on artificial barriers
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present	Attribute and target based on data from Harvey and Cowx (2003). King (2007) provides survey information for the Barrow. It is impossible to distinguish between brook and river lamprey juveniles in the field, hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m² in optimal conditions and more than 2/m² on a catchment basis
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). Lampreys spawn in clean gravels. Artificial barriers are currently preventing lamprey from accessing suitable spawning habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Artificial barriers are currently preventing juvenile lampreys from accessing the full extent of suitable habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information

1103 Twaite Shad *Alosa fallax fallax*

To restore the favourable conservation condition of Twaite shad in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	In some catchments, artificial barriers block twaite shads' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas
Population structure: age classes	Number of age classes	More than one age class present	Regular breeding has been confirmed in the River Barrow in recent years, but not in the Nore
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning habitats	
Water quality: oxygen levels	Milligrammes per litre	No lower than 5mg/l	Attribute and target based on Maas, Stevens and Briene (2008)
Spawning habitat quality: Filamentous algae; macrophytes; sediment	Occurrence	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth	See Maitland and Hatton-Ellis (2003) for further information

1106 Salmon *Salmo salar*

To restore the favourable conservation condition of Salmon in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmons' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. See Sullivan (2007) and CFB and Compass Informatics (2008) for further information on artificial barriers
Adult spawning fish	Number	Conservation limit (CL) for each system consistently exceeded	A conservation limit is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee of the National Salmon Commission's annual model output of CL attainment levels. See SSC (2010). Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	Target is threshold value for rivers currently exceeding their conservation limit (CL)
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice (*Lepeophtheirus salmonis*)
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. Artificial barriers are currently preventing salmon from accessing suitable spawning habitat
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)

1355 Otter *Lutra lutra*

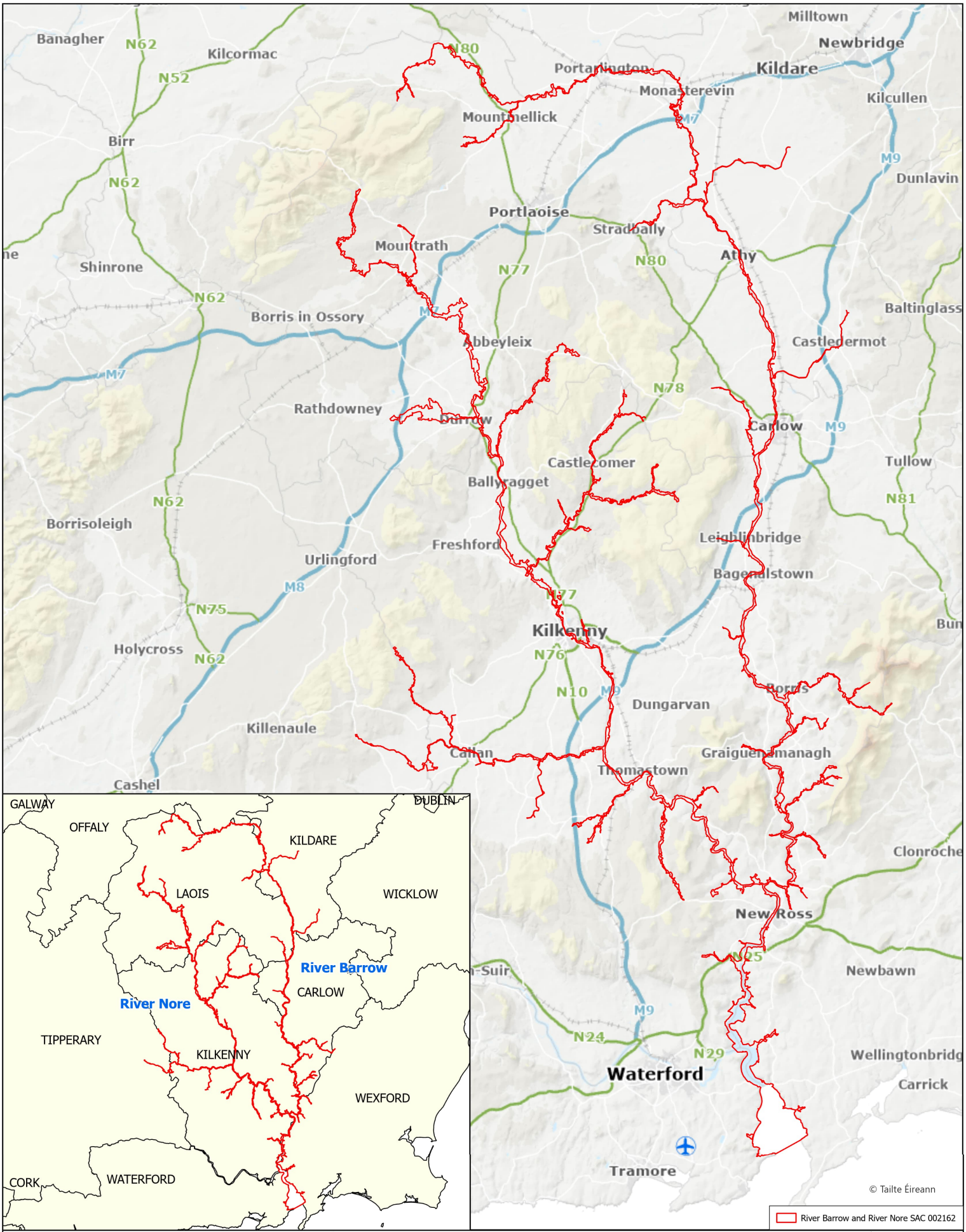
To restore the favourable conservation condition of Otter in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. FCS target, based on 1980/81 survey findings, is 88% in SACs. Current range in south-east estimated at 73% (Bailey and Rochford, 2006)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 122.8ha above high water mark (HWM); 1136.0ha along river banks / around ponds	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 857.7ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (NPWS, 2007; Kruuk, 2006)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 616.6km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake) habitat	Hectares	No significant decline. Area mapped and calculated as 2.6ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk, 2006; Kruuk and Moorhouse, 1991)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006) and wrasse and rockling in coastal waters (Kingston et al., 1999)

1421 Killarney Fern *Trichomanes speciosum*

To maintain the Favourable conservation condition of Killarney Fern in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Location	No decline. Three locations known, with three colonies of gametophyte and one sporophyte colony. See map 7	Data from NPWS rare and threatened species database
Population size	Number	Maintain at least three colonies of gametophyte, and at least one sporophyte colony of over 35 fronds	Data from NPWS rare and threatened species database
Population structure: juvenile fronds	Occurrence	At least one of the locations to have a population structure comprising sporophyte, unfurling fronds, 'juvenile' sporophyte and gametophyte generations	Juvenile' sporophytes, which appear as small entire fronds, are known from this site. However, it is unknown whether they are due to apogamous growth or sexual reproduction. Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Habitat extent	m²	No loss of suitable habitat, such as shaded rock crevices, caves or gullies in or near to, known colonies. No loss of woodland canopy at or near to known locations	Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Hydrological conditions: visible water	Occurrence	Maintain hydrological conditions at the locations so that all colonies are in dripping or damp seeping habitats, and water is visible at all locations	Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Hydrological conditions: humidity	Number of dessicated fronds	No increase. Presence of dessicated sporophyte fronds or gametophyte mats indicates conditions are unsuitable	Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Light levels: shading	Percentage	No changes due to anthropogenic impacts	Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Invasive species	Occurrence	Absent or under control	NPWS and EHS-NI (2008) provides further details



NPWS An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra National Parks and Wildlife Service

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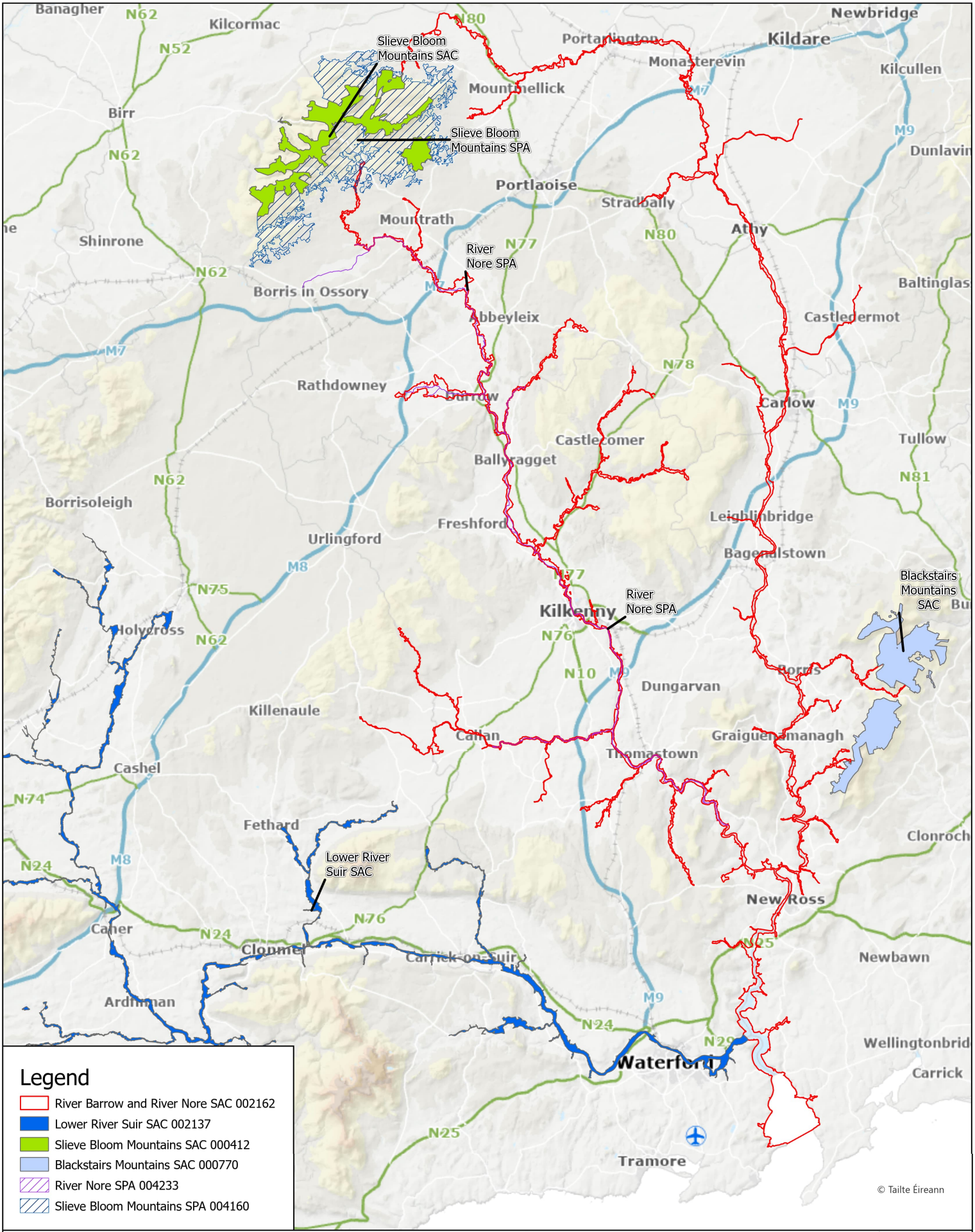
N

Map Version 2
Date: May 2025

MAP 1: RIVER BARROW AND RIVER NORE SAC CONSERVATION OBJECTIVES SAC DESIGNATION

0 7 14 km

Map to be read in conjunction with the NPWS Conservation Objectives Document.



Legend

- River Barrow and River Nore SAC 002162
- Lower River Suir SAC 002137
- Slieve Bloom Mountains SAC 000412
- Blackstairs Mountains SAC 000770
- River Nore SPA 004233
- Slieve Bloom Mountains SPA 004160

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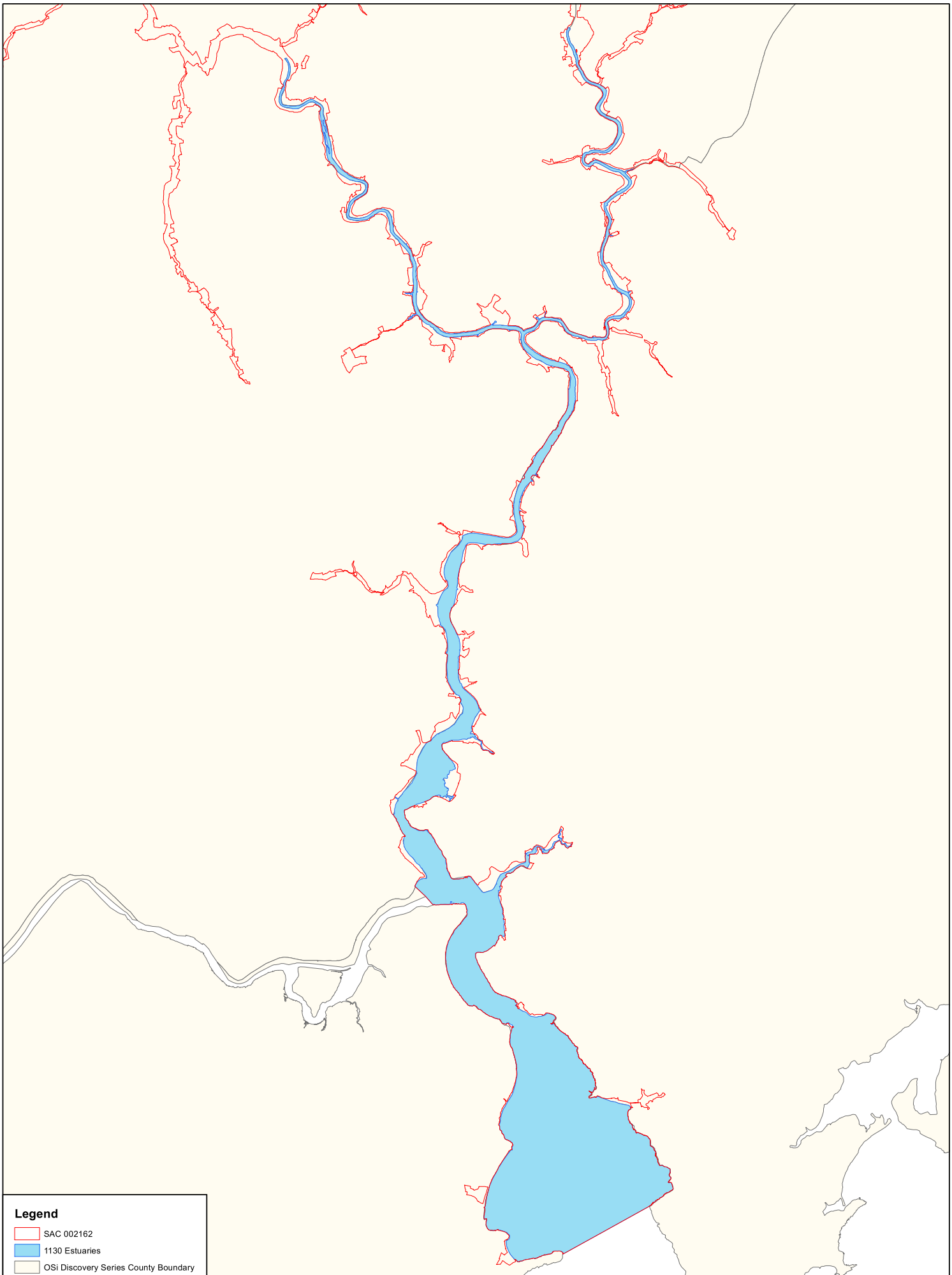
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Map Version 1
Date: May 2025

MAP 1a: RIVER BARROW AND RIVER NORE SAC CONSERVATION OBJECTIVES OVERLAPPING AND ADJACENT SITES

0 7 14 km

Map to be read in conjunction with the NPWS Conservation Objectives Document.



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MAP 2: RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES ESTUARIES

Map to be read in conjunction with the NPWS Conservation Objectives Document.

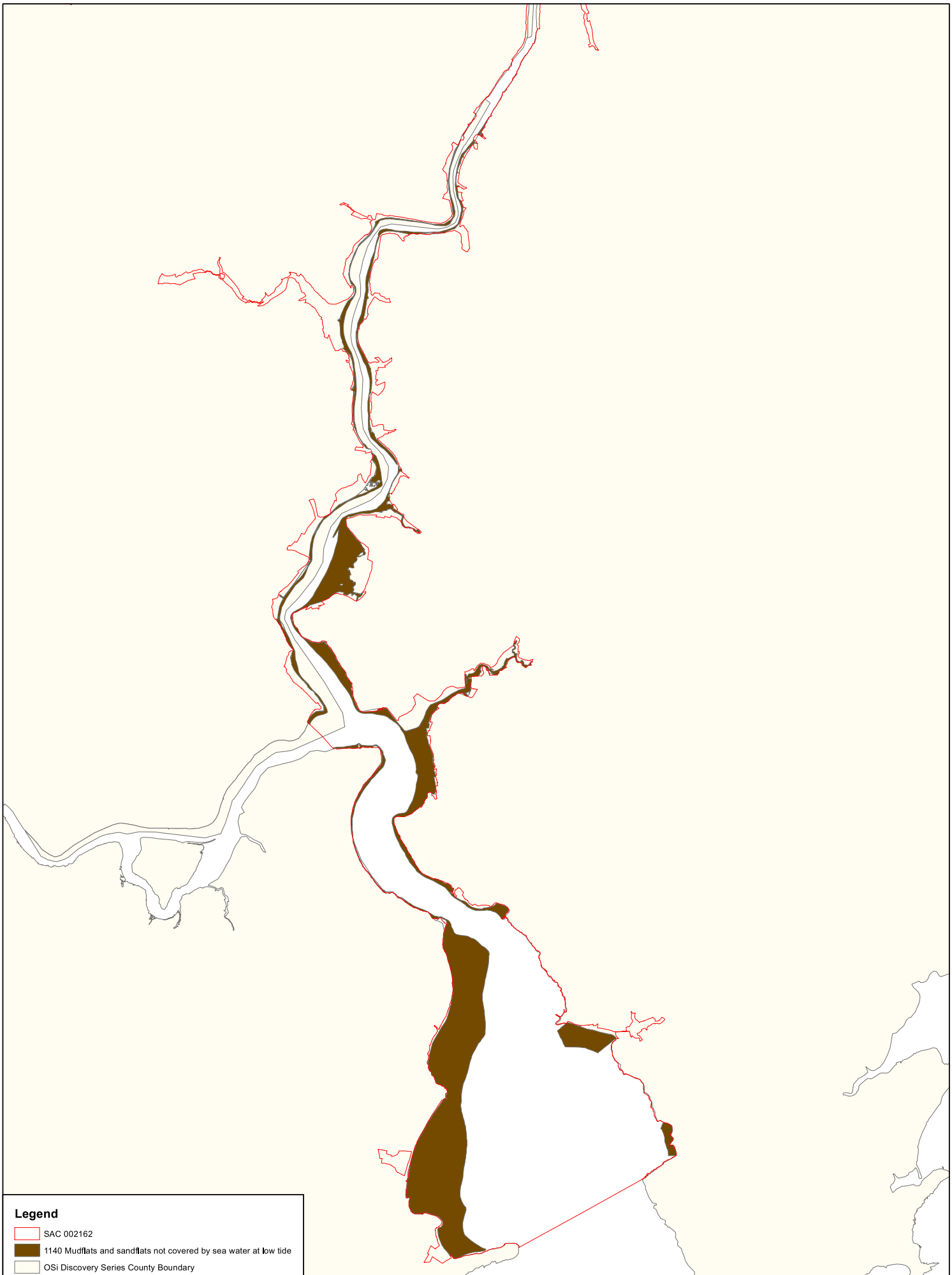
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0 1 2 3 4 5 km

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MAP 3:
RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES TIDAL MUDFLATS AND SANDFLATS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

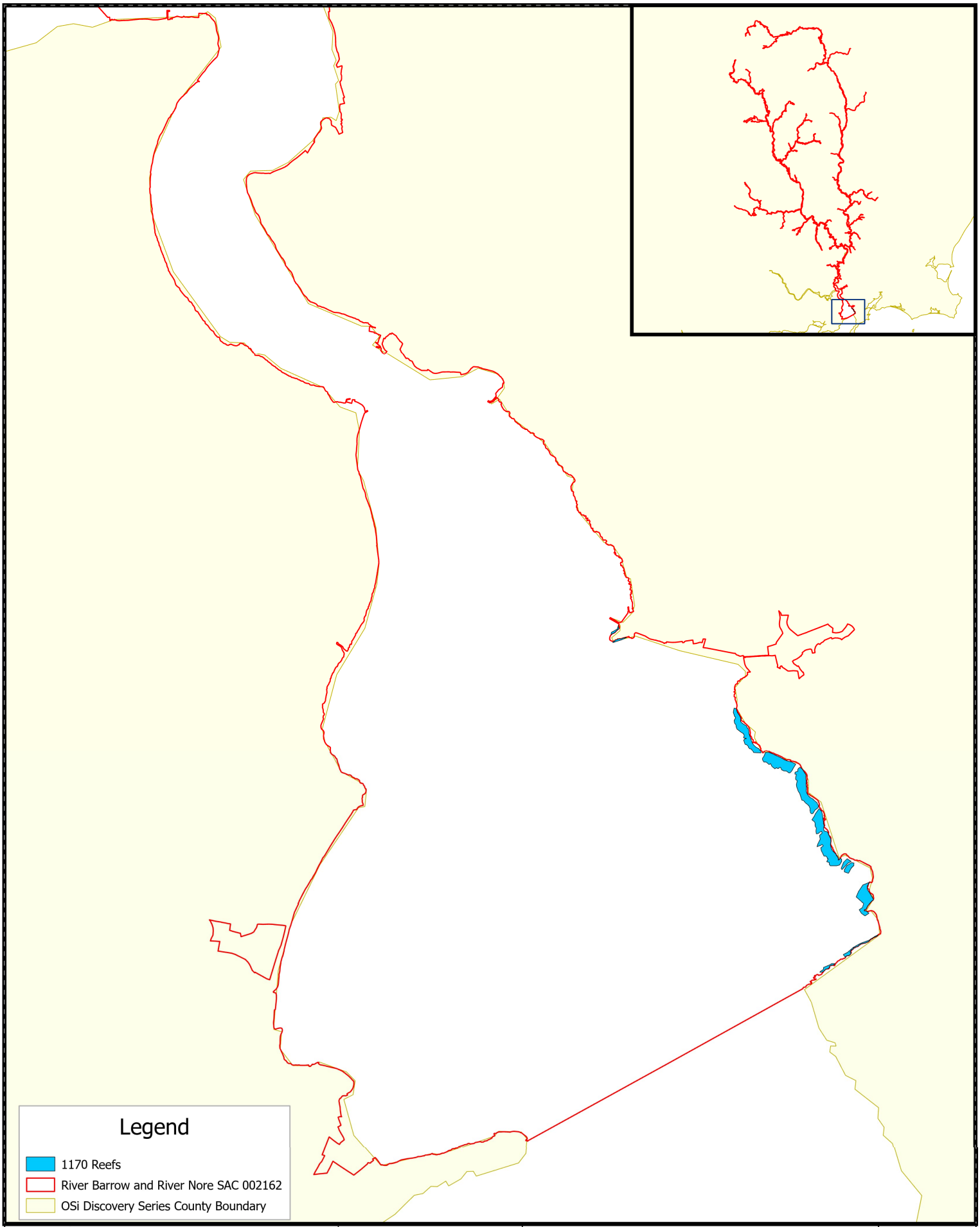
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CO. OFFALY; version 1.01, CO. TIPPERARY; version 1.01,
CO. WATERFORD; version 1.01, CO. WEXFORD; version 1.01

0 1 2 3 km

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Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar
comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis
le chead ón Rialtas (Ceadunas Uimh. EN 0059208)

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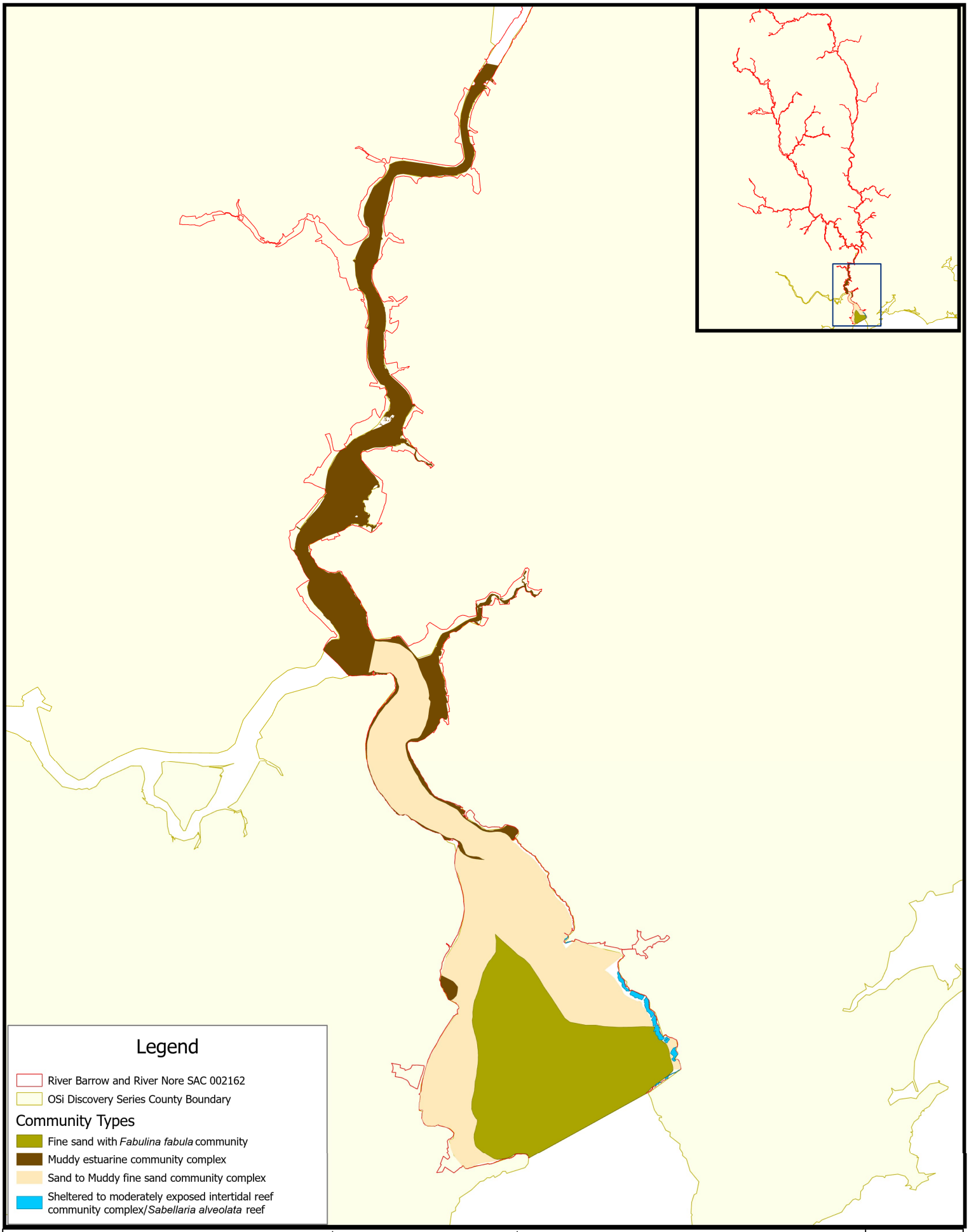
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Map Version 1
Date: March 2025

MAP 4: RIVER BARROW AND RIVER NORE SAC
CONSERVATION OBJECTIVES
REEFS

0 0.5 1 km

Map to be read in conjunction with the NPWS Conservation Objectives Document.



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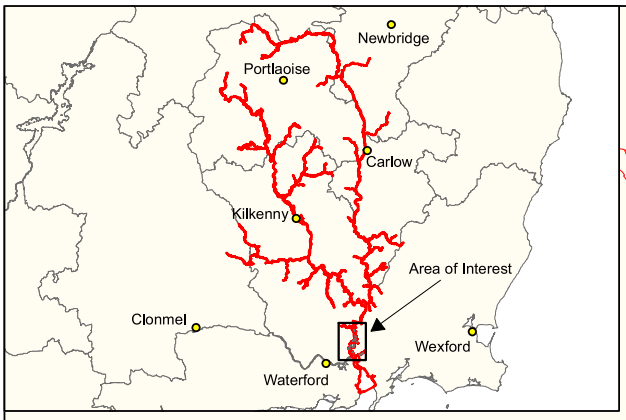
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Map Version 2
Date: March 2025

MAP 4a: RIVER BARROW AND RIVER NORE SAC
CONSERVATION OBJECTIVES
MARINE COMMUNITY TYPES

0 1.5 3 km

Map to be read in conjunction with the NPWS Conservation Objectives Document.



SMP0049

SMP0050

SMP0051

SMP0048

Legend

SAC 002162

OSi Discovery Series County Boundary

Saltmarsh Habitats

1310 *Salicornia* and other annuals colonising mud and sand

1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)

1330 / 1410 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) / Mediterranean salt meadows (Juncetalia maritimi)

1410 Mediterranean salt meadows (Juncetalia maritimi)

Potential 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)

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MAP 5:
RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES SALTMARSH HABITATS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

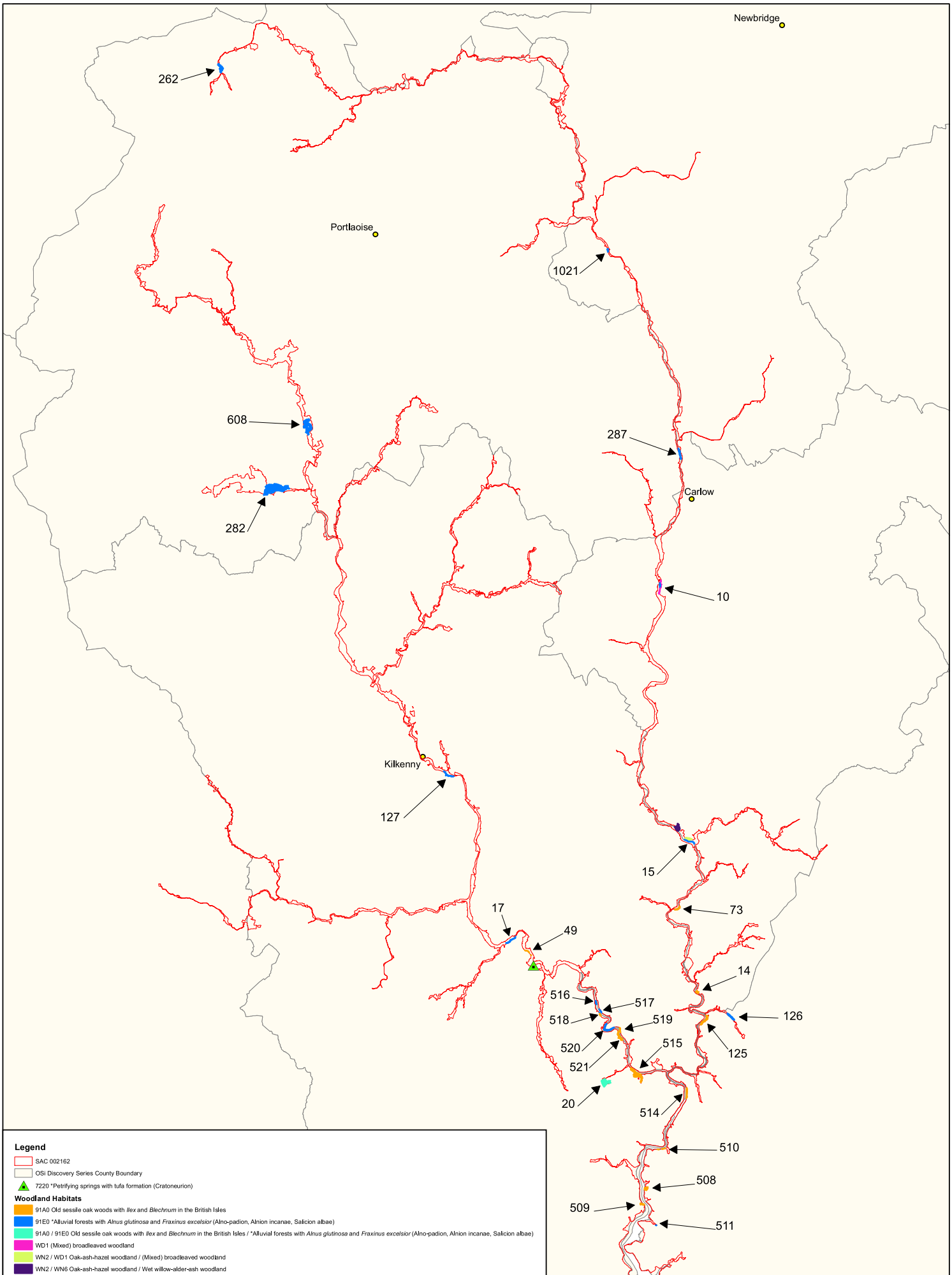
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0 0.25 0.5 0.75 1 km

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Map Version 1
Date: April 2011



Legend

- SAC 002162
- OSi Discovery Series County Boundary
- 7220 *Petrifying springs with tufa formation (Cratoneurion)

Woodland Habitats

- 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- 91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-padion, Alnion incanae, Salicion albae)
- 91A0 / 91E0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles / *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-padion, Alnion incanae, Salicion albae)
- WD1 (Mixed) broadleaved woodland
- WN2 / WD1 Oak-ash-hazel woodland / (Mixed) broadleaved woodland
- WN2 / WN6 Oak-ash-hazel woodland / Wet willow-alder-ash woodland

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MAP 6:
RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES OLD OAK WOODLANDS, ALLUVIAL FORESTS & PETRIFYING SPRINGS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

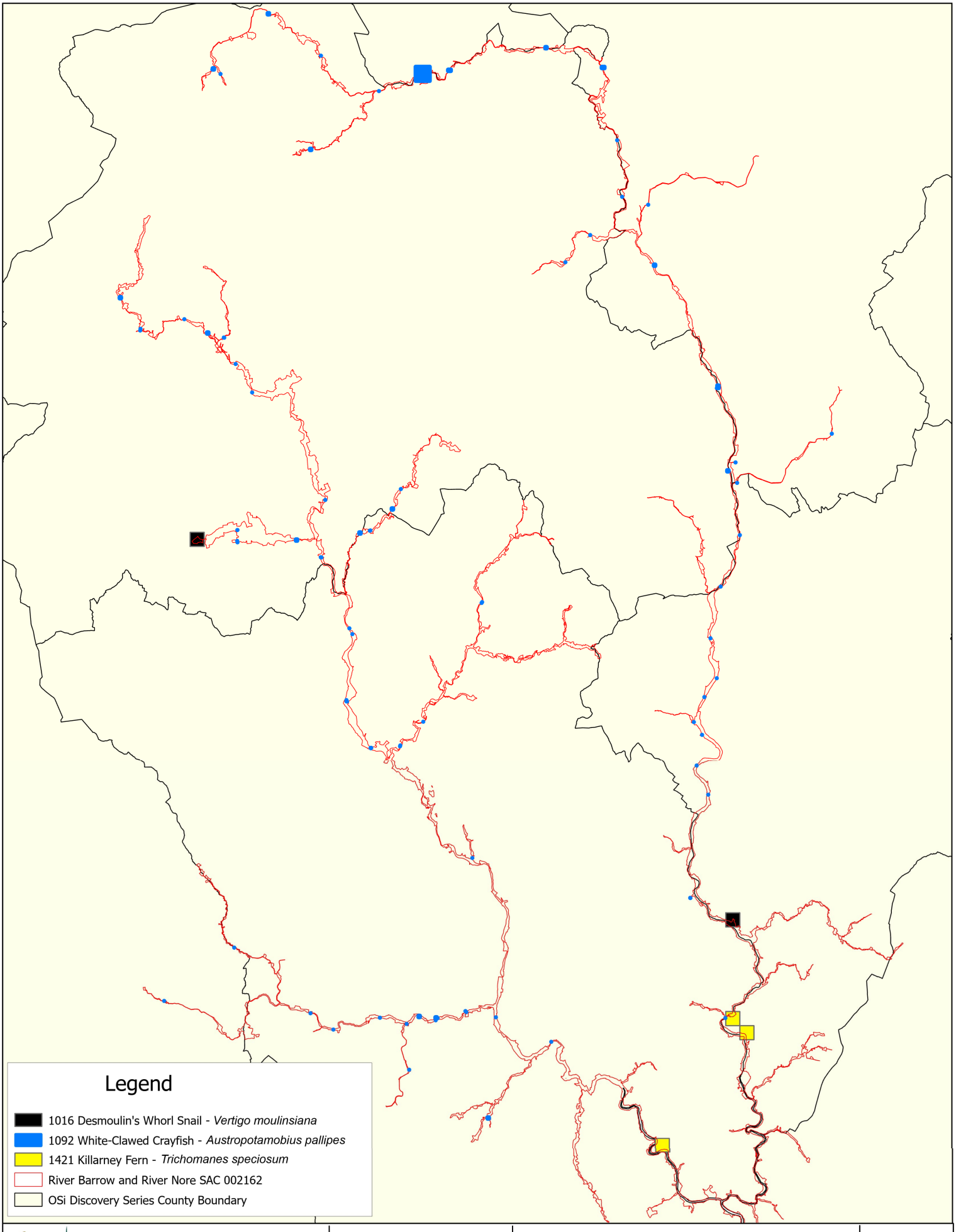
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0 2 4 6 8 10 km

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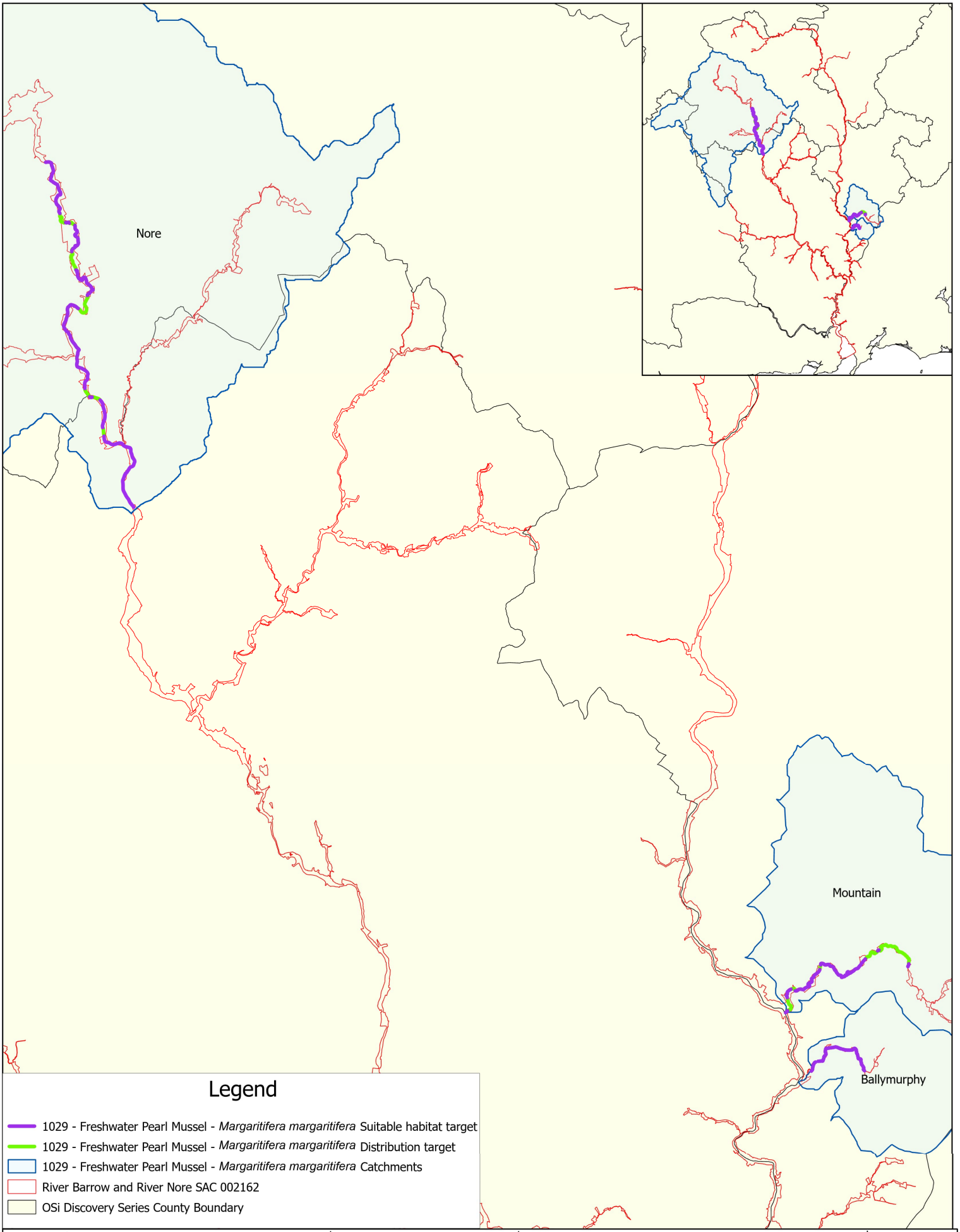
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Map Version 2
Date: May 2025

MAP 7: RIVER BARROW AND RIVER NORE SAC CONSERVATION OBJECTIVES DESMOULIN'S WHORL SNAIL, WHITE-CLAWED CRAY FISH & KILLARNEY FERN

0 5 10 km

Map to be read in conjunction with the NPWS Conservation Objectives Document.



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Map Version 1
Date: May 2025

MAP 8: RIVER BARROW AND RIVER NORE SAC CONSERVATION OBJECTIVES FRESHWATER PEARL MUSSEL

0 3 6 km

Map to be read in conjunction with the NPWS Conservation Objectives Document.