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CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

# ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED COOM GREEN ENERGY PARK, COUNTY CORK

## VOLUME 2 – MAIN EIAR

## CHAPTER 8 – BIODIVERSITY

**Prepared for: Coom Green Energy Park Limited**

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# 8 BIODIVERSITY

## 8.1 INTRODUCTION

This chapter provides a description of the existing terrestrial and aquatic flora and fauna of the study area and assesses the likely biodiversity impacts arising as a result of the proposed Coom Green Energy Park (**CGEP**) development. Furthermore, where negative effects are predicted, the chapter identifies appropriate mitigation strategies therein.

The potential for impacts of the Project to have adverse effects on the integrity of any European Sites has been assessed within a Natura Impact Statement (NIS) (INIS, 2020)[1].

This Biodiversity chapter has been prepared by Inis Environmental Consultants (IEC). Information on the Ecological baseline and the consideration of likely significant effects for all CGEP project elements was based on data collected by Inis, with the exception of information on proposed Replant Lands and the proposed Turbine Delivery Route (TDR) which was provided by Fehily Timoney Company with key findings incorporated into this chapter. For the purposes of this impact assessment Replant Lands are considered under cumulative impacts. Further detail is provided in **Appendix-I** regarding Replant Lands.

### 8.1.1 Overview of the Project

The proposed Coom Green Energy Park (CGEP) project comprises a 22 no. Turbine Windfarm and associated infrastructure, including a grid connection, up to 2 no. substations, 2 no. met masts, battery energy storage systems and all ancillary civil and electrical infrastructure, along with ancillary works such as forestry replant and turbine delivery.

A comprehensive description of the proposed development is provided in Chapter 3. For the avoidance of doubt project elements outside the proposed planning application development boundary, comprising part of the Grid Connection Route (GCR : 16.7km of high voltage (up to 110kV) underground cabling between the proposed on-site substations and the existing Barrymore substation and associated ancillary works within public roads) and), along with the turbine delivery route are also considered herein. Replant lands (located at Moneygorm, Co. Cork and Ballard Co. Wicklow) as outlined are considered under cumulative impacts.

References to Grid Connection Route or GCR in this chapter refer to the 16.7km of underground cabling and associated ancillary works on public roads, with the remainder of the Grid Connection appraised as part of CGEP.

See **Figures 8.1 to 8.6** for site location maps of the proposed CGEP site layout, CGEP Grid Connection Route and replant lands.

### 8.1.2 Overview of Biodiversity in the Local Environment

The proposed CGEP project is located in north County Cork. The receiving environment for the proposed wind farm consists of lands under active management for agriculture and forestry. In addition, there is an unopened, previously consented municipal landfill in close proximity within the townland of Bottlehill. The Grid Connection Route, where it occurs outside the proposed planning application development boundary follows ca.17km of local roads through a mosaic of largely improved farmland and forestry eastwards to Barrymore substation at Farran South, near Fermoy. Turbine delivery routes comprise two options routed from Cork City via the public road network.

Features of the local environment on or around the works include the River Bride and other tributaries of the Blackwater (Munster) River, in addition to the Nagle Mountains. Birds, bats and other mammals, amphibians, reptiles and invertebrates are present within the receiving environment.

European Sites such as the Blackwater River (Cork/Waterford) SAC (Site Code:002170) are located in the surrounding area. This European Site has features of interest which includes *Margaritifera margaritifera*

[1] Inis Environmental Consultants (2020). Natura Impact Statement Coom Green Energy Park.

(Freshwater Pearl Mussel), *Salmo salar* (Salmon) and *Lutra lutra* (Otter)[2]. Further to the east, beyond the town of Fermoy, the Blackwater Callows SPA (Site Code:004094) is designated for wetlands and waterbirds, including Whooper Swan (*Cygnus Cygnus*) and Black-tailed Godwit (*Limosa limosa*)[3]. See **Figure 8.7** for the location of European Designated sites, and **Figure 8.8** for pNHA's within 15km of the proposed CGEP and CGEP Grid Connection Route. Proposed Natural Heritage Areas (pNHA's) in the surrounding area include the Bride/Bunaglanna Valley pNHA, which is primarily of floristic interest.

The proposed replant lands include lands at Moneygorm Co Cork and Ballard, Co Wicklow. Further detail on baseline ecology and an Ecological Impact Assessment for these lands is provided in **Appendix 8 I** for the replant lands. Designated sites in relation to the TDR and Replant lands are detailed in **Figures 8.9** to **8.11**.

### 8.1.3 Statement of Authority

This chapter was written by Inis Environmental Consultants ltd with contributions from additional sub-consultants listed and Fehilly Timony (Turbine Delivery Route and Replant Land). The following persons worked on this report or contributed to baseline studies.

**Mr Howard Williams** is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). He is a Chartered Environmentalist (CEnv) with the Society for the Environment (Soc Env) and a Chartered Biologist (CBiol) with the Society of Biology. He is also a full member of the Institute of Fisheries Management. Mr Williams is lead ecologist with INIS Environmental Consultants Ltd and currently project manager on all INIS projects in the Republic of Ireland and the UK.

**Mr. Roger Macnaughton** managed the updated (2020) draft of the biodiversity chapter. He is a qualified and experienced environmental consultant specialising in ecology. He has over eighteen year's professional experience in the environmental consultancy sector and an additional seven years of primarily research-based experience in freshwater and marine ecology. He specialises in the delivery of Ecological Impact Assessment (EcIA) and Appropriate Assessment (AA) for a broad range of projects potentially affecting; terrestrial, freshwater and marine ecology.

**Donncha Ó Catháin** is an Ecologist and Graduate Member of the Chartered Institute of Ecology and Environmental Management. He holds First Class honours M.Sc. in Ecological Assessment and a B.Sc (Hons) in Environmental Science. Mr Ó Catháin has a broad range of expertise within the Ecology sector, including ornithology, aquatic ecology, botany and habitat assessment.

**Mr. Joao Martins** Joao is an Ecologist with 11 years' relevant professional experience in freshwater ecology including monitoring of both lotic and lentic systems. Mr Martins has extensive experience of preparation of screenings for Appropriate Assessment (AA), Natura Impact Statements (NIS), Ecological Impact Assessments (EcIA) and Environmental Impact Assessment Reports (EIAR). He additionally has specific field surveys experience of Invasive Alien Plant Species, Bat Activity, Habitats, Mammals, amongst others.

Additional contributions were made by the following:

**Mr. Nick Marchant** drafted the bat impact assessment in conjunction with Inis ecologists. He is the principal ecologist of NM Ecology Ltd. He has thirteen years of professional experience, including ten years as an ecological consultant, one year as a local authority biodiversity officer, and two years managing an NGO in Indonesia. He is a member of the Chartered Institute of Ecology and Environmental Management and operates in accordance with their code of professional conduct. He regularly carries out bat surveys for projects throughout Ireland and Northern Ireland, and has completed training courses in *Bat Identification and Survey* (Bat Conservation Ireland, 2008), *Bat mitigation for construction projects* (Bat Conservation Trust, 2014) and *Bat handling, mist netting and harp trapping* (Bat Training UK, 2014).

**Dr. Alex Copland BSc PhD** conducted the hen harrier collision risk assessment. He has over 20 years of bird survey experience. He is proficient in experimental design and data analysis and has been working on bird populations on in Ireland for over 12 years. In addition to developing and managing numerous research and conservation projects, he has worked extensively in the design and delivery of management measures for priority bird species of conservation concern in Ireland. He has worked at numerous coastal sites studying

[2] https://www.npws.ie/protected-sites/sac/002170
[3] https://www.npws.ie/protected-sites/spa/004094

shorebird ecology and has published several scientific, peer-reviewed papers and abstracts in relation to birds and habitat use in Ireland.

**Mr Ross Macklin** conducted the aquatic ecology surveys. Ross is an aquatic and fisheries ecologist with over 15 years' professional experience in Ireland and is one of the most experienced aquatic ecologists in the country. He has considerable experience in a wide range of ecological and environmental projects including EIAR, EcIA, CEMP and AA/NIS 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 experience includes work on renewable energy developments, flood relief schemes, road schemes, waste management, blueways/greenways, biodiversity projects, fisheries management projects and catchment wide water quality management.

**Mr Pascal Sweeny** conducted the Freshwater Pearl Mussel Surveys. Pascal Sweeney of Sweeney Consultancy is a freshwater biologist, specialising in aquatic invertebrates. Pascal Sweeney is issued yearly licences by NPWS for Stage 2 surveys of freshwater pearl mussels throughout the state. Clients for these surveys have included IFI, OPW, Coillte, Irish Rail, Cork CC, Carlow CC, Tipperary CC, Galway CC, as well as several engineering firms planning infrastructure projects.

**Mr. Jon Kearney** is a principal ecologist with over 15 years' experience in both the UK and Ireland. He managed the Turbine Deliver Route and Replant Land EIAR. Jon has completed ecological assessments, EcIAs, and Appropriate Assessments for a wide variety of projects in Ireland and the UK including numerous wind farm applications, solar farms, pipelines, road schemes, greenways and commercial developments. He has considerable experience of EIS and ecological constraints work, which often includes extensive reference to, and interpretation of, Article 6 of 'The Habitats Directive', and to other EU, UK and Irish conservation legislation.

### 8.1.4 Certainty and Sufficiency of information provided

A clear documentary trail is provided throughout this chapter, and chapter appendix, to the competency of data and methods used and the rationale for selection of same. The information used to compile this chapter is collated from reports and documents generated by local authorities and statutory agencies, including the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs and Cork County Council with remit in the regulatory field. In all cases the most recent publications available are relied on. All documentation used is referenced at the end of the chapter.

In respect of Biodiversity the findings outlined within this chapter 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, 2017), Guidelines for Preliminary Ecological Appraisals (CIEEM, 2015) 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 Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2017), 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 Act (1976), the Wildlife (Amendment) Act (2000), 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.

## 8.2 METHODOLOGY

### 8.2.1 Legislation, Policy and Guidance

#### *8.2.1.1 Legislation*

Relevant International and Irish environmental legislation for a biodiversity impact assessment for this development includes the following:

- Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna, commonly known as the Habitats Directive.
- Council Directive 2009/147/EC on the conservation of wild birds, commonly known as the Birds Directive (codified version of Council Directive 79/409/EEC).
- The European Community (Natural Habitats) Regulations 2011 (S.I. No. 477);European Communities (Birds and Natural Habitats) Regulations 2011.
- Wildlife Act, 1976 and amendments.
- Planning and Development Act 2000, as amended
- Flora (Protection) Order (FPO), 2015.
- The European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. 272 of 2009) and as amended.
- European Union Environmental Objectives (Freshwater Pearl Mussel) (Amendment) Regulations 2009 to 2018.

#### *8.2.1.2 Development Plans and pertinent Policies*

This assessment has cognisance of the National Heritage plan published in 2002. Along with the Heritage Plan, The National Biodiversity Action Plan 2017-2021 (NBAP) emphasises the requirement for National, Regional and Local Governments to ensure that the conservation and sustainable use of biodiversity for human well-being is at the forefront of their work. Ireland's Vision for Biodiversity is set out in the NBAP and states: *"That biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally."*

Local and Regional policies also considered in this assessment include;

- Cork County Development Plan 2014;
- County Cork Biodiversity Action Plan 2009-2014;
- Cork County Council Environmental Strategy 2016-2020;
- Fermoy Local Area Plan; and
- Department of Agriculture, Food and the Marine (2017). Felling and Reforestation Policy.

#### *8.2.1.3 Relevant Guidelines*

An extensive list of published guidelines/baseline sources listed in **Section 8.11** have been considered during the preparation of this chapter.

### 8.2.2 Scoping

Detailed ongoing scoping was conducted to identify the key biodiversity related points and issues which are of importance during the environmental impact assessment (EIA) process, and to remove biodiversity points which are not important/ relevant. Key information sources that informed scoping and identification of *Important Ecological Features* (CIEEM 2018) that require focussed assessment in this chapter are outlined below.

#### *8.2.2.1 Consultation*

Feedback was received from the following which informed this biodiversity assessment and mitigation:

- An Bord Pleanála
- Cork County Council
- Developments Application Unit
- National Parks and Wildlife Service
- Inland Fisheries Ireland

**Table 8-1** below details dates and consultees with responses which were fully considered in this assessment.

**Table 8-1: Consultation with relevant consultees in relation to the project.**

| Date | Consultees | Action | Response |
|---|---|---|---|
| 07/09/2020 | Development Applications Unit (DAU) | Detail on project issued to Manager DAU. | No response received to date. |
| 13/01/2020 | Development Applications Unit (DAU) | An email requesting any observations regarding biodiversity on the project was sent to Manager DAU. | No response received to date. |
| 21/08/2019 | Inland Fisheries Ireland (IFI) | A meeting was held on site with Inland Fisheries Ireland | Inspections took place of water crossing points, both on the public road and within the development site associated with the proposed grid connection cable route and the proposed internal access road network. Crossing points were inspected, and preferred design solutions and construction methodologies were agreed for both the examined crossing points and generally throughout the site. |
| 26/03/2019 | Development Applications Unit (DAU) | An email requesting any observations regarding biodiversity on the project was sent to Manager DAU. | No response received to date. |
| 14/02/2019 | NPWS | An email requesting a consultation in March/ April was issued to NPWS Divisional Ecologist.. | An email was received on 14/02/2019 stating a meeting could not be guaranteed: |
| 08/01/2018 | Development Applications Unit (DAU) | An email requesting a pre planning consultation, with a meeting agenda and proposed attendees attached, was sent to Manager DAU. | A receipt of consultation was received on 09/01/2018 from Sinéad O' Brien, advising a turnaround for consultation of six weeks from date of receipt:<br>"*Our Ref: G Pre00256/2017 (Please quote in all related correspondence)*<br>*A Chara*<br>*On behalf of the Department of Culture, Heritage and the Gaeltacht, I acknowledge receipt of your below email.*<br>*In the event that the NPWS is in a position to facilitate your meeting request, you will receive a co-ordinated heritage-related response by email from Development Applications Unit (DAU) on behalf of the Department.* |

| | | | |
|---|---|---|---|
| | | | *The normal target turnaround for pre-planning and other general consultations is six weeks from date of receipt. In relation to general consultations from public bodies under the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 to 2011, the Department endeavours to meet deadline dates, where requested.*<br>*If you have not heard from DAU and wish to receive an update, please telephone the direct line number below or email manager.dau@ahg.gov.ie .*<br>*Le meas*<br>*Sinéad O' Brien*" |
| 13/11/2017 | Development Applications Unit (DAU) | A consultation letter containing the project description and map of the proposed CGEP/ grid connection was sent to Manager DAU. | A receipt of consultation was received on 18/12/2017 from Sinéad O' Brien, advising a turnaround for consultation of six weeks from date of receipt:<br>"*Your Ref: INIS DAU Bottlehill Consultation*<br>*Our Ref: G Pre00256/2017 (Please quote in all related correspondence)*<br>*A Chara*<br>*On behalf of the Department of Culture, Heritage and the Gaeltacht, I acknowledge receipt of your below consultation. I apologise for the delay in reply but unfortunately I have been out of the office for the past couple of months on sick leave.*<br>*In the event of observations, you will receive a co-ordinated heritage-related response by email from Development Applications Unit (DAU) on behalf of the Department.*<br>*The normal target turnaround for pre-planning and other general consultations is six weeks from date of receipt. In relation to general consultations from public bodies under the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 to 2011, the Department endeavours to meet deadline dates, where requested.*<br>*If you have not heard from DAU and wish to receive an update, please telephone the direct line number below or email manager.dau@ahg.gov.ie .*<br>*Le meas*<br>*Sinéad O' Brien*" |

#### *8.2.2.2 Desk Study*

A desktop survey was completed to gather information on nearby protected areas and the likely distribution of Important Ecological Features in the general area prior to the survey visits, so that a targeted approach to surveying could be undertaken focused on Important Ecological Features. The desktop survey enabled an assessment of the likely issues and concerns relating to the project and provided information on the species and habitats that might be impacted by the Development.

Primary sources of information included drawings provided by Brookfield Renewables, orthophotographs, datasets on designated areas available from NPWS, and species records and information from the National Biodiversity Data Centre (NBDC). Key other information sources are listed below. Additional sources included an extensive list of sources detailed in **Section 8.11**. Information from these sources were reviewed and confirmed during fieldwork in order to gather information on the baseline environment.

- NPWS website[4];
- NPWS sensitive data request - data received on 16th December 2019;
- National Biodiversity Data Centre website (NBDC)[5];

[4] https://www.npws.ie/

[5] http://www.biodiversityireland.ie/

- Environmental Protection Agency website (EPA)[6];
- Tree Council of Ireland Website[7];
- Invasive Species Ireland Website[8].
- Residual Landfill at Bottlehill, County Cork, Main EIS (2003)
- Bottlehill Residual Landfill: Management Programme for the Protection of Hen Harrier and its habitats (2005).
- Botanical Society of Britain and Ireland (BSBI) database[9]
- Birdwatch Ireland (BWI)[10];
- Mammal Atlas available online[11]
- Species Red Lists available online[12]
- Article 17 Reporting available online[13]
- Butterfly Ireland[14]
- IFI (2015) Annual report. Inland Fisheries Ireland;
- EPA Maps[15]
- NPWS: https://www.npws.ie/; in addition, species-specific data records were reviewed for the Freshwater pearl mussel populations in the Blackwater (Munster) sub-catchment.

#### *8.2.2.3 Identification of Important Ecological Features*

Rationale for inclusion

Scoping for relevant Important Ecological Features (CIEEM 2018) is an iterative process allowing for the initial proposed scope of any biodiversity impact assessment to be modified following further ecological survey and /or new research findings. It should be a flexible, adaptive and iterative process based on consultations, literature searches, site surveys and discussions with the wider project team. Statutory and non-statutory consultees have an important role in providing site-specific data, contextual information and expertise into the scoping process. Consultation enables evaluation and agreement of the scope per receptor and methods of any investigations, including the period for data collection.

Biodiversity receptors were included for evaluation based on desktop review, past precedent in respect of known sensitivities, and/or the results of consultation as appropriate. Professional Judgement and prior personal knowledge of receptors within the zone of influence (ZOI) of the proposed development was also utilised where appropriate.
A summary of the biodiversity scoping conducted, and Important Ecological Features identified for more detailed assessment are outlined in **Table 8-2** below.

[6] https://www.epa.ie/
[7] https://treecouncil.ie/
[8] https://invasivespeciesireland.com/
[9] https://database.bsbi.org/maps/
[10] https://birdwatchireland.ie/
[11] http://www.biodiversityireland.ie/product/atlas-of-mammals-in-ireland-2010-2015/
[12] https://www.npws.ie/publications/red-lists
[13] https://www.npws.ie/publications/article-17-reports
[14] https://www.irishbutterflies.com/butterfly_species.html
[15] https://gis.epa.ie/EPAMaps/

**Table 8-2: Summary of Biodiversity Scoping Evaluation**

| Biodiversity Receptor | Sub-category | Conservation Status | Significance Context | Pathways for Connectivity (Y=Yes, N=No, P=Possible) | Identified as Important Ecological Feature (CIEEM 2018) | Rationale | Scoped in / out |
|---|---|---|---|---|---|---|---|
| Designated Nature Conservation Sites | European Sites (SAC/SPA) | Variable dependant on Features of Interest | Important in an International, European and National Context | Yes | Yes | The proposed development is hydrologically connected to watercourses within the Blackwater River (Cork/Waterford SAC) and is located upstream of the Blackwater Callows SPA. European Sites and/or their supporting habitats or species may be susceptible to e.g. deteriorations in water quality leading to adverse effects on Aquatic Ecology. | In |
| | Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHA's) | Variable dependant on NHA or pNHA | Nationally Important | Yes | Yes | The proposed development is hydrologically upstream of a number of NHA's or pNHA's in the Blackwater River valley. Sites and/or their supporting habitats may be susceptible to secondary effects such as water quality deterioration. | In |
| Habitats and Flora | EU HD* Annex I habitats | Variable dependant on individual receptor | Important in an International, European (Annex I & II) and National (FPO*** Species and Red Data | Yes | Yes | 1) Potential for direct effects on Annex I habitats, if present onsite, through compaction or destruction of the habitat (2) Potential for indirect effects on habitats through the | In |
| | EU HD Annex II flora | | | | | | |
| | Flora Protection Order species | | | | | | |

| Biodiversity Receptor | Sub-category | Conservation Status | Significance Context | Pathways for Connectivity (Y=Yes, N=No, P=Possible) | Identified as Important Ecological Feature (CIEEM 2018) | Rationale | Scoped in / out |
|---|---|---|---|---|---|---|---|
| | Red Data listed species | | Listed Species) Context | | | spread of invasive species (3) Potential for habitat corridor severance (4) Direct loss of Flora Protection Order species | |
| Avifauna | EU BD** Annex I listed species:<br>Hen Harrier<br>Kingfisher<br>Whooper Swan<br>Golden Plover<br>Merlin<br>Peregrine<br>Short Eared Owl | Protected under the European Union Birds Directive, Wildlife Acts 1976 to 2018, Red Lists and Birds of Conservation Concern in Ireland species lists as applicable | Important in an International, European and National Context | Hen Harrier (Y)<br>Kingfisher (Y)<br>Whooper Swan (P)<br>Golden Plover (P)<br>Merlin (P)<br>Peregrine (P)<br>Short-eared Owl(P) | Yes | Potential for Direct effects on Hen Harrier through during construction direct mortality (at nest sites), disturbance, land cover change, during operation collision mortality and displacement.<br>Potential for secondary effects on downstream Kingfisher through water quality deterioration.<br>Potential for possible operational collision mortality / disturbance effects on wintering Whooper Swan should regularly utilised flight paths traverse the development location, or Golden Plover should wintering birds frequent the development site.<br>Potential for during construction disturbance and secondary habitat loss to breeding Merlin and | Hen Harrier (In)<br>Kingfisher (In)<br>Whooper Swan (In)<br>Golden Plover (In)<br>Merlin (In)<br>Peregrine (In)<br>Short-eared Owl (In) |

| Biodiversity Receptor | Sub-category | Conservation Status | Significance Context | Pathways for Connectivity (Y=Yes, N=No, P=Possible) | Identified as Important Ecological Feature (CIEEM 2018) | Rationale | Scoped in / out |
|---|---|---|---|---|---|---|---|
| | | | | | | Short-eared Owl, if present. | |
| | EU BD Annex II listed Species,<br>Red or Amber Listed Species:<br>Grey Wagtail<br>Skylark<br>Snipe<br>Woodcock<br>Goshawk<br>Red Grouse<br>Kestrel | Protected under the Wildlife Acts 1976 to 2019, Red &Amber Lists and Birds of Conservation Concern in Ireland species as applicable | Internationally (EU BD Annex II), Nationally & Locally Important | Y | Y | Potential for disturbance/displacement during construction phase. Direct habitat loss and secondary effects from habitat degradation (terrestrial and aquatic)<br>Potential for operational phase mortality to Kestrel through collision with rotating turbine blades. | Grey Wagtail (In)<br>Skylark (In)<br>Snipe (In)<br>Woodcock (In)<br>Goshawk (In)<br>Kestrel (In)<br>Red Grouse (Out - insufficient suitable habitat is present |
| | Other Species and/or Green Listed:<br>Dipper | Protected under the Wildlife Acts 1976 to 2012 | Locally Important | Y | Y | Localised loss of habitat and small scale displacement effects to common breeding birds. Supporting offsite habitats for Dipper may be susceptible to e.g. deteriorations in water quality leading to adverse effects at a local level. | In |
| Terrestrial Mammals (excluding bats) | Otter<br>Pine marten<br>Badgers | EU HD Annex II and Annex IV species; Wildlife Act, 1976 to 2019. | Internationally, Nationally and locally Important | | | (1) Potential for disturbance/ displacement of otters, badgers and other mammals due to noise from construction | In |

| Biodiversity Receptor | Sub-category | Conservation Status | Significance Context | Pathways for Connectivity (Y=Yes, N=No, P=Possible) | Identified as Important Ecological Feature (CIEEM 2018) | Rationale | Scoped in / out |
|---|---|---|---|---|---|---|---|
| | Wildlife Act species | | | Y | Y | activities (2) Potential for direct effects through physical injury from construction machinery (3) Potential for the loss of suitable breeding and foraging habitat of various mammal species | |
| Bats | All species | EU HD- Annex II and Annex IV species under the Habitats Directive; Wildlife Act, 1976 to 2019 | Internationally, Nationally and locally Important | Y | Y | (1) Potential for direct disturbance effects from construction activities on known bat roosts through noise and vibration (2) Bats are susceptible to the effects of lighting during the construction phase (3) Bats are susceptible to disturbance/displacement due to severance of foraging and commuting routes through hedgerow/treeline removal. (4) Direct mortality through inadvertent destruction of e.g. bats roosting in trees and through operational collision mortality. | In |
| Other Species | Reptiles<br>Amphibians<br>Marsh Fritillary | Wildlife Act, 1976 to 2019 | Nationally (Marsh Fritillary only) otherwise | | Y | (1) Potential for direct effects through physical injury from construction machinery (2) Potential for | Reptiles (In)<br>Amphibians (In) |

| Biodiversity Receptor | Sub-category | Conservation Status | Significance Context | Pathways for Connectivity (Y=Yes, N=No, P=Possible) | Identified as Important Ecological Feature (CIEEM 2018) | Rationale | Scoped in / out |
|---|---|---|---|---|---|---|---|
| | Other Invertebrates | | Locally Important | Y | | the loss of suitable breeding and foraging habitat of amphibians, reptiles and Marsh Fritillary (3) Secondary effects through habitat degradation. | Marsh Fritillary (in) Other Invertebrates – Out |
| Fisheries and Aquatic Ecology | Salmonids and fisheries | Atlantic Salmon: Annex II, WA. Brown Trout: WA European Eel: IUCN RL 'Critically Endangered' | Internationally important; nationally important. | Hydrological and hydrogeological pathways. Physical disturbance. | Yes | The proposed development is hydrologically connected to the River Bride catchment and watercourses within the River Blackwater (Munster). There is connectivity to Internationally important population of Atlantic salmon, designated within the River Blackwater (Cork/Waterford) SAC; Nationally important Brown trout population; and nationally important European eel population. | In |
| | Lamprey species (Lampetra sp.) | Annex II | Internationally important | Hydrological and hydrogeological pathways. Physical disturbance. | Yes | The proposed development is hydrologically connected to the River Bride catchment and watercourses within the River Blackwater (Munster). There is connectivity to Internationally important | In |

| Biodiversity Receptor | Sub-category | Conservation Status | Significance Context | Pathways for Connectivity (Y=Yes, N=No, P=Possible) | Identified as Important Ecological Feature (CIEEM 2018) | Rationale | Scoped in / out |
|---|---|---|---|---|---|---|---|
| | | | | | | population of River and Brook lamprey (*Lampetra* sp.), designated within the River Blackwater (Cork/Waterford) SAC; | |
| | Freshwater pearl mussel | Annex II; IUCN RL 'Critically Endangered' | Internationally important | Hydrological and hydrogeological pathways.<br>Physical disturbance. | Yes | The proposed development is hydrologically connected to the River Bride catchment and watercourses within the River Blackwater (Munster). There is connectivity to Internationally important Annex II population of Freshwater Pearl Mussel- within the River Blackwater (Cork/Waterford) SAC; | In |
| | Aquatic macroinvertebrate community | Q4 (Good status) macroinvertebrate communities. | Local importance (higher value) | Hydrological and hydrogeological pathways.<br>Physical disturbance. | Yes | The proposed development is hydrologically connected to the River Bride catchment and "Good" water quality status watercourses within the River Blackwater (Munster) catchment. | In |

*EU HD=European Union Habitats Directive (Council Directive 92/43/EEC)
**EU BD=European Union Birds Directive (Council Directive 79/409/EEC)
***FPO=Flora Protection Order (2015).

### 8.2.3 Field Assessment

This section describes the methods applied in respect of Field Studies undertaken which focussed on Important Ecological Features identified in scoping, **Table 8-2.** Information is presented in respect of the main CGEP Project elements including the windfarm (CGEP) and Grid connection (GCR). **Appendix 8-C** provides detail on Field Survey methods for the Turbine Delivery Route (TDR). Field survey methods for the replant lands are detailed in **Appendix 8-I**. In some instances, project elements such as the proposed CGEP and Grid Connection Route (GCR) are grouped. This reflects a similar application of survey methods due to spatial overlap, or instances where surveys were co-ordinated across both elements. Given the minor scale and temporary nature of potential impacts; the TDR required focused surveys on localised points (Nodes) along the route where small scale (temporary) works such as tree cutting or bush clearance may be required. Therefore, the survey methods required on the TDR focused on habitats.

#### *8.2.3.1 Designated Nature Conservation Sites*

The study area for European Sites focused on the site and a buffer area up to 15km from the project construction works area boundary. An evaluation distance of 15km is considered adequate to identify the potential Zone of Influence (of impacts) from a project of this nature and scale. 15km is also currently recommended in the case of projects (DoEHLG, 2009). The study area for nationally protected sites such as NHA's and pNHA's was also 15km. Consideration was also given to designated nature conservation sites located outside the 15km buffer where downstream hydrological links exist, or other potential impact source pathway were identified. The designated nature conservation sites within 15km of the proposed development were compiled from the most up to date shapefiles available from the NPWS website, having been downloaded on 05/12/2019 (SAC's, and SPA's), 28/06/2019 (NHA's) and November 2015 (pNHA's). This 15km buffer has been applied to all project elements including the proposed Energy Park and Grid Connection Route, turbine delivery route and replant lands.

#### *8.2.3.2 Habitats and Flora*

CGEP and Grid Connection Route

All habitat surveys undertaken for CGEP and CGEP Grid Connection Route followed best practice guidance (Smith *et al*., 2011) and utilised the habitat classification presented in Fossitt (2000). All surveys were carried out at an appropriate time of the year, during the botanic growing season. Initial walkover surveys (as per NRA Guidelines, 2009c) to investigate habitats took place in 11th and 12th July 2016. Survey effort was focused on potential semi-natural habitats as identified from aerial photography. Lower conservation value habitats such as improved grassland and conifer plantation were identified visually. These initial surveys identified constraints and informed the windfarm design layout process. Further ground truthing of habitats pertinent to certain project infrastructure (wind turbines and associated access tracks plus a 50m buffer) was undertaken in August 2019 (8th) (for 250m turbine buffer calculations), September 2019 (11th) (access tracks plus a 50m buffer). Additional habitat mapping surveys was also carried out in August 2020 (11th, 12th and 13th) to confirm no significant changes in relation to minor changes in turbine and access road layout.

Detailed habitat surveys of the proposed Grid Connection plus a 50m buffer were undertaken in June 2018 (12th, 13th and 14th); this was followed by a high-level assessment of the proposed grid connection route, carried out in August 2018, to identify and evaluate any potential constraints. Additional surveys to check for invasive plant species were conducted on the proposed Grid Connection on August 13th 2020.

During all surveys listed above, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) (as amended) was conducted.

Full details of the results of habitat mapping including the location of invasive species records for the CGEP and Grid Connection Route are presented in **Figure 8.12** through to **Figure 8.23.**

##### 8.2.3.2.1 Turbine Delivery Route

Terrestrial ecological surveys were undertaken on 16th July and 13th August 2019 and 13th August 2020. The objective of these visits was to obtain data at relevant node locations on the presence of invasive plant species, and habitats or species that are protected and/or are qualifying interests of nearby European sites.

The area surveyed was the oversail and load-bearing areas and immediate surroundings for each node, including drainage features. The survey was carried out in accordance with the guidance document Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road-Schemes (NRA, 2009).

#### *8.2.3.3 Avifauna*

##### 8.2.3.3.1 CGEP and Grid Connection Route

**Vantage Point Flight Activity Surveys**

*CGEP*

Vantage point surveys on initial lands under consideration, commenced for Hen Harrier in March 2016 and finished in February 2017 (Year 1- covering March to August inclusive (36hrs) as Breeding Season and September to February inclusive (36hrs) as Wintering Season). A total of 19 vantage points was selected following viewshed analysis to provide ground level coverage of all the lands under consideration at the time, and inform the initial constraints-based design layout process.

The above vantage points were also utilised to inform a second year of vantage point flight activity surveys commencing in March 2017 and finishing in February 2018 (Year 2 – covering March to August 2017 (36Hrs) as breeding Season and October to February inclusive as Winter Season (30hrs).

In July 2017, an indicative turbine layout, and revised viewshed analysis led to a reduction in requirement for VP's from 19 in total downwards to 15, with further iterations to turbine layout occurring in July and August of 2017 resulting in a further downwards revision to 14 VP's in total. These 14 no. VP's covering the entire turbine (+500m) envelope were utilised until February 2018. Viewshed for Year 1 and 2 are illustrated in **Figures 8.24** and **8.25**, respectively. Vantage point locations for Year 1 and Year 2 are illustrated in **Figures 8.28** and **8.29**, with coordinates for each VP presented in **Appendix 8 – A.**

Year 3 of survey effort commenced in March 2018 (March to August inclusive (36Hrs) as breeding) and completed in February 2019 (October to March inclusive as Winter (36hrs)). A total of 13 no. VP's were used for March 2018, which was dropped to 12 in April 2018 for the remainder of fieldwork, in line with further layout changes. At all times turbine +500m buffer viewshed coverage in line with SNH Guidance was adhered with. Vantage point locations and the respective viewsheds for Year 3 are Illustrated in **Figures 8.30** and **8.26**, respectively , with coordinates for each VP presented in **Appendix 8 – A**.

Year 4 of survey effort commenced in April 2019 and was completed in September 2019 (April to September inclusive as breeding (36hrs and 12 no. VP's). Vantage point locations and the respective viewsheds for Year 4 are illustrated in **Figures 8.30** and **8.27**, with coordinates for each VP presented in **Appendix 8 – A**.

To summarise, available data to inform the current baseline evaluation of flight activity, comprising 4 consecutive breeding seasons (2016-2019 inclusive) is presented, covering the period March-August of Yrs. 1 ,2 and 3, and April-September of Year 4, representing a total of (36X4) 144Hrs of flight activity data in total at each vantage point location. The variation in months of survey from March-August in 2016, 2017 and 2018 to April-September in 2019 is not considered a significant constraint; March 2019 was also covered as part of winter 2018/19 effort, and thus any information on early displaying Hen Harrier was still available (Hen Harrier begin to occupy breeding areas in the uplands in March with a view towards pair bonding (NPWS,2015)).

In addition, the breeding season is only broadly defined as mid-March to mid-August in the Irish context (NPWS, 2015) and studies on the recoveries of ringed birds suggest breeding birds are often still present into September around breeding areas, in particular juveniles (Watson, 1977). All vantage point effort was completed by mid-September. As the literature suggests most evidence of *wintering* birds occurs from around '*late September onwards'* within areas where they typically do not occur as breeding species (Watson, 1977), the described variation is not considered a significant constraint.

In respect of winter effort, data from 3 consecutive winters (i.e. winter period 2016/17, 2017/18 and 2018/19) is presented, covering the period September to February inclusive (Year 1), October to February inclusive (Year 2) and October to March inclusive (Year 3) (36x1, 30x1 and 36x1) representing 102Hrs in total at each vantage point location.

*Grid Connection Route*

Additional Grid Connection Route (GCR) VP Surveys covered the period from October 2017 to September 2018 inclusive (12 months). Four vantage points were used in these surveys, resulting in 72Hrs of flight activity data from each vantage point location. These surveys focussed on the GCR eastwards from the substation at Lackendarragh North to Farran South (Remaining lands where the GCR is to be located overlap the CGEP study area) in particular potential suitable Hen Harrier breeding (or winter roosting) habitat within 500m of the likely locations of cable laying works. Vantage point locations and the respective study areas for flight activity surveys carried out on the grid are illustrated in **Figure 8.32**, with coordinates for each VP presented in **Appendix 8 – A.**

In line with Best Practice (SNH, 2014,2017) recommendations, no impact pathways pertaining to collision mortality are to be expected from an underground Grid Option, therefore, VP coverage was focussed on those areas which could be subject to possible usage by Hen Harrier i.e. suitable hen harrier habitat, in particular during the breeding season as possible nest sites (where disturbance pathways become relevant). Survey areas were chosen based on aerial imagery information followed up by ground truthing.

**General Breeding Bird Surveys**

*CGEP*

Bird transects surveys were designed to ensure that all areas and main habitat types of the project area were sampled. Survey methods followed the latest guidelines for the Countryside Bird Survey (CBS) methodology used to monitor breeding bird populations across Ireland (Birdwatch Ireland & NPWS, 2012).

For this method, Bird Transects are surveyed from early in the morning (transect surveys start between 30 minutes and three hours after dawn) and are 1km in length. These 1km transects are divided into five, 200m sections. All birds encountered (visually and aurally) are identified, and their abundance recorded. Recognisable juveniles are not recorded, but all birds observed in flight are noted. Binoculars (with c.8x magnification) are used to assist with identification. All birds observed or heard are allocated a distance category from the transect route (0-25m, 25-100m, >100m and in flight), and recorded appropriately on specifically-designed recording forms.

For analysis, all species which occur more than 100 metres from the transect line or flying over the site, and hence not using it, are noted but not included in abundance analysis. Any 'flight paths' of note will be recorded and geo-referenced.

A total of 7 no. Transects were identified and surveyed within representative habitats. Early and late season visits (defined as April to mid-May and mid-May to late June) were undertaken in 2016. An additional early season visit only was undertaken in April to mid-May of 2018. Locations of transects are provided in **Figure 8.47**.

*Grid Connection*

As per the main CGEP area, bird transects surveys were designed to ensure that all areas and main habitat types were sampled. Survey methods followed the latest guidelines for the Countryside Bird Survey (CBS) methodology used to monitor breeding bird populations across Ireland.

Breeding season surveys on 6 no. transects in representative habitat between Lackendarragh North and Farran South were carried out in the Spring of 2018. Remaining lands where the GCR is to be located overlap the CGEP study area, this includes the section of grid connection route between Mullenaboree and Lackendarragh. Locations of transects are provided in **Figure 8.48.**

**Wintering Wildfowl Surveys**

*CGEP*

Wintering wildfowl surveys took place in the winter period of 2016/17 and also 2017/18. The purpose of these surveys was to establish numbers if any of wintering Whooper Swan along the Blackwater River corridor, to the north of CGEP, between Mallow town and Fermoy town. This survey comprised a 'round-robin' style survey in line with established methods such as IWeBS/National Swan Census methods whereby suitable locations for feeding/roosting swans on both sides of the Blackwater River corridor (North and South) were visited over

the course of a single day per month, across 4 months (October to January inclusive of winter 2016/17 and November to February inclusive of winter 2017/18).

Additional VP watches were also carried out at dawn or dusk during the winter months (1 dawn and 1 dusk watch per month November to February inclusive and usually around the same date as the monthly census), to determine whether or not wildfowl (particularly swans) possibly utilising the corridor eastwards from Mallow town along the Blackwater also occasionally traversed southwards through the proposed development area. The area surveyed for winter wildfowl is presented in figure is illustrated in **Figure 8.49**

*Grid connection Route*

No requirement for Winter Wildfowl surveys was scoped in regarding the proposed Grid Connection Route eastwards from Lackendarragh North to Farran South. Habitats adjacent are unsuitable for larger wintering wildfowl such as geese or swans, the underground cabling will not pose a risk in terms of collision mortality along regularly used flight paths, and the CGEP surveys of the River Blackwater provide background information on numbers of wildfowl. Remaining lands where the GCR is to be located overlap the CGEP study area, this includes the section of grid connection route between Mullenboree and Lackendarragh.

**General Winter Bird Surveys**

*CGEP*

Winter season surveys utilised the same 7no. transect locations as selected for General breeding birds. Between December 2016 and February 2017, each transect location was visited on 3no. occasions. All species were recorded in line with methods described above for general breeding birds.

*Grid Connection Route*

Winter season surveys on 6 no. transects in representative habitat between Lackendarragh North and Farran South were carried out in the Winter period of 2017/2018 and early spring from January 2018 to April 2018 and utilised the same transect locations as used for breeding birds. Remaining lands where the GCR is to be located overlap the CGEP study area, this includes the section of grid connection route between Mullenboree and Lackendarragh.

**Hen Harrier Winter Roost Surveys**

*GCEP and Grid Connection Route*

Winter roosts watches in line with established methods from the Irish Hen Harrier Winter Roost Survey (IHHWRS[16]) were carried out in the winter periods of 2016/17 (winter #1) and 2017/18 (winter #2). Surveys were targeted at known roosts identified through consultation and/or suitable habitat in the hinterland of the proposed development.

In the first winter of survey, roosts watches spanned the months of November 2016 through to March 2017 inclusive and took place at 9no. locations where suitable habitat for roosting birds was either identified from field survey or desktop review, or where consultation with local birdwatchers suggested Hen Harriers may be roosting. Most roosts surveys were conducted at dusk (n=29), but dawn was also utilised on 8no. occasions. A total of 37 watches were completed.

Similarly, in the second winter of survey (2017/18), roosts watches spanned the months of October 2017 through to March 2018 inclusive and took place at 2no. locations where roosts had been confirmed in winter #1. Most roosts surveys were conducted at dusk (n=9), but dawn was also utilised on 8no. occasions. A total of 17 watches were completed.

In the case of one of the above identified roosts, a known nearby roost which was identified from additional studies conducted by IEC (IEC, unpublished) in the winter of 2016/17, data from the winter period of 2016/17 in respect of this location is also utilised in the current appraisal.

**Breeding Merlin**

*CGEP*

[16] http://www.ihhws.ie/

Breeding Merlin surveys took place in 2019 and targeted lands within 2km of CGEP (on foot surveys to within 500m of all suitable habitat). Methods employed were from Hardey *et al.,* 2013. Potentially suitable Merlin habitat within the site boundary as described in Fernández *et al*., 2010 and Hardey *et al.,* 2013 and 2km outside of the site boundary was identified using aerial photography, these habitats were then ground-truthed and surveyed. The survey consisted of a search for suitable Merlin habitat and identification of potential nesting locations (such as old corvid (crows such as Hooded Crow) nests or plucking posts (Fence lines, isolated posts, hummocks, boulders, trees, etc.) which are all checked for faecal droppings, pellets, the plucked remains of kills and moulted Merlin feathers. The locations of any signs found are mapped.

Only 2 of the 4 no. recommended visits were required, due to the absence of evidence of breeding Merlin being recorded on visit #1 and #2, these surveys were carried out in May and June of 2019.

Further detail on locations of habitats surveyed and walking routes is provided in **Figure 8.50.**

*Grid Connection*

No requirement for Merlin surveys was required for the proposed Grid Connection Route eastwards from Lackendarragh North to Farran South. Habitats here are unsuitable for breeding Merlin. Remaining lands where the GCR is located fall within the search hinterland for CGEP, this includes the section of grid connection between Mullenboree and Lackendarragh.

**Dipper**

Dipper surveys of suitable reaches of the Bride River, downstream of CGEP, were undertaken in May 18th and June 22nd of 2018. The method involved a systematic search of suitable bridges along the river Bride as far east as the M8 Motorway crossing at Rathcormac, to determine possible numbers of nesting Dipper. Bridges were classified as to their suitability and any evidence of nesting (whitewash/old nests/new nests) recorded. The locations surveyed for Dipper are presented in Figure **8.54**.

**Kingfisher**

Kingfisher surveys of suitable reaches of the Bride River, downstream of CGEP, were undertaken in Spring of 2018. The method involved a systematic search of suitable habitats (slow moving water with suitable nest banks) along the river as far east as the M8 Motorway crossing at Rathcormac, to determine suitability and/or evidence of Kingfisher. The locations surveyed for Kingfisher are illustrated in Figure **8.55**. Updated surveys were additionally conducted at proposed river crossing locations in August 2020 to search for evidence of potential nest sites.

**Kestrel**

Kestrel was included as a receptor for flight activity surveys and any nesting behaviour or nesting locations were noted.

**Goshawk**

A number of visits to suitable habitat for breeding Goshawk were undertaken in Spring/Summer of 2018 (March-May inclusive), following incidental sightings of Goshawk on site during flight activity surveys. Suitable nesting habitat in line with literature descriptions (Kenward, 2006) were visited and walked transects undertaken to identify old or previously used nest sites, any signs of Goshawk or to audibly identify any calling birds (Goshawk can be particularly vocal at dawn/early morning during the peak of the territorial season).

Additional watches around dawn at suitable habitat were undertaken, in Spring of 2018, to identify vocal birds during the territorial season and a number of watches were timed to coincide with peak weather conditions for displaying birds (**Figure 8.53**). Goshawk was included as a target species for vantage point flight activity. surveys.

#### 8.2.3.3.2 Turbine Delivery Route

The suitability of habitats for nesting birds at TDR node locations was evaluated in ecological surveys conducted. The survey was carried out in accordance with the guidance document Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road-Schemes (NRA, 2009).

### *8.2.3.4 Terrestrial Mammals (excluding bats)*

#### 8.2.3.4.1 CGEP and Grid Connection Route

**General Mammal Surveys**

*CGEP*

Walkover surveys in respect of Terrestrial mammals were initially carried out in the winter of 2016/17 throughout the study area of the CGEP. Initial surveys over this period followed a transect method whereby the different habitats on site were effectively sampled to determine the scale and extent of terrestrial mammal usage, to inform the constraints-based design layout process. The following field signs of mammals were recorded during all day-time walked transects:

- Well-used pathways;
- Prints/tracks;
- Scat/spraints/dropping;
- Signs of feeding (foraged pine cones, badger snuffle holes)
- Places of shelter and features or areas likely to be of particular value as foraging resources (NRA 2004).

The location of transects surveyed for mammals in 2016/2017 is presented in **Figure 8.64**.

With respect to Otter, limited potentially suitable habitat occurs within the original larger study area under consideration in 2016/17 and targeted surveys for this species were therefore focussed on watercourse crossings associated with the proposed Grid Connection, in addition to downstream watercourses where connectivity may exist. Once a refined layout and associated infrastructure was available (2019) then further targeted studies also included evaluation of watercourse crossings occurring within the potential zone of influence for Otter. Updated otter surveys were conducted in August 2020 of all stream crossings along the cable route, and all downstream locations sampled during 2020 aquatic surveys, refer to **Figure 8.70**.

Additional mammal Surveys were carried out on the main CGEP site in September 2019 and July 2020. These surveys involved a search for badger setts and signs of badger and other mammal activity (including Otter) within a 70m buffer of the proposed /specified turbine locations, and 50m in either direction of the proposed internal access roads. The survey area for Otter extended 150m upstream and downstream of watercourse crossings on streams which had potential to support Otter. The survey aim was to establish the presence of badger setts and evidence of other mammal species within the proposed clear fell zone around turbine locations and also the within the ZOI of internal infrastructural works. Any evidence of usage of the site by badgers, including latrines, hairs, tracks and evidence of feeding such as snuffle holes in addition to other species such as Pine Marten, Red Squirrel which might indicate a requirement for subsequent disturbance licenses was noted in particular. The location of transects surveyed for mammals in 2018 and 2019 is presented in **Figure's 8.65** and **8.66**, respectively.

All surveys were conducted in line with the following Guidance:

- Scottish Badgers (2018) Surveying for Badgers, Good Practice Guidelines, Version 1
- NRA (2005). Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes.
- NRA (2008c). Ecological Survey Techniques for the Protection of Flora and Fauna during the Planning of National Road Schemes

*Grid Connection Route*

Walkover surveys in line with the methods outlined above were carried out in June 2018, for the proposed Grid Connection Route (GCR). The area surveyed for mammals in 2018 is illustrated in **Figure 8.67**. Additional lands at Knappoge townland subsequently included in the GCR were subject to a walkover survey for mammals in September 2019.

**Camera Trapping**

*CGEP*

Camera-trapping presents a relatively new approach for surveying mammals. Cameras, which can be left in the field for up to 30 days at a time, use motion sensor technology to record mammals as they pass by the camera. The area directly in front of each camera trap is typically baited to increase the effectiveness of this mammal monitoring method. Once triggered, the camera is set to record a 30 second video clip. This clip will be stored on a memory card, which will be examined during the data analysis stage. Bushnell Passive Infrared Camera Traps were used during the current assessment. This specific model uses an automatic infrared flash for taking photos at night. All units were programmed to capture videos when triggered. They were also configured to minimal latency periods between triggers and secured to trees at a height of approximately 1.5m above the ground to maximize capture probability.

Cameras were operational on a 24-hour basis and date/time was imprinted on all videos. Traps were checked frequently so as to ensure functionality and to replace memory cards/batteries if necessary. Traps were placed in a variety of different locations and habitat type throughout the site (including rivers to inform the evaluation of Aquatic Ecology) to ensure maximum coverage to record species presence/absence and distribution. The GPS coordinates of all remote camera trap locations and the number and type of species recorded were logged, and used to create detailed GIS maps. Camera trapping was carried out in winter (November) 2016/17 and in May and June of 2018. Cameras were deployed typically for a minimum of 30 days during each survey period. The camera trap deployment locations are presented in **Figure 8.68**.

*Grid connection Route*

Camera trapping using the same methods as above was carried out in Spring (April) of 2018 (in respect of watercourses).

#### 8.2.3.4.2 Turbine Delivery Route

The total footprint of the proposed turbine delivery route was traversed by experienced ecologists for potential signs of mammals within the study area. As well as direct observations of mammal features such as tracks, trails, fur, droppings and shelter (setts, dreys and holts) were also recorded using GPS.

The conservation status of mammals within Ireland and Europe is assessed using one or more of the following documents; Wildlife Acts (1976 - 2010), the Red List of Terrestrial Mammals (Marnell *et al*., 2009) and NPWS (2019) *The Status of EU Protected Habitats and Species in Ireland*.

### *8.2.3.5 Bats*

#### 8.2.3.5.1 CGEP and Grid Connection Route

**Transect Surveys**

Transect surveys were undertaken using an Anabat Express detector (Titley Scientific Inc) in transect mode, which recorded a GPS track of the survey route, and a GPS point and sonogram for every bat pass. Bat activity was also verified and recorded manually using a handheld *EM3+* bat detector (Wildlife Acoustics, USA).

Walked transects were undertaken on forest roads within conifer plantations, but for safety reasons the public roads were surveyed by car, driven at a very slow speed (approx. 20 km/hr) along the route, and with the automated detector mounted on the roof. As most of the site is located within conifer plantations and has limited access, the survey area was expanded to cover the public roads surrounding the applicant's landholding. An average of 100km of transect survey was carried out in each month, covering periods of approx. 3 hours after sunset over 2 – 3 consecutive nights. All surveys were carried out during suitable weather conditions for bats, i.e. low winds, mild temperatures and no rain.

Transects were carried out in May, July, August and September 2016, June and October 2017 and in August and September 2020; see **Figures 8.64** to **Figure 8.66** for the transect routes utilised in these surveys. The survey in May 2016 was carried out early in the design process, and therefore did not cover the entire survey area. However, surveys of the full area were carried out in five months across the active season, and in all months of peak activity (typically June until September), thus meeting the requirements of the Bat Conservation Ireland guidelines. The starting point and route was altered from month to month in order to ensure equal coverage during the survey season, because bat activity is often highest in the first 30 – 60 minutes after sunset. In order to standardise survey results between months with different coverages, all results were represented as bat passes per km.

**Automated Detector Surveys**

A series of automated detector surveys were carried out in order to assess bat activity over longer periods of time, and to provide a comparative analysis of activity levels in different locations. Surveys were carried out using *Anabat Express* detectors, with external microphones mounted at a height of 1.5 m above ground level.

Surveys were carried out over four years from 2017 to 2020, covering different aspects of CGEP and the GCR. In the first year of surveying (2017), the proposed locations for new wind turbines had not been determined, so six detectors were spread across the CGEP study area, and left in position for at least eight nights on three occasions (30 June – 10 July, 5 – 13 August, and 18 – 25 October). For ease of reference, the 2017 surveys are referred to as 'Preliminary automated detector surveys' in **Section 8.3.5.3.3**. The deployment locations of static detectors in 2017 are presented in **Figure 8.94** and **8.95**.

In the second year of surveying (2018), eight detectors were spread across the proposed GCR, and left in position for five nights on three occasions (31 May – 4 June, 16 – 20 August, and 19 – 23 October). The deployment locations of these detectors are presented in **Figure 8.96**.

In the third year (2019), the aim was to sample a representative number of the proposed CGEP turbine locations. The approach was based on the following text from the SNH guidance:

> *"At sites where the proposed turbine locations are known, static detectors should be placed to provide a representative sample of bat activity at or close to these points. Detectors should be placed at all known turbine locations at wind farms containing less than ten proposed turbines. Where developments have more than ten turbines, detectors should be placed within the developable area at ten potential turbine locations plus a third of additional potential turbine sites up to a maximum of 40 detectors for the largest developments. Thus, a development with 22 proposed turbines would require 14 static detectors. The selection of locations at which to place detectors should be based on professional judgement, but at large sites, it is recommended that beyond the initial ten detectors placed at proposed turbine sites (if known), the remainder should be distributed according to a system of stratified sampling based on the availability of different habitats and topographical features on the site."*

As there are 22 proposed turbine locations, it was calculated that 14 locations should be sampled to provide a good representation of habitats present on the site in line with SNH (2019) recommendations. The sampling locations were spread throughout the CGEP site, covering a range of habitat types, including open areas, forest edge habitat, forest roads, and closed-canopy forestry. Automated detectors were installed in these locations for ten consecutive nights in May, August and September 2019, covering the spring, summer and autumn survey seasons, as defined in the Guidance. See **Figure 8.97** which illustrates the deployment location of static detectors in 2019.

The locations of some turbines were adjusted in 2020, and the 2019 dataset was reviewed to assess any changes in habitat. In general, the majority of turbine locations were in the same location as assessed in 2019 or had moved a relatively short distance in similar habitat. However, the original sampling location for T3 was in an area of immature forestry, and the adjusted location was on a transition between mature forestry and immature forestry. Similarly, the original sampling location for T4 was on a transition between mature forestry and immature forestry, and the adjusted location was in an area of immature forestry. Considering that the habitat types were inverted in each case, the data from 2019 was inverted for this assessment. Consequently, the survey data for the adjusted location of T3 was collected from an area of immature forestry approx. 500 m to the north, and the survey data for the adjusted location of T4 was collected from a transition between mature forestry and immature forestry approx. 550 m to the south. Both sampling sites are within a large conifer plantation, so the distances between the sampling sites and turbine locations is not considered likely to affect the reliability of the data. Some confirmatory surveys were carried out at the adjusted turbine locations (**Figure 8.98**) in August and September 2020, and the results were consistent with the 2019 results. As the 2019 dataset provides a comparative analysis of all sampling sites (as all locations were sampled concurrently), it was decided that the 2019 data would be used for all detailed analyses in this assessment.

It is noted that the habitat will change significantly as a result of the development, because trees will be felled at turbine locations and along access tracks, and this will, in turn, change the way that bats use the site. By sampling a range of habitat types it is possible to make some inferences about the changes in bat activity after construction works, although any such predictions are inevitably open to some degree of error, so a precautionary approach is adopted. Particularly emphasis was placed on clear felled and edge habitats in conifer plantations, as these are considered to be most representative of the post-construction habitat

conditions. A list of the sampling sites is provided in **Table 8-3**, including a description of the habitat type, details of which sites were surveyed, and an indication of proxy sites for turbine locations that were not sampled.

**Table 8-3: Description of habitat type at each proposed CGEP turbine location, and of the selection of representative sampling sites for automated detector surveys in 2019**

| Turbine | Habitat | Sampling rationale |
|---|---|---|
| T2 | Mature, closed-canopy forestry | Surveyed |
| T3 | Edge between mature forestry and immature forestry | Surveyed in similar habitat approx. 500m to the north |
| T4 | Immature forestry | Surveyed in similar habitat approx. 550m to the south |
| T5 | Semi-mature / patchy forestry | Not surveyed, similar to T2 |
| T6 | Clearfelled in 2015, now immature forestry | Not surveyed, similar to T4 |
| T7 | Clearfelled in 2015, now immature forestry | Not surveyed, similar to T4 |
| T8 | Mature mixed broadleaved and coniferous forestry | Surveyed |
| T9 | Edge between clearfell and mature forestry | Not surveyed, similar to T8 |
| T10 | Edge between mature forestry and improved grassland | Surveyed |
| T11 | Improved agricultural grassland, no hedgerows or other linear features | Surveyed |
| T12 | Ride in mature, closed-canopy forestry | Surveyed |
| T13 | Clearfelled in 2017, now immature forestry | Surveyed |
| T14 | Semi-mature / patchy forestry | Not surveyed, similar to T12 |
| T15 | Edge between mature forestry and immature forestry | Surveyed |
| T16 | Semi-mature / patchy forestry | Not surveyed, similar to T12 |
| T17 | Narrow track in mature, closed-canopy forestry | Surveyed |
| T18 | Semi-mature forestry | Surveyed |
| T19 | Mature forestry, near forest road | Surveyed |
| T20 | Small clearing surrounded by mature forestry | Surveyed |
| T21 | Semi-mature forestry, closed canopy | Not surveyed, similar to T18 and T23 |
| T22 | Ride in mature, closed-canopy forestry | Not surveyed, similar to T19 and T20 |
| T23 | Ride in mature, closed-canopy forestry | Surveyed |

The Irish climate is highly variable, even during summer months, and the survey period covered a range of weather conditions. Although most surveys were carried out in suitable conditions for bats, all survey periods included one or more nights in which the weather was unfavourable for bats, such as heavy / prolonged rain, high winds, or low temperatures. However, this is considered to be representative of natural conditions, and is not thought to have negatively affected the dataset.

**Evaluation of Potential Bat Roosts**

*Preliminary Evaluation*

A Preliminary Ecological Appraisal was carried out for all buildings within the applicant's landholding and its immediate surroundings. All buildings were assigned a suitability category of negligible, low, moderate or high suitability, based on the age and condition of structural features used by roosting bats (e.g. roof tiles, attic spaces, soffit / fascia boards, walls).

Mature trees within 50m of the proposed development were inspected from ground level using binoculars (Steiner SkyHawk 3.0 10x42). The aim of the ground-level inspection was to identify any potential roost features (cavities or crevices on trunks or limbs) and evidence of bats (e.g. droppings, fur-oil stains at access points). Coniferous trees within plantations were not inspected, because they are rarely large enough to have any features suitable for bats, and because it is standard forestry practice to remove any trees that have obvious signs of damage and disease; as a result, trees within plantations typically have negligible suitability for bats.

Records of bat roosts and activity within 10km of CGEP and the GCR were obtained from Bat Conservation Ireland in March 2018.

*Surveys of Potential Roosts*

Follow-up surveys were carried out for all buildings within the landholding, and for any other potential roost features of high or moderate roost suitability that were considered to be at risk of direct or indirect effects. In most cases this included a detailed internal and external inspection of the structure, and an emergence / re-entry survey at dusk and dawn. Where evidence of bats was found, an attempt was made to characterise the type of roost, e.g. maternity roost, non-breeding roost. A number of structures were surveyed on multiple occasions in order to cover the maternity period (July / August 2017), the mating season (September / October 2017) and the hibernation period (December 2017). All known roosts in the vicinity of turbines were re-surveyed in August 2020 in order to confirm that the data was still valid (see sub-section on Data Validity below). Where at bat roost was confirmed still to be present in August 2020, it was assumed that hibernation and/or mating activity recorded in 2017 was still valid. Emergence / re-entry surveys were carried out using an *EM3+* bat detector (Wildlife Acoustics).

**Data Analysis**

*Species identification and interpretation of data*

Sonograms from automated detectors were obtained in the 'zero-crossing' format and viewed using Anabat Insight software (Titley Scientific) and AnalookW (Corben 2014). Species were identified with reference to *British Bat Calls: A Guide to Species Identification* (Russ 2012), based primarily on frequency and call shape. Social calls were also classified as unidentified bats unless they closely matched the examples provided in Russ (2012).

It is acknowledged that the classification of *Myotis* spp. from sonograms can be imprecise, so for the purposes of this assessment all *Myotis* records from automated detectors were identified only to genus level. Similarly, there can be overlaps in call frequency between *Pipistrellus* spp, particularly at frequencies of 50 kHz. If a bat call could not be confidently identified to species level, it was recorded as an unidentified bat, or identified only to genus level (e.g. Myotis spp.).

*Categorisation and comparison of data*

At present there is not a standard system in Ireland to categorise bat activity as low, moderate or high, because activity levels vary depending on the species involved and the location of a site. In some parts of the British Isles the Ecobat tool (managed by the Mammal Society, Lintott et al. 2018) can be used to contextualise bat activity levels relative to other data collected in the region, and to identify activity categories using percentiles. However, such analyses are only reliable if sufficient data has been input to the Ecobat database to provide a reasonable sample size for analysis (Lintott et al 2017).

Data from the 2019 automated detector surveys were analysed using the Ecobat tool in December 2019, with a reference range of 200 km (this covers the southern half of Ireland) and a temporal range of +/- 30 days. The reference ranges (the sample size of comparable data) were 139 data points for Leisler's bat, 281 for common pipistrelles, 290 for Myotis bats and 297 for soprano pipistrelles. The following is noted in Lintott et al 2017 "*we recommend that a reference range dataset is comprised of 200 nights of bat surveying*"; on this basis we conclude that there is insufficient data for comparative analyses of Leisler's bat activity, but sufficient data for other species.

Upon review of the Ecobat percentile data output, some of the results were considered to be of questionable value. For example, nights with 4 – 6 bat passes were categorised as having 'moderate activity', even though this represented an average of less than one bat pass per hour. Similarly, nights with 15 or more bat passes were categorised as 'high activity', even though this represented an average of one bat pass every 30 – 40 minutes. This is also significantly lower than the threshold of 50 passes per night used to categorise nights as 'high activity' in Mathews et al. 2016. Therefore, we do not consider the Ecobat data to be of use for the purposes of this impact assessment, probably because there is not currently a large enough dataset in the Republic of Ireland to provide reliable results. Data from Britain cannot be applied to Ireland, due to differences in the relative abundances of some species, notably Leisler's bat.

Therefore, for the purposes of this report we use a bespoke system to discuss and compare levels of bat activity at the Site, as outlined in **Table 8-4**. This system is based on the professional judgement of the surveyor, and the results of peer reviewed research (Mathews et al. 2016). For ease of comparison, bat activity levels are classified into four categories based on a simple count of bat passes in any night, and cells are coloured using shades of blue. For the purposes of this assessment, any species that regularly has more than 50 bat passes per night (i.e. moderate to high activity) is considered to have a significant level of activity, which would warrant further consideration in an impact assessment. This corresponds with the threshold of 50 passes per night that was used in the Mathews et al. 2016 report. See also 8.2.6.1.

**Table 8-4 Terminology and colour-scheme used to categorise bat activity levels**

| Category | Number of bat passes |
|---|---|
| Negligible | ≤9 |
| Low | 10 - 49 |
| Moderate | 50 - 99 |
| High | ≥100 |

It should be noted that activity levels can only be compared within a species and not between species, due to differences in the detection distances for each species and their flight characteristics. For example, if there is low activity by brown long-eared bats (a species with short-range echolocation pulses) and moderate activity by Leisler's bats (which has long-range echolocation pulses), it does not necessarily mean that Leisler's bats are more abundant than brown long-eared bats at that location.

Data validity

It is noted that the initial surveys in 2016 to 2017 were carried out 3 – 4 years prior to lodgement. In a CIEEM *Advice Note on the Lifespan of Ecological Reports & Surveys* (CIEEM 2019), it is suggested that data collected more than three years ago is "*unlikely to still be valid and most, if not all, of the surveys are likely to need to be updated (subject to an assessment by a professional ecologist, as described above)*".

The survey area has not changed significantly over the course of the sampling period. The only changes during this period were the clear-felling of forestry at proposed turbine location T13 in 2017 and at T9 in 2018. The habitat at all other turbine locations has not changed since 2016. In addition, it is noted that the overall trend in bat populations in Ireland is stable or slightly increasing, so it is considered highly unlikely that there has been any significant increase or decline in bat activity or distribution since the surveys were carried out. Nonetheless, the terms of the CIEEM 2019 Advice Note are recognised, and the validity of survey data for transect, automated detectors and roost surveys are outlined below.

The initial transect surveys were carried out in 2016 / 2017, approx. 3 – 4 years before lodgement. The aim of these surveys was to provide a general appraisal of bat activity in the area, and the results do form a core component of the impact assessment (most detailed analyses are based on the 2019 automated detector data). Therefore, considering that the habitat has not changed substantially in this period, that trends in bat populations are stable, and that the transect data does not form a core component of the analysis, we consider the 2016 / 2017 transect surveys to be valid for the purposes of this assessment. Nonetheless, some additional transect surveys were carried out in 2020 in order to add to the dataset in August and September.

The preliminary automated detector surveys were carried out in 2017, which is more than three years prior to lodgement. The aim of these surveys was to provide a general appraisal of bat activity in the area, and the results do form a core component of the impact assessment (in comparison to the 2019 automated detector data). Therefore, considering that the habitat has not changed substantially in this period, that trends in bat

populations are stable, and that the preliminary automated detector survey data does not form a core component of the analysis, we consider the 2017 surveys to be valid for the purposes of this assessment. In addition, the 2018 and 2019 automated detector surveys were carried out within three years of submission, and therefore are still considered to be valid.

The roost surveys in 2017 were carried out 3 years prior to lodgement. It is noted that most of the roosts were located in derelict buildings, so it was possible that the status of the roosts may have changed since 2017 due to further deterioration of these buildings. Therefore, all known roosts in the vicinity of turbines were re-surveyed in August 2020 in order to assess any changes. Where at bat roost was confirmed still to be present in August 2020, it was assumed that hibernation and/or mating activity recorded in 2017 was still valid.

#### 8.2.3.5.2 Turbine Delivery Route

The suitability of habitat for roosting bats was evaluated during site visits to Nodes along the route.

### *8.2.3.6 Other species*

#### 8.2.3.6.1 CGEP and Grid Connection

Records of other species such as Amphibians, Newts, Reptiles and any invertebrates of note were recorded during other surveys for birds, mammals and habitats.

**Marsh Fritillary**

Due to the inclusion of Marsh Fritillary following scoping, a habitats-based appraisal technique was utilised to classify habitat surveys along the proposed Grid Route in 2018 (12th, 13th and 14th of June), as to their suitability for Marsh Fritillary. Appraisal criteria was based on a number of factors such as percentage cover of food plant, aspect, slope etc. This enabled potential habitats for this species to be identified even if not currently being utilised. Surveys for Marsh Fritillary were not carried out within CGEP study area due to the absences of suitable habitat present.

A known Marsh Fritillary colony (IEC, unpublished) within 4km of the proposed development was also considered when determining the likelihood of significant effects/pathways for effects to this receptor.

**Amphibians and Reptiles**

Amphibians and reptiles occurring within the study area of CGEP and Grid Connection were recorded during the course of all site walkovers for habitat, mammal and bird surveys.

#### 8.2.3.6.2 Turbine Delivery Route

An ecological appraisal of each TDR Node was carried out in August 2019, including for any protected species likely to occur. The survey was carried out in accordance with the guidance document Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road-Schemes (NRA, 2009c), refer to **Appendix 8-C**.

### *8.2.3.7 Fisheries and Aquatic Ecology*

#### 8.2.3.7.1 CGEP and Grid Connection

**Field Assessment**

Field surveys and sampling for the fisheries and aquatic biodiversity receptors were undertaken at selected sampling sites within the study area, identified within the zone of influence as part of the scoping study. The field surveys followed standard survey protocols for key biodiversity receptors as outlined in **Section 8.2.3** Watercourse crossings throughout the study area were visited and field notes made in relation to upstream

and downstream conditions identified at each crossing point. In addition, the character of the affected streams and the larger watercourses downstream were evaluated utilising a range of field survey methodologies.

Sampling was completed over an extended period between September 2017 and October 2018. Full aquatic ecology, fishery and specific *Margaritifera margaritifera* surveys were conducted of all relevant downstream receiving waters in September 2020, refer to Aquatic Baseline Report **Appendix 8-B.** The 2020 survey report is the key information informing this assessment, being the most up to date. Relevant information from previous surveys in 2017/2018 are also considered in the assessment e.g. records of invasive species and more extensive survey area (**Figure 8-100**).

**Fisheries Survey**

*Electro-fishing*

Electro-fishing was conducted at *n*=25 sites of both named and unnamed tributaries within the River Bride catchment, as well as the River Bride itself and a single site located within the northernmost extent of the Manin_SC_010 sub-catchment.

These electro-fishing survey locations are highlighted in **Figure 8.99**. The fish stock composition of each survey site is discussed individually in **Section 8.3.7**. with the physical characteristics including physio-chemical water quality data presented in **Appendix 8 - B**.

The electro-fishing survey utilised a back-pack electrofisher and focussed on determining the fish community present in the affected watercourses, in conjunction with the fish habitat present. For salmonid species (i.e. trout & Atlantic salmon), electro-fishing was carried out in an upstream direction for a standard 5-minute CPUE after Kennedy (1984) and O' Connor & Kennedy (2002). The lamprey survey followed the methodology of Harvey & Cowx (2003). The species-specific settings and further detail were scoped under the license requirements as advised by Inland Fisheries Ireland.

*Fish Stock Assessment*

The electro-fishing survey helped to establish the fisheries composition of rivers sampled. In this fashion the demographics of the fish stock helped to elucidate the most important areas of fish habitat in the respective riverine catchments downstream of the proposed CGEP and GCR. This is achieved by virtue that the presence of juvenile fish identifies potentially important nursery habitat, whilst the occurrence of large adults identifies holding areas, and so forth.

The electro-fishing survey established each watercourse's importance as a fish nursery, holding or spawning area for Atlantic salmon, brown trout and lamprey species (*Lampetra spp*. & *Petromyzon marinus*) in the catchment of the proposed development and grid connection. The presence of other conservation importance species (e.g. European eel) would also be assessed.

A state-of-the-art single anode Smith-Root LR24 backpack (12V DC input; 300V, 100W DC output) was used to electro-fish *n*=13 riverine sites within the River Bride catchment. The survey was undertaken in July 2020 under a DCCAE Section 14 Authorisation. As three primary species groups were to be targeted during the survey, i.e. lamprey, eel and salmonids, the electro-fishing settings were tailored for each species. By undertaking electro-fishing using the rapid electro-fishing technique (see methodology section below), the broad characterisation of the fish community at each sampling reach can be determined as a longer representative length of channel can be surveyed. Electro-fishing methodology followed accepted European standards (CEN, 2003)

Water with a low conductivity has a higher resistance to the passage of an electric current through it. This means that in high conductivity waters the current for a given voltage is higher than in low conductivity water and the threshold values for different fish responses are also lower (Zalewski & Cowx, 1990). Given this fact, conductivity (µs) was measured on-site prior to any electro-fishing activity to better inform the management of settings (on-site measurements of conductivity were between 94µs and 230µs across all sites to prevent damage to fish captured. The optimised settings used during the survey are discussed below relative to salmonids, lamprey & European eel.

*Salmonids*

Salmonids typically require a higher frequency than lamprey ammocoetes and, as such, the frequency was set at 40-50Hz frequency, with a voltage of 200-230V, pulse duration of 4ms and a duty cycle of 18% (site

dependant). These settings were utilised to draw fish to the anode without causing physical damage. Electro-fishing was conducted in an upstream direction for a standard 5-minute CPUE after Crozier & Kennedy (1994) and O' Connor & Kennedy (2002).

*Lamprey Species & European Eel*

Electro-fishing for lamprey ammocoetes was conducted using targeted box quadrat-based electro-fishing (as per Harvey & Cowx, 2003) in areas of sand/silt, where encountered. 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 surface, approx. 10–15cm above the sediment, to prevent immobilising lamprey ammocoetes within the sediment. The anode was then 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. All ammocoetes were then transferred to a container with oxygenated river water, identified to species level where possible through external pigmentation patterns, physical cues and trunk myomere counts (following Potter & Osborne (1975) and Gardiner, 2003), measured (to nearest 0.1cm) and released *in situ* following a suitable recovery period. Where encountered, European eel and all other fish species were also measured to the nearest 0.1cm and released at the site of capture. All fish species were transferred to a container with oxygenated river water following capture and anaesthetised in a 30mg/L clove oil solution for identification and meristic measurement purposes.

Length frequency graphs and species composition graphs with numbers of fish captured at each of the 13 sites are presented in the results, **Section 8.3.7**.

**Fisheries Habitat Survey**

*Salmonids*

Fisheries habitat quality for salmonids was assessed using the Life Cycle Unit method (Kennedy, 1984; O'Connor & Kennedy, 2002) to map the n=25 riverine sites as nursery, spawning and holding habitat, by assigning quality scores to each type of habitat, refer to **Table 8-5**. Those habitats with poor quality substrata, shallow depth and a poorly defined river profile receive a higher score. Higher scores in the Life Cycle Unit method of fisheries quantification are representative of poorer value, with lower scores being more optimal despite this appearing counter-intuitive.

**Table 8-5: Life Cycle Unit scoring system for salmonid nursery, spawning and holding habitat value (as per Kennedy, 1984 & O'Connor & Kennedy, 2002)**

| Habitat quality | Habitat score | Total score (three components) |
|---|---|---|
| Poor | 4 | 12 |
| Moderate | 3 | 9-11 |
| Good | 2 | 6-8 |
| Excellent | 1 | 3-5 |

*Lamprey*

Lamprey habitat evaluation for each survey site was undertaken using the Lamprey Habitat Quality Index (LHQI) scoring system, as devised by Macklin et al. (2018), refer to **Table 8-6**. The LHQI broadly follows a similar rationale as the Life Cycle Unit score for salmonids. Those habitats with a lack of soft, largely organic sediment areas for ammocoete burrowing, shallow sediment depth (<10cm) or compacted sediment nature receive a higher score. Higher scores in this index are thus of poorer value (in a similar fashion to the salmonid Life Cycle Unit Index), with lower scores being more optimal. Overall scores are calculated as a simple function of the sum of individual habitat scores.

Larval lamprey habitat quality as well as the suitability of adult spawning habitat is assessed based on the information provided in Maitland (2003) and other relevant literature (e.g. Gardiner, 2003). Unlike the

salmonid Life Cycle Unit index, holding habitat for adult lamprey is not assessed owing to their different migratory and life history strategies, and that electro-fishing surveys routinely only sample larval lamprey.
The LHQI scoring system provides additional information compared to the habitat classification based on the observations of Applegate (1950) and Slade et al. (2003), which deals specifically with larval (sea) lamprey settlement habitat. Under this scheme, habitat is classified into three different types: preferred (Type 1), acceptable (Type 2), and not acceptable for larvae (Type 3) (Slade et al. 2003). Type 1 habitat is characterized by soft substrate materials usually consisting of a mixture of sand and fine organic matter, often with some cover over the top such as detritus or twigs in areas of deposition. Type 2 habitat is characterized by substrates consisting of shifting sand with little if any organic matter and may also contain some gravel and cobble (lamprey may be present but at much lower densities than Type 1). Type 3 habitat consists of materials too hard for larvae to burrow including bedrock and highly compacted sediment. This classification can also be broadly applied to other lamprey species ammocoetes, including Lampetra species.

**Table 8-6: Lamprey Habitat Quality Index (LHQI) scoring system for lamprey spawning and nursery habitat value (Macklin et al., 2018).**

| Habitat quality | Habitat score | Total score (two components) |
|---|---|---|
| Poor | 4 | 8 |
| Moderate | 3 | 6-7 |
| Good | 2 | 3-5 |
| Excellent | 1 | 2 |

*General fisheries habitat*

A broad appraisal / overview of the upstream and downstream habitat at each site was also undertaken to evaluate the wider contribution to salmonid and lamprey spawning and general fisheries habitat. River habitat surveys and fisheries assessments were also carried out utilising elements of the approaches in the River Habitat Survey Methodology (Environment Agency, 2003) and Fishery Assessment Methodology (O'Grady, 2006) to broadly characterise the river sites (i.e. channel profiles, substrata etc.).

**Freshwater Pearl Mussel Survey**

The Freshwater Pearl Mussel (FPM) is known to occur within the River Blackwater (Munster) main channel and tributaries of the catchment (River Allow and River Lickey), and although no records are identified in the River Bride sub-catchment this watercourse was surveyed, in addition to a number of the larger tributaries of the Blackwater which are hydrologically connected to the CGEP and CGEP Grid Connection Route. The FPM surveys were completed under licence from NPWS on 24th March 2018 and again in September 2020. Methods utilised standard instream observational survey methods using bathyscopes, following NPWS guidance (Anon, 2004). The following FPM survey methods were taken into account:

- Anon (2004). *Margaritifera margaritifera*. Stage 1 and Stage 2 survey guidelines. Irish Wildlife Manuals, No. 12. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
- NS2 (2009). Monitoring Methods Report: Freshwater Pearl Mussel Sub-basin Plans. North South 2 Project. Department of Environment, Heritage and Local Government, Ireland.

The locations surveyed for Freshwater Pearl Mussel are presented in **Figure 8.138**.

**Aquatic Macroinvertebrate Community Survey**

To evaluate biological water quality (**Table 8-7**) across the survey area, Q-sampling was carried out at n=12 riverine sites, namely sites A6 (Monparson River), B3 (Coom River), B4 (Toor River), B7 (River Bride), B8 (Lyravarrig Stream), B10 (Inchinagah River), B11 (River Bride), B13 (unnamed stream), B15 (River Bride), C1 (Slumberhill Stream), D1 (Shanowen Trib 1 Stream) and D2 (Farran North Stream) (Figure 2.1, Table 2.1).
Macro-invertebrate samples were converted to Q-ratings as per Toner et al. (2005). All riverine samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a two-minute sample, as per ISO standards for water quality sampling (ISO 10870:2012). Large cobble was also washed at each site where present and samples were elutriated and fixed in 70% ethanol for

subsequent laboratory identification. Any rare invertebrate species were identified from the NPWS Red List publications for beetles (Foster et al., 2009), mayflies (Kelly-Quinn & Regan, 2012) and other relevant taxa (i.e. Feeney et al., 2020; Byrne et al., 2009; Nelson et al., 2011).

**Table 8-7: Reference Categories for EPA Q-Ratings (Q1 to Q5)**

| 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 | Moderately polluted | Unsatisfactory |
| Q2, Q1-2 or Q1 | Bad | Seriously polluted | Unsatisfactory |

The evaluation of 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).

**Biosecurity**

All equipment and PPE used was disinfected with Virkon® prior to and post-survey completion at each of the sites, and best practice precautions were employed to prevent the potential spread of invasive species and water-borne pathogens, according to standard Inland Fisheries Ireland (IFI) biosecurity protocols.

During 2017 outbreaks of crayfish plague (*Aphanomyces astaci*), a disease spread by water-borne spores, had been recorded in the Rivers Suir, Barrow, Lorrha and (Limerick) Deel. As such biosecurity is extremely important when working in water as keystone invertebrate species such as White-clawed crayfish (*Austropotamobious pallipes*) can be eradicated from river systems by its introduction.

#### 8.2.3.7.2 Turbine Delivery Route

The requirement for Aquatic Ecology surveys were scoped out in respect of Turbine Delivery due to the absence of pathways for impacts on waterbodies as identified during surveys of the TDR nodes.

### 8.2.1 Evaluation Criteria for Ecological Assessment

**Table 8-8** below outlines the Guidance from which biodiversity receptor/resource (except avian (bird)) evaluations have been derived.

**Table 8-8 Outlines the Guidance from which receptor/resource evaluations (excluding birds and Aquatic Ecology) have been derived.**

| Resource Evaluation | NRA Criteria |
|---|---|
| International Importance | 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.<br><br>Proposed Special Protection Area (SPA). Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). Features essential to maintaining the coherence of the Natura 2000 Network.<br><br>Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.<br><br>Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.<br><br>Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).<br><br>Biosphere Reserve (UNESCO Man & The Biosphere Programme). Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).<br><br>Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).<br><br>Biogenetic Reserve under the Council of Europe. European Diploma Site under the Council of Europe.<br><br>Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988). |
| National Importance | Site designated or proposed as a Natural Heritage Area (NHA).<br><br>Statutory Nature Reserve.<br><br>Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA);<br><br>Statutory Nature Reserve;<br><br>Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.<br><br>Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive. |
| County Importance | Area of Special Amenity. |

| Resource Evaluation | NRA Criteria |
|---|---|
| | Area subject to a Tree Preservation Order.<br><br>Area of High Amenity, or equivalent, designated under the County Development Plan.<br><br>Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list.<br><br>Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.<br><br>County important populations of species, viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared.<br><br>Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.<br><br>Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level. |
| Local Importance (Higher Value) | Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;<br><br>Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list.<br><br>Sites containing semi natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;<br><br>Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value. |
| Local Importance (Lower Value) | Sites containing small areas of semi natural habitat that are of some local importance for wildlife;<br><br>Sites or features containing non-native species that is of some importance in maintaining habitat links. |

Sites / features evaluated as Local Importance (Higher Value), County, National and International are identified as Important Ecological Features and a focus for assessment.

The evaluation of aquatic / fishery 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) i.e. table 8.4.

#### *8.2.1.1 Avifauna Receptor Evaluation*

**Table 8-9** below outlines the Guidance from which avian (bird) receptor/resource evaluations have been derived.

**Table 8-9: Bird Sensitivity Rating Equivalency (Percival 2007 and NRA 2009 Combined)**

| Sensitivity of Bird receptor | Percival 2007 criteria | NRA Resource Evaluation | NRA Criteria | Combined Criteria |
|---|---|---|---|---|
| **Very High** | Species is cited interest of SPA.<br>Species present in Internationally important numbers. | International Importance. | Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive | Species is cited interest of SPA.<br>Species present in Internationally important numbers.<br>Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive |
| **High** | Other non-cited species which contribute to integrity of SPA.<br>Ecologically sensitive species (<300 breeding pairs in UK) and less common birds of prey.<br>Species listed on Annex 1 of the EU bird's directive.<br>Regularly occurring relevant migratory species which are rare or vulnerable | National Importance | Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list | Other non-cited species which contribute to integrity of SPA<br>Ecologically sensitive species (<300 breeding pairs nationally) and less common birds of prey.<br>Species listed on Annex 1 of the EU bird's directive.<br>Regularly occurring relevant migratory species which are rare or vulnerable<br>Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list (in this case BOCCI Red list). |
| **Medium** | Species present in regionally important numbers (>1% of regional population).<br>Species occurring within SPA's but not crucial to the integrity of the site.<br>Species listed as priority species in the UK BAP subject to special conservation measures | County Importance | Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;<br>County important populations of species.<br>Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level. | Species present in regionally important numbers (>1% of regional population).<br>Species occurring within SPA's but not crucial to the integrity of the site.<br>Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;<br>County important populations of species.<br>Species that are rare or are undergoing a decline in quality or extent at a national level. |
| **Low** | Species covered above which are present very infrequently or in | Local Importance (High Value) | Locally important populations of priority species or habitats or natural heritage | Locally important populations of priority species identified in the Local BAP, if this has been prepared; |

| Sensitivity of Bird receptor | Percival 2007 criteria | NRA Resource Evaluation | NRA Criteria | Combined Criteria |
|---|---|---|---|---|
| | very low numbers. Any other species of conservation interest not covered above, e.g. species listed on the red or amber lists of the BoCCI. | | features identified in the Local BAP, if this has been prepared; Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. | Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Amber listed species. |
| **Negligible** | Species that remain common and widespread | Local Importance (Low Value) | n/a | Species that remain common and widespread Green Listed Species. |

#### *8.2.1.2 Fisheries and Aquatic Ecology*

##### 8.2.1.2.1 Fisheries Habitat Evaluation

A fisheries habitat appraisal of the watercourses in the footprint of the proposed Coom Green Energy Park and associated cable route was undertaken to establish their importance for salmonid, lamprey, European eel and other fish species. The baseline assessment considered the quality of spawning, nursery and holding habitat within the vicinity of the survey sites using Life Cycle Unit (salmonids) and Lamprey Habitat Quality Index scores (lamprey).

##### 8.2.1.2.2 Aquatic Habitat Evaluation

The physical morphology and chemical status of affected waterbodies are evaluated fully in the Water Chapter (Chapter 10), while the aquatic habitat value with regard to biodiversity receptors is evaluated with regard to its supporting function in relation to the conservation objectives as set out for the respective SAC sites, i.e. the Blackwater River (Cork/Waterford) SAC (NPWS, 2012) and also the WFD status and objectives as specified in the River Basin Management Plan (2018-2021) sub-catchment reporting for each respective waterbody / sub-catchment. Aquatic habitat is evaluated in terms of the EC Surface Water Regulations (2009) environmental quality standards for WFD status, as well as local biodiversity value for water-dependant receptors identified during the course of this assessment.

##### 8.2.1.2.3 Freshwater Pearl Mussel Evaluation

Freshwater pearl mussel habitat is evaluated following the requirements of the S.I. No. 355/2018 - European Union Environmental Objectives (Freshwater Pearl Mussel) (Amendment) Regulations 2018 and following the assessment criteria published in the Munster Blackwater Sub-basin Management Plan (NS2, 2010) and the Conservation Objectives prescribed for this species within the Blackwater River (Cork/Waterford) SAC (NPWS, 2012).

##### 8.2.1.2.4 Aquatic Macroinvertebrate Community Evaluation

The aquatic macroinvertebrate community was evaluated following the EPA standard Q-value assessment (Toner, 2005) with scores attributed according to this biotic index. Additional evaluation scores were

attributed to smaller watercourses following the updated Small Stream Risk Score (SSRS) methodology (Walsh, 2005; EPA, 2018) as appropriate.

### 8.2.2 Assessing Impact Significance

#### *8.2.2.1 Determining magnitude of Effect to Birds (Percival 2007)*

**Table 8-10 below outlines** the definition of terms in respect of magnitude for avian receptor evaluations. This rating system has also been used as a general guide for magnitude quantification throughout.

**Table 8-10 Definition of Terms relating to Magnitude (Percival 2007)**

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

#### *8.2.2.2 Determining Risk of Effect to Birds (Percival 2007)*

**Table 8-11** below outlines probability rating definitions used to inform avian receptor impact appraisal.

**Table 8-11 Significance Matrix for high probability impacts (Percival 2007 with equivalent EPA Significance Ratings).**

| Probability | Description | Comments |
|---|---|---|
| **High** | Impact is likely to occur (>50% likelihood) | Species known to be vulnerable to specific impact |
| **Medium** | Impact may occur (5-50% likelihood) | Species may be affected by specific impact |
| **Low** | Impact is very unlikely (<5% likelihood) | Species known to be tolerant to specific impact |

#### *8.2.2.3 EPA EIAR Guidance Definitions of Effects*

**Tables 8-12 to 8-17** outline the EPA evaluation criteria utilised in this appraisal of the Environmental Factor, Biodiversity. These criteria are included in the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, August 2017)

**Table 8-12 Probability of Effects (EPA, August 2017)**

| Likely Effects | Unlikely Effects |
|---|---|
| The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented. | The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented. |

**Table 8-13 Quality of Effects (EPA, August 2017)**

| Quality of Effect | Description |
|---|---|
| Positive Effect | A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or removing nuisances or improving amenities) |
| Neutral Effect | No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error. |
| Negative/Adverse Effect | A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance). |

**Table 8-14 Significance of Effects (EPA, August 2017)**

| Significance of Effect | Description |
|---|---|
| Imperceptible | An effect capable of measurement but without significant consequences |
| Not Significant | An effect which causes noticeable changes in the character of the environment but without significant consequences |
| Slight | An effect which causes noticeable changes in the character of the environment without affecting its sensitivities |
| Moderate | An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends |
| Significant | An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment |
| Very Significant | An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment |
| Profound | An effect which obliterates sensitive characteristics |

**Table 8-15 Duration of Effects (EPA, August 2017)**

| Duration of Effect | Description |
|---|---|
| Momentary Effects | Effects lasting from seconds to minutes |
| Brief Effects | Effects lasting less than a day |
| Temporary Effects | Effects lasting less than a year |
| Short-term Effects | Effects lasting one to seven years |
| Medium-term Effects | Effects lasting seven to fifteen years |

| | |
|---|---|
| Long-term Effects | Effects lasting fifteen to sixty years |
| Permanent Effects | Effects lasting over sixty years |

**Table 8-16 Types of Effects (EPA, August 2017)**

| Type of Effect | Description |
|---|---|
| Effect/Impact | A change resulting from the implementation of a project |
| Likely Effects | The effects that are specifically predicted to take place – based on an understanding of the interaction of the proposed project and the receiving environment. |
| Indirect Effects (a.k.a. secondary effects) | Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway |
| Cumulative Effects | The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects. |
| 'Do Nothing' Effects | The environment as it would be in the future should the subject project not be carried out. |
| 'Worst Case' Effects | The effects arising from a project in the case where mitigation measures substantially fail |
| Indeterminable Effects | When the full consequences of a change in the environment cannot be described. |
| Irreversible Effects | When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost. |
| Reversible Effects | Effects that can be undone, for example through remediation or restoration |
| Residual Effects | The degree of environmental change that will occur after the proposed mitigation measures have taken effect |
| Synergistic Effects | Where the resultant effect is of greater significance than the sum of its constituents (e.g. combination of SOx and NOx to produce smog). |

**Table 8-17 Definition of Terms – Source, Pathway, Receptor (EPA, August 2017)**

| Term | Description |
|---|---|
| Source | The activity or place from which an effect originates |
| Pathway | The route by which an effect is conveyed between a source and a receptor. |
| Receptor | Any element in the environment which is subject to impacts |
| Effect/Impact | A change resulting from the implementation of a project |

### 8.2.3 Constraints and Limitations

#### *8.2.3.1 Bat Surveys*

Surveys were undertaken using a range of best practice techniques and covered the peak period of bat activity (typically May to September). This is considered to provide a robust dataset on which to base the impact assessment. However, some minor issues were noted during fieldwork, which are discussed below:

- The transect survey in May 2016 covered the southern portion of the CGEP site, as the extent of CGEP had not been fully determined at that stage. As this only occurred on one occasion, it is not thought to have negatively affected the dataset.
- The coverage of transect surveys varied slightly from month to month. This was to ensure that surveys started in different locations in each month, which required surveyors to use slightly different routes on each occasion. This is not thought to be a significant limitation, because transect surveys provide a simple temporal and spatial comparison of bat activity, and are not used for detailed analysis.

- Due to a shortage of automated detectors in September 2019, sampling point T19 was surveyed using a Song Meter SM2 detector (Anabat Express detectors were used for all other automated surveys), and sampling point T23 was surveyed ten days later than other sampling points. The Song Meter data was not in a format that could be used for the data analysis in Section 4, so it was omitted from the assessment. However, this only represented a small proportion of the dataset, so it is not considered a significant limitation.
- In September 2019, and to a lesser extent August 2019, a significant number of 'noise' files were recorded on some of the automated detectors, which were from the movement of nearby conifer trees during periods of high wind. It is possible that this background noise 'drowned out' some bat calls, although this is considered unlikely, because bat activity is often suppressed during periods of high wind.
- No surveys were carried out in April. This is because the spring season for automated detector surveys includes both April and May; given bat activity levels are usually higher in May, it is a greater priority for survey.

With the exception of these minor limitations, all other data presented in this report in respect of bats is considered to be robust, and of sufficient breadth and detail to support a comprehensive impact assessment.

At present there is not a standard system in Ireland to categorise bat activity as low, moderate or high, because activity levels vary depending on the species involved and the location of a site. In some parts of the British Isles the Ecobat tool (managed by the Mammal Society, Lintott *et al.*, 2018) can be used to contextualise bat activity levels relative to other data collected in the region, and to identify activity categories using percentiles. However, such analyses are only reliable if sufficient data has been input to the Ecobat database to provide a reasonable sample size for analysis (Lintott et al 2017).

Data from the 2019 automated detector surveys were analysed using the Ecobat tool, using a reference range of 200 km (this covers the southern half of Ireland) and a temporal range of +/- 30 days. The reference ranges (the sample size of comparable data) were 139 data points for Leisler's bat, 281 for common pipistrelles, 290 for Myotis bats and 297 for soprano pipistrelles. The following is noted in Lintott *et al.,* 2017 "*we recommend that a reference range dataset is comprised of 200 nights of bat surveying*"; on this basis we conclude that there is insufficient data for comparative analyses of Leisler's bat activity, but sufficient data for other species.

Upon review of the Ecobat percentile data output, some of the results were considered to be of questionable value. For example, nights with 4 – 6 bat passes were categorised as having 'moderate activity', even though this represented an average of less than one bat pass per hour. Similarly, nights with 15 or more bat passes were categorised as 'high activity', even though this represented an average of one bat pass every 30 – 40 minutes. This is also significantly lower than the threshold of 50 passes per night used to categorise nights as 'high activity' in Mathews *et al.,* 2016. Therefore, we do not consider the Ecobat data to be of use for the purposes of this impact assessment, probably because there is not currently a large enough dataset in the Republic of Ireland to provide reliable results. Data from Britain cannot be applied to Ireland, due to differences in the relative abundances of some species, notably Leisler's bat.

Therefore, for the purposes of this report we use a bespoke system to discuss and compare levels of bat activity at the Site. This system is based on the professional judgement, and the results of peer reviewed research (Mathews *et al.,* 2016). For ease of comparison, bat activity levels are classified into four categories based on a simple count of bat passes in any night, and cells are coloured using shades of blue. For the purposes of this assessment, any species that regularly has more than 50 bat passes per night (i.e. moderate to high activity) is considered to have a significant level of activity, which would warrant further consideration in an impact assessment. This corresponds with the threshold of 50 passes per night that was used in the Mathews *et al*., 2016 report.

## 8.3 DESCRIPTION OF EXISTING ENVIRONMENT

### 8.3.1 Designated Nature Conservation Sites

#### *8.3.1.1 Study Area*

The study area for European Sites in relation to the CGEP project is described in **Table 8-18.**

**Table 8-18 Study area for European Sites in relation to the CGEP project**

| Study Area for European Sites | Justification for Study Area Extents |
|---|---|
| 1. 15km from the development boundary, Grid Connection, Turbine Delivery Route and Replant Lands in respect of European Sites.<br>2. European Sites greater than 15km from the development boundary, Grid Connection Turbine Delivery Route and Replant Lands which have hydrological connectivity to the proposed CGEP development. | 1. An evaluation distance of 15km is currently recommended in the case of projects (DoEHLG, 2009).<br>2. Professional Judgement |

#### *8.3.1.2 Sites of International Importance*

European sites such as Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSACs), and Special Protection Areas (SPAs) designated within the Natura 2000 network and which occur within 15km of the whole project (CGEP plus Grid Connection and Turbine Delivery Route) are herein considered. Consideration is also given to sites greater than 15km form the CGEP and Grid Connection Route, which are connected via hydrological pathways.

The EU Habitats Directive (92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora formed a basis for the designation of Special Areas of Conservation (SACs). Similarly, Special Protection Areas are legislated for under the Birds Directive (Council Directive 79/409/EEC on the Conservation of Wild Birds). Collectively SACs and SPAs are referred to as Natura 2000 sites, or 'European' sites. In general terms, they are considered to be of exceptional importance in terms of rare, endangered or vulnerable habitats and species within the European Community.

The location of European Sites relative to the CGEP, GCR, TDR and replant lands is detailed below in **Table 8-19** to **8-20** inclusive, along with distance to the nearest point of the project, development boundary, or works location, where pertinent. A map showing the location of European Sites within 15km of the CGEP and CGEP Grid Connection Route is presented in **Figure 8.7**. Further detail on European Sites is provided in **Appendix 8-E**.

**Table 8-19 European Designated Sites (SAC and SPA) sites within 15km of CGEP and Grid Connection Route**

| Site | Code | Features of Interest | Summary Description | Distance (CGEP development boundary or GCR nearest works location) |
|---|---|---|---|---|
| Blackwater Callows SPA | 004094 | Whooper Swan (*Cygnus cygnus*)<br>Wigeon (*Anas Penelope*)<br>Teal (*Anas crecca*)<br>Black-tailed Godwit (*Limosa limosa*)<br>Wetland and Waterbirds | Contains a stretch of the River Blackwater, running west to east for a 25km distance between Fermoy, Co. Cork and Lismore, Co. Waterford. Site is comprised of the river channel and a flood plain containing areas of seasonally-flooded grassland. | 4.17km |
| Blackwater River (Cork/Waterford) SAC | 002170 | Estuaries, Mudflats, Sandflats, Perennial vegetation of stony banks, Atlantic salt meadows, Mediterranean salt meadows, Freshwater Pearl Mussel (*Margaritifera margaritifera*), Salmon (*Salmo salar*), Otter (*Lutra lutra*), Killarney Fern (*Trichomanes speciosum*) | One of Ireland's largest rivers, the River Blackwater drains a major part of Co. Cork and five mountain ranges. The river's surrounding peaty terrain give it a distinctively dark appearance. The river is surrounded by areas of hollows, wetlands, species-rich wet grasslands and woodlands. | 0.6km |
| Cork Harbour SPA | 004030 | Little Grebe (*Tachybaptus ruficollis*) [A004]<br>Great Crested Grebe (*Podiceps cristatus*) [A005]<br>Cormorant (*Phalacrocorax carbo*) [A017]<br>Grey Heron (*Ardea cinerea*) [A028]<br>Shelduck (*Tadorna tadorna*) [A048]<br>Wigeon (*Anas penelope*) [A050]<br>Teal (*Anas crecca*) [A052]<br>Pintail (*Anas acuta*) [A054]<br>Shoveler (*Anas clypeata*) [A056]<br>Red-breasted Merganser (*Mergus serrator*) [A069]<br>Oystercatcher (*Haematopus ostralegus*) [A130] | The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Great Crested Grebe,<br>Cormorant, Grey Heron, Shelduck, Wigeon, Teal, Mallard, Pintail, Shoveler, Redbreasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Blackheaded Gull, Common Gull, Lesser Black-backed Gull and Common Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds. | 19.2km |

| Site | Code | Features of Interest | Summary Description | Distance (CGEP development boundary or GCR nearest works location) |
|---|---|---|---|---|
| | | Golden Plover (*Pluvialis apricaria*) [A140]<br>Grey Plover (*Pluvialis squatarola*) [A141]<br>Lapwing (*Vanellus vanellus*) [A142]<br>Dunlin (*Calidris alpina*) [A149]<br>Black-tailed Godwit (*Limosa limosa*) [A156]<br>Bar-tailed Godwit (*Limosa lapponica*) [A157]<br>Curlew (*Numenius arquata*) [A160]<br>Redshank (*Tringa totanus*) [A162]<br>Black-headed Gull (*Chroicocephalus ridibundus*) [A179]<br>Common Gull (*Larus* canus) [A182]<br>Lesser Black-backed Gull (*Larus fuscus*) [A183]<br>Common Tern (*Sterna hirundo*) [A193]<br>Wetland and Waterbirds [A999] | | |
| Great Island Channel SAC | 001058 | Mudflats and sandflats not covered by seawater at low tide [1140]<br>Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] | The Great Island Channel stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest. | 20.4km |

**Table 8-20 European Designated Sites (SAC and SPA) sites within 15km of the Turbine Delivery Route**

| Site | Code | Features of Interest | Summary Description | Distance (nearest works or activity location) |
|---|---|---|---|---|
| Blackwater Callows SPA | 004094 | Whooper Swan (*Cygnus cygnus*)<br>Wigeon (*Anas Penelope*)<br>Teal (*Anas crecca*)<br>Black-tailed Godwit (*Limosa limosa*)<br>Wetland and Waterbirds | Contains a stretch of the River Blackwater, running west to east for a 25km distance between Fermoy, Co. Cork and Lismore, Co. Waterford. Site is comprised of the river channel and a flood plain containing areas of seasonally-flooded grassland. | within 15km of Nodes [2.0 - 2.14] (closest 1.3 km) |
| Blackwater River (Cork/Waterford) SAC | 002170 | Estuaries, Mudflats, Sandflats, Perennial vegetation of stony banks, Atlantic salt meadows, Mediterranean salt meadows, Freshwater Pearl Mussel (*Margaritifera margaritifera*), Salmon (*Salmo salar*), Otter (*Lutra lutra*), Killarney Fern (*Trichomanes speciosum*) | One of Ireland's largest rivers, the River Blackwater drains a major part of Co. Cork and five mountain ranges. The river's surrounding peaty terrain give it a distinctively dark appearance. The river is surrounded by areas of hollows, wetlands, species-rich wet grasslands and woodlands. | within 15km of [all] Nodes (closest 10m) |
| Cork Harbour SPA | 004030 | Little Grebe (*Tachybaptus ruficollis*) [A004]<br>Great Crested Grebe (*Podiceps cristatus*) [A005]<br>Cormorant (*Phalacrocorax carbo*) [A017]<br>Grey Heron (*Ardea cinerea*) [A028]<br>Shelduck (*Tadorna tadorna*) [A048]<br>Wigeon (*Anas penelope*) [A050]<br>Teal (*Anas crecca*) [A052]<br>Pintail (*Anas acuta*) [A054]<br>Shoveler (*Anas clypeata*) [A056]<br>Red-breasted Merganser (*Mergus serrator*) [A069]<br>Oystercatcher (*Haematopus ostralegus*) [A130]<br>Golden Plover (*Pluvialis apricaria*) [A140] | The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Great Crested Grebe,<br>Cormorant, Grey Heron, Shelduck, Wigeon, Teal, Mallard, Pintail, Shoveler, Redbreasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Blackheaded Gull, Common Gull, Lesser Black-backed Gull and Common Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds. | Within 15km of Nodes [1.3 & 1.4] (closest 1.6 km) |

| Site | Code | Features of Interest | Summary Description | Distance (nearest works or activity location) |
|---|---|---|---|---|
| | | Grey Plover (*Pluvialis squatarola*) [A141]<br>Lapwing (*Vanellus vanellus*) [A142]<br>Dunlin (*Calidris alpina*) [A149]<br>Black-tailed Godwit (*Limosa limosa*) [A156]<br>Bar-tailed Godwit (*Limosa lapponica*) [A157]<br>Curlew (*Numenius arquata*) [A160]<br>Redshank (*Tringa totanus*) [A162]<br>Black-headed Gull (*Chroicocephalus ridibundus*) [A179]<br>Common Gull (*Larus* canus) [A182]<br>Lesser Black-backed Gull (*Larus fuscus*) [A183]<br>Common Tern (*Sterna hirundo*) [A193]<br>Wetland and Waterbirds [A999] | | |
| Great Island Channel SAC | 001058 | Mudflats and sandflats not covered by seawater at low tide [1140]<br>Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] | The Great Island Channel stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest. | within 15km of Nodes [1.3 & 1.4] (closest 5.6 km) |
| Lower River Suir SAC | 002137 | Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]<br>Mediterranean salt meadows (*Juncetalia maritimi*) [1410]<br>Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]<br>Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] | The Lower River Suir contains excellent examples of a number of Annex I habitats, including the priority habitats alluvial forest and Yew woodland. The site also supports populations of several important animals species, some listed on Annex II of the Habitats Directive or listed in the Irish Red Data Book. The presence of two legally protected plants (Flora (Protection) Order, 1999) and the ornithological importance of the site adds further to the ecological interest and importance. | within 15km of Node [2.0] (14 km) |

| Site | Code | Features of Interest | Summary Description | Distance (nearest works or activity location) |
|---|---|---|---|---|
| | | Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]<br>Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae*, *Salicion albae*) [91E0]<br>*Taxus baccata* woods of the British Isles [91J0]<br>*Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029]<br>*Austropotamobius pallipes* (White-clawed Crayfish) [1092]<br>*Petromyzon marinus* (Sea Lamprey) [1095]<br>*Lampetra planeri* (Brook Lamprey) [1096]<br>*Lampetra fluviatilis* (River Lamprey) [1099]<br>*Alosa fallax fallax* (Twaite Shad) [1103]<br>*Salmo salar* (Salmon) [1106]<br>*Lutra lutra* (Otter) [1355] | | |

#### *8.3.1.3 Sites of National Importance*

The study area for National Sites in relation to the CGEP and Grid Connection Route (GCR) is described in **Table 8-21** below and Illustrated in **Figure 8.8**.

**Table 8-21 Study area for National Sites in relation to the CGEP and Grid Connection Route (GCR).**

| Study Area for European Sites | Justification for Study Area Extents |
|---|---|
| 15km from the CGEP, Grid Connection Route, Turbine Delivery Route and Replant Lands in respect of National Sites. | 1. An evaluation distance of 15km is currently recommended in the case of projects (DoEHLG, 2009).<br>2. Professional Judgement |

Natural Heritage Areas (NHA) are sites of national importance[17] for nature conservation established under the Wildlife (Amendment) Act, 2000, and protected under the Wildlife Acts, 1976-2018, or through planning legislation.

Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation. Prior to statutory designation, pNHA's are subject to limited protection including but not limited to, Agri-environmental schemes, Forest Service requirements (in respect of the approval of lands for forestry) and due recognition by Planning and Licensing Authorities.

The location of National Sites is included in **Table 8-22** to **Table 8-23**, below, in respect of CGEP, Grid Connection and Turbine Delivery Route (TDR) along with distance to the nearest point of the development boundary or works or activity location, where pertinent. All sites are pNHA's as no NHA's are present within 15km.

**Table 8-22 pNHA's within 15km of CGEP and Grid Connection Route.**

| SITECODE | SITE_NAME | Distance km (development boundary or nearest works or activity location) |
|---|---|---|
| 000079 | Bride/Bunaglanna Valley | 1.25 |
| 001797 | Blackwater Valley (The Beech Wood) | 2.30 |
| 001796 | Blackwater Valley (Cregg) | 3.04 |
| 000073 | Blackwater River Callows | 3.38 |
| 001795 | Blackwater Valley (Killathy Wood) | 3.50 |
| 002050 | Cregg Castle | 3.53 |
| 001080 | Blackwater Valley (Killavullen) | 4.59 |
| 001794 | Blackwater Valley (Kilcummer) | 4.67 |
| 002097 | Convamore, Ballyhooly (Near Fermoy) | 4.77 |
| 001793 | Blackwater Valley (Ballincurrig Wood) | 4.83 |
| 001561 | Awbeg Valley (Castletownroche) | 6.17 |
| 001029 | Araglin Valley | 7.81 |
| 000073 | Blackwater River Callows | 7.99 |
| 000085 | Glanworth Ponds | 9.49 |
| 001829 | Ballinaltig Beg Pond | 10.02 |
| 001169 | Brown's Farm, Togher Cross Roads | 10.69 |
| 000074 | Awbeg Valley (Below Doneraile) | 11.17 |
| 000899 | Ballindangan Marsh | 13.99 |

[17] Cited from "Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs Contribution and Observations to National Planning Framework - Ireland 2040, Our Plan Consultation Issues Paper & SEA Scoping Document" available online at http://npf.ie/wp-content/uploads/2017/09/0633-Department-of-Arts-Heritage-Regional-Rural-and-Gaeltacht-Affairs.compressed.pdf

| SITECODE | SITE_NAME | Distance km (development boundary or nearest works or activity location) |
|---|---|---|
| 000075 | Awbeg Valley (Above Doneraile) | 14.29 |
| 001799 | Ardamadane Wood | 9.66 |
| 001857 | Blarney Bog | 12.10 |
| 000103 | Shournagh Valley | 11.37 |
| 001039 | Blarney Castle Woods | 12.37 |
| 001798 | Blarney Lake | 12.91 |

**Table 8-23 pNHA's and NHA's within 15km of the Turbine Delivery Route.**

| SITE CODE | SITE NAME | FEATURE OF INTEREST |
|---|---|---|
| 000073 | Blackwater River Callows | No information available |
| 000074 | Awbeg Valley (Below Doneraile) | The site is of interest because the limestone substrate gives rise to plant communities that are unusual in the south-west.<br>Along this section of the river, below Doneraile, dry broad-leaved woodlands dominate the valley sides, although there are a few patches of conifers. Within the Awbeg Valley as a whole, two local plants associated with the woods are Toothwort (*Lathraea sqaumaria*) and Ivy Broomrape (*Orobanche hederae*). At the edges of the valley thin soils over limestone support an interesting community, including herbs such as Marjorum (*Origanum vulgare*) and common Calamint (*Calamentha sylvatica* subsp. *ascendens*), along with several grasses (*Koeleria cristata, Trisetum flavescens* and *Aira caryophylea*).<br>The recent NHA survey recorded abundant frogspawn within a marshy field. |
| 000079 | Bride/Bunaglanna Valley | The major features of interest in the site are firstly, the diverse range of comparatively intact habitat type present and, secondly, the microfungi community, some of which have not been recorded elsewhere. Deciduous woodland is a scarce habitat in Ireland. |
| 000085 | Glanworth Ponds | The Glanworth Ponds are new records for the occurrence of the Golden Dock in East Cork. Golden Dock is a Red Data Book species where occurrence is apparently declining because often its appearance in a place is only fleeting; it depends on low water levels to provide the right conditions and stimulus for seed germination. This site contains healthy and viable populations of the Golden Dock, as well as, a good species diversity of other aquatic and wetland plants and should therefore be considered for conservation and NHA status. |
| 000094 | Lee Valley | Wet broadleaved woodland has developed in a number of places on the river side. Some areas behind the riverbank are frequently flooded and support wet grassland communities. Dry broadleaved woodland exists in other sections of the valley, with the ground flora of many of these woods is relatively species-rich. Unimproved dry grassland occurs on an area of soil that has probable glacial origins. Freshwater marsh fringes the river itself in places. A number of wetland bird species |

| SITE CODE | SITE NAME | FEATURE OF INTEREST |
|---|---|---|
| | | breed here, including Mallard, Heron, Sedge and Grasshopper Warblers and Reed Bunting and two rather locally distributed butterflies, the Small Blue and the Wood White occur. |
| 000103 | Shournagh Valley | The woods along the Shournagh Valley included in this site (103) are recommended for conservation and are noted to be of regional importance and deserving of NHA status. |
| 001029 | Araglin Valley | The Araglin Valley is of regional importance because of its high diversity of species and ecological interest. The area is predominantly underlain by sandstone, with limestone occurring in the lower reaches near Fermoy. These two contrasting rocky types bring with them differences in the soils and a wide diversity of plant and animal communities. |
| 001046 | Douglas River Estuary | The prime importance of this site is its birdlife and it ranks as the second most important area in Cork Harbour (l99l-92). It is a valuable area and high tide roost for waterfowl; a typical count, provided by the l986 An Foras Forbartha County Report, is as follows (average and peak winter counts given):- Teal (48; l8l), Wigeon (l6l; 550), Shelduck (l68; 577), Red-breasted Merganser (80; l20), Oystercatcher (3l4; l,l00), Lapwing (948; 5,485), Golden Plover (l,l48; 3,400), Curlew (236; 675), Black-tailed Goduit (220;48l), Bar-tailed Goduit (220; 474), Redshank (l97; 400) and Dunlin (684; 2,543). This gives totals of 4l2 (l,074) wildfowl and 3,563 (37,355) waders.<br>Based on the above figures, four species occur in nationally important numbers, namely: Shelduck, Red-breasted Merganser, Golden Plover and Black-tailed Goduit. However, the bird populations tend to be mobile and this site must be considered an essential part of Cork Harbour which is of international importance for waterfowl. |
| 001054 | Glanmire Wood | The main habitat of interest is mixed broad-leaved woodlands dominated by oak (*Quercus* sp.), beech (*Fagus sylvatica*) and sycamore (*Acer pseudoplatanus*) with a few conifers, especially Silver Fir (*Abies alba*). The ground flora is particularly rich and includes two grasses, wood fescue (*Festuca altissima*) and wood millet (*Milium effusum*), which are thought to indicate ancient woodland. More commonly occurring species include Primrose (*Primula vulgaris*), violets (*Viola riviniana*, *V.reichen/bachiana*), wood anemone (*Anemone nemorosa*) and Lords-and-ladies (*Arum maculatum*).<br>The tidal river below the wood adds to the diversity of the site with patches of saltmarsh. |
| 001058 | Great Island Channel | No information available |
| 001074 | Rockfarm Quarry, Little Island | The area is of considerable interest botanically because of its species diversity and the presence of 'varieties' for the region, such as the dense-flowered orchid and the Portland spurge. |
| 001080 | Blackwater Valley (Killavullen) | 10 Areas of Scientific Interest occur along its length. This site is situated just downstream (east) of Killavuller Village within an area of limestone. Large prominent outcrops of limestone and caves can be seen along this section. Other habitats included within this site are broad leaved dry woodland and scrub. |

| SITE CODE | SITE NAME | FEATURE OF INTEREST |
|---|---|---|
| 001081 | Cork Lough | In 1972 An Foras Forbartha noted it as an important place to observe wildfowl and gulls due to its close proximity to a large human population. It appears, however, that high numbers of birds, attracted by bread-feeding, are causing severe eutrophication which is in need of remedial action. Also, exotic fish have been released over the years. In spite of these factors the lake regularly holds over 100 Mute Swans, a feral flock of over 30 Canada Geese and small numbers (usually under 50) of Mallard, Teal, Tufted Duck and Coot. An increasing flock of wintering Lesser Black-backed Gulls also occurs (460+ in Jaunuary 1995). |
| 001082 | Dunkettle Shore | The site is of value because is mudflats provide an important feeding ground for waterfowl and it acts as a significant roost for birds in the upper harbour. Furthermore, it is an integral part of Cork harbour which is an internationally important wetland, regularly holding flocks of over 20,000 waterfowl. A Heronry occurs to the east of the site. |
| 001169 | Brown's Farm, Togher Cross Roads | It is a small site comprising 4 fields, at the intersection of three hedges in the middle, is a small area of exposed mud, whose vegetation is trampled and grazed. Here the Red Data Book species - Golden Dock (*Rumex maritimus*) is found in association with Nodding bur-marigold (*Bidens cernua*), Water starworts (*Callintiche species*) and Water-purslane (*Lythrum portula*). This is another new record for the Golden Dock in E. Cork found in a rare Plant Survey of the area in 1992/3.<br>Golden Dock is a Red Data Book species whose occurrence is apparently declining, ofter its appearance is only fleeting as it depends on low water levels to provide the right conditions and stimulus for seed germination. This site contains hundreds of immature plants and should be considered for conservation and NHA status to protect this rare plant, to monitor its growth and heath and to protect it in future years from threats such as field drainage. |
| 001561 | Awbeg Valley (Castletownroche) | The site is of interest because the limestone substrate gives rise to plant communities that are unusual in the south-west. |
| 001793 | Blackwater Valley (Ballincurrig Wood) | The Ballincurrig Wood site is recommended for inclusion in the Blackwater Valley NHA because the area supports the growth of a population of the very rare Starred Woodsedge. |
| 001794 | Blackwater Valley (Kilcummer) | Within the site there is wet woodland of Alder (*Alnus glutinosa*) and Willow (*Salix species*)<br>This woodland is one of a series of woodlands along the banks of the Blackwater river.<br>The valley sides support the growth of much woodland, but also of ecological interest are the marshes, the river itself and the associated limestone outcrops e.g. inland cliffs and craggs.<br>The river-side trees are Alders (*Alnus glutinosa*) and Willow (*Salix species*) including the Almond Willow (*Salix triandra*). The shallower river water and adjacent marshland are vegetated with Common Bulrush (*Scirpus lacustris* subsp. *lacustris*), Bur-reeds (*Sparganium* species) and Pondweeds (*Potamogeton* species). The flowering rush (*Butomus umbellatus*) grows locally in the water and Creeping Yellow-Cress (*Ronippa sylvestris*) on the river banks. |

| SITE CODE | SITE NAME | FEATURE OF INTEREST |
|---|---|---|
| | | The marshland is often colonized by Willow scrub and amongst the bushes Great Yellow-Cress (*Ronippa amphibia*), Lesser Pond-sedge (*Carex acutiformis*) and Wood Club-rush (*Scirpus sylvaticus*) occur with much Lady's smock (*Cardamine pratensis*), Meadowsweet (*Filipendula ulmaria*) and Hemp-agrimony (*Eupatorum cannabinum*). |
| 001795 | Blackwater Valley (Killathy Wood) | Killathy Wood is a small strip of mixed woodland c. 1km long, situated on the north bank of the River Blackwater. The dominant species in this woodland is Ash (*Fraximus excelsior*) with some Oak (*Quercus petraea*) and Scot's pine (*Pinus sylvestris*). Elm (*Ulmus species*) were present in the wood but many have been killed by Dutch Elm disease and felled for firewood. Sycamore (Acer pseudoptatanus) is also spreading through the wood; at the moment it is found mainly in the eastern half of the site, but it is seriously damaging the character of the wood. Other non-native species include a line of Spruce (*Picea species*) on the north-west edge of the wood. Cattle have access to shelter and graze in some parts of the wood from the adjacent fields. |
| 001796 | Blackwater Valley (Cregg) | It comprises dry deciduous woodland, lowland dry grassland, the river channel, scrub and mixed woodland. There is very little information on this site; the ranger notes the spread of Rhododendron and Cherry Laurel at the eastern edge of the wood. |
| 001797 | Blackwater Valley (The Beech Wood) | It comprises both wet and dry deciduous woodland, the dominant species are Oak (*Quercus petraea*) and Beech (*Fagus sylvatica*). There is a good ground flora and many woodland birds, the wood also provides cover and seclusion for otters and other mammals. |
| 001799 | Ardamadane Wood | This site comprises mainly dry deciduous woodland of Oak (*Quercus petraea*) and Birch (*Betula pubescens*) with some scrub woodland and improved agricultural grassland.<br>Ardamadare Woods consists of a patch of scrub with Hazel (*Corylus avellana*) and Ash and a linear Oak and Birch Wood stretching northwards along the R. Martin towards Waterloo (the river is also included in this site).<br>The flora of Ardamadare Wood is not as species-rich and includes species of more acid conditions such as Great Wood-rush (*Luzula sylvatica*). |
| 001829 | Ballinaltig Beg Pond | The Golden Dock was found on the south-western margin of the pond in association with species such as Marsh Foxtail (*Alopecunus gemiculatus*), Jointed Rush (*Juncus articulatus*), Nodding bur-marigold (*Bidens armia*), Water pepper (*Polygonum hydropyer*) and Brooklime (*Veronica beccabunga*). |
| 001857 | Blarney Bog | The main habitats of the area are lowland wet grassland, both grazed and ungrazed and freshwater marsh/fen. The dominant species of the wet grassland are Reed grass (Phalan's anundinacea), Soft Rush (*Juncus effusus*) and grasses such as Creeping Bent (Agrostis stolonifera), Tufted Hair-grass (*Deschampsia caespitosa*) and Yorkshore Fog (*Holcus lanatus*). Land to the west is generally wetter with herbs such as Greater Tussock-Sedge (*Carex paniculata*), Greater pond-sedge (*Carex riparia*) and Bladder-sedge (*C. vesicana*); commonly occurring herbs are Meadowsweet (*Filipondula almaria*) and Common |

| SITE CODE | SITE NAME | FEATURE OF INTEREST |
|---|---|---|
| | | Valenian (*Valeniana efficinalis*), locally distributed in the sward are Yellow Loosestrife (*Lysimachia vulgaris*) and Purple Loosestrife (*Lythrum salicana*). The land nearer the Blarney road is drier with a mixture of grasses and sedges, the ungrazed areas are more tussocky with herbs such as Common Sand (*Rumex acetosa*) and Tormentil (*Potentilla erecta*).<br>The area as a whole is used by a variety of bird species, birds noted to be breeding in the site include: the Sedge and Grasshopper Warblers, Reed Bunting, Stonechab, Meadow Pipet, Snipe and Mallard. In the water Snipe and Mallard are seen feeding in the area and also Teal. Hen Harriers, a species listed in Annex 1 of the EU Bird's Directive and also a Red Data Book species whose status is threatened in Ireland, are regularly seen in this area, hunting over the wetter ground and sometimes nesting in the reed beds. |
| 001979 | Monkstown Creek | The mudflats and tidal creeks are fringed by a small amount of saltmarsh vegetation while, above the limestone on the southern shore, two areas of semi-natural woodland occur. The latter contain Spindle (*Euonymus europaeus*) and a thick carpet of Bluebell (*Hyacintnoides non-scripta*) and Ramsons (*Allium ursinum*).<br>The area is of value because its mudflats provide an important feeding area for waterfowl and it is a natural part of Cork Harbour which, as a complete unit, is of international importance for waterfowl. |
| 002050 | Cregg Castle | This site is a nursery roost of the Daubenton's Bat (*Myotis daubentonii*). Approximately 100 bats hang from the ceiling of a domed ground floor room in Cregg Castle, approximately 3 miles east of Fermoy Town. This is a site of national importance because it is the second largest nursery colony of this species in the country. The owners are extremely well disposed towards the bats, this site is completely safe from any adverse human disturbance. The only threat facing this site is the deterioration of the castle roof.<br><br>This species is dependent on aquatic insects so the proximity of the extensive River Blackwater is of utmost importance to the colony. It is essential that pollution of this river system and its associated tributaries is prevented. |
| 002097 | Convamore, Ballyhooly (Near Fermoy) | This site is a male roost of the Daubenton's bat (*Myotis daubentonii*). Approximately 50 bats hang from the roof of the wine cellars in the ground floor of the ruined Convamore House, near Ballyhooley, Co. Cork. This is a site of national importance because it is the only known male roost of this species in the country. The only threat facing the bats at this site is disturbance from people exploring the ruins and the destruction of parts of the cellars walls by people removing bricks.<br><br>This bat species is dependent on aquatic insects so the proximity of the extensive River Blackwater is of utmost importance to the colony. It is essential that pollution of this river system and its associated tributaries is prevented. |

Further Information on NHA's or pNHA's within 15km of the TDR are provided in **Appendix 8 - F**.

#### *8.3.1.1 Sensitivities*

**European Sites**

European designated sites can be sensitive to hydrological changes to groundwater and surface water quality which may affect water dependant ecosystems. Within individual Designated Sites (both SAC's and SPA's), specific species may be sensitive to disturbance, displacement, habitat loss or accidental mortality, which could reduce their favourable conservation status. Designated sites are also sensitive to encroachment by invasive species.

**National Sites**

National Sites can be sensitive to hydrological changes to groundwater and surface water quality which may affect water dependant ecosystems. Within individual Sites, specific species or features of interest may be sensitive to disturbance and/or displacement, which could reduce their conservation status. Sites are also sensitive to encroachment by invasive species and habitat loss or degradation from human activities such as turf cutting.

#### *8.3.1.2 Receiving Environment*

##### 8.3.1.2.1 European Sites

**SPA Trends**

Trends in respect of taxa designated under the EU Birds Directive (SPA's) are reported to the EU under Article 12[18] of said directive. The most recently available trend information covers the period 2008-2012. Longer term trends in regard to wintering and breeding taxa across the SPA network are largely unknown[19].

The 2014 Report covers 196 bird species, including species which live in Ireland all year round and others which migrate here for summer or winter. It provides a picture of both short-term and long-term trends for some species, and similarly a view of the breeding range trends in some species. However, there is an absence of long-term data for some species. The report was required to provide information on trends rather than a conclusive assessment of status, as is the case in the Article 17 report. In summary, 58% of species populations were stable or increasing in the short term, while 27% were decreasing. However, looking at long term data (where available) 36% were stable or increasing, while 28% were decreasing[20].

**SAC Trends**

Reporting on trends with regard to protected habitats and species under the EU Habitats Directive is provided to the EU under Article 17 of said directive. The most recently available trend information in respect of individual habitats and species was published in 2019 (NPWS 2019a, NPWS 2019b, NPWS 2019c).

*Habitats*

Under Article 11 of the Directive, each member state is obliged to undertake surveillance of the conservation status of the natural habitats and species in the Annexes and under Article 17, to report to the European Commission every six years on their status and on the implementation of the measures taken under the Directive. In April 2019, Ireland submitted the third assessment of conservation status for 59 habitats.

The Overall Status of habitats as depicted in the report is that 85% of habitats are in Unfavourable (i.e. Inadequate or Bad) status, with 46% of habitats demonstrating ongoing declining trends.

Many of the changes from previous assessments are due to improved knowledge e.g. marine habitats, changes of interpretation of the ecology of the habitat e.g. Rynchosporion depressions, or changes in the

[18] https://circabc.europa.eu/sd/a/a211d525-ff4d-44f5-a360-e82c6b4d3367/IE_A12NatSum_20141031.pdf
[19] http://cdr.eionet.europa.eu/Converters/run_conversion?file=/ie/eu/art12/envuvesya/IE_birds_reports-14328-144944.xml&conv=343&source=remote#A082_B
[20] Summarised from "Evaluation study to support the Fitness Check of the Birds and Habitats Directives" available online at https://www.npws.ie/sites/default/files/publications/pdf/Fitness%20Check%2015%204%2015.pdf.

thresholds for Structure and Functions e.g. Juniper scrub. Therefore, the actual status (i.e. Favourable, Unfavourable-Inadequate or Unfavourable-Bad) of habitats has remained largely unchanged over time but with ongoing declining trends impacting almost half of all habitats. Although some habitats had insufficient Range and Area when the Directive came into force (e.g. active raised bog, hay meadows and many woodland habitats), it is the Structure and Functions of the habitats that is driving the Overall Status results in many cases, with inadequate conservation measures in place to improve the Future Prospects. Declining trends are particularly notable in marine, peatland, grassland and woodland habitats.

Pressures and threats are recorded in 54 of the 59 habitats assessed. The most frequent pressures recorded in habitats relate to the agriculture category. Over 70% of habitats are impacted by pressures relating to agricultural practices, and the pressure is ranked as High importance in more than 50% of habitats.

The next most frequent category of pressure to be recorded in habitats is "I Alien and problematic species" (listed as a pressure in 42% of habitats), closely followed by "F Development, construction and use of residential, commercial, industrial and recreational infrastructure and areas", a pressure in 41% of habitats. However, alien and problematic species are high-importance pressures at just 12% of habitats, while infrastructure is recorded as a high-importance pressure in 22% of habitats.

Conservation measures are reported as being undertaken in 36 habitats. For 27 of these habitats, the main purpose of the conservation measures is to maintain the Range, Area or Structure and Functions of the habitat. For five habitats the main purpose of the measures is to restore the habitat, while for the remaining four the purpose of the measures is to increase the habitat area.

*Species*

Of the 68 Habitats Directive-listed species in Ireland, eight species have been described as vagrants. These include six cetacean species, Allis shad *(Alosa alosa)* and Brandt's bat *(Myotis brandtii).* The latter two species have been assigned to this category since 2007 as there is no evidence of breeding populations of these species. The Nore pearl mussel *(Margaritifera durrovensis)* is no longer considered a separate species from the freshwater pearl mussel.

The Overall Status of the remaining 60 species (including three species groups) is that 57% of species are in Favourable status and 30% are in Unfavourable status (i.e. Inadequate or Bad), with 72% demonstrating stable or improving trends while 15% demonstrate ongoing declining trends.

Many species remain in Favourable status. Population increases and Range expansion have been observed for several bat species, marsh fritillary *(Euphydryas aurinia),* otter *(Lutra lutra)* and pine marten *(Martes martes)*. Ongoing declines are reported for all whorl snails, freshwater pearl mussel, lesser horseshoe bat *(Rhinolophus hipposideros)* and maërl species. Knowledge has improved for many cetacean species and all data point to Favourable status for all species. A re-assessment of data for river lamprey *(Lampetra fluviatilis)* and leatherback turtle *(Dermochelys coriacea)* has resulted in an Unknown assessment for these species due to difficulties associated with identifying river lamprey juveniles and the paucity of records across a vast marine area for the leatherback turtle.

Pressures are identified as impacting on 46 of the 57 taxa assessed. Threats are identified for 48 taxa.

Impacts from agricultural activities, and to a lesser extent forestry, are reported as having a negative effect on a wide range of species, including fish, molluscs, terrestrial mammals and vascular plants. This is because of the wide sphere of influence of some of these activities which, though implemented at relatively local levels, may influence a much wider area, particularly if they affect groundwater supplies or nearby watercourses. Examples include drainage, fertiliser application and clear-felling. The issue of alien species is a cross-cutting one, as it is for habitats, but it is recorded as a pressure for species much less frequently; however, the impact is predicted to increase over the next 12 years. In general, lower numbers of pressures and threats are reported for bat species than the other species groups, with no significant impacts noted for six of the nine bat species assessed.

*Conclusion*

The conclusion is that most Irish habitats listed on the Habitats Directive are in Unfavourable status and almost half are demonstrating ongoing declines. The majority of species listed on the Habitats Directive are, however, in Favourable status in Ireland, and stable, although a small number are considered to be in Bad status and continue to require concerted efforts to protect and restore them.

**Receiving Environment (Baseline plus trends)**

It is assumed in this report that the baseline environment in relation to designated sites, as identified above, will be the receiving environment at the time of construction due to the short separation period. Further trends in species and habitats as identified in reporting to Europe are likely overlap the operational phase, dependant on the occurrence of causal mechanisms such as identified pressures.

#### 8.3.1.2.2 National Sites

**Trends**

No trends are currently available in respect of NHA's or pNHA's. The do-nothing scenario is therefore that in the absence of the proposed development under consideration that any existing trends would continue in respect of the features of interest which form the basis for designation.

**Receiving Environment (Baseline plus trends)**

It is assumed in this report that the baseline environment in relation to National Sites, as identified above, will be the receiving environment at the time of construction. As longer terms trends are unavailable, it is considered that existing pressures on pNHA's within 15km are likely to continue into the operational stage; however, we note that longer term mitigating strategies in respect of certain pNHA's such as the National Peatlands Strategy 2015 are in place, and may result in longer term positive trends.

### 8.3.2 Habitats and Flora

#### *8.3.2.1 Study Area*

See **Table 8-24** below which outlines the study in respect of habitats and flora.

**Table 8-24 CGEP and CGEP Grid Connection Route study area and justification.**

| Study Area for Terrestrial Habitats | Justification for the Study Area Extents |
|---|---|
| *CGEP Development:* Development footprint area plus 50m in all directions<br>*CGEP Grid Connection:* Grid Connection Route plus 50m in all directions | Professional judgement and as per Best Practice (CIEEM, 2018) as informed by scoping (Table 8-2). |

#### *8.3.2.2 Desktop Study*

Desktop study results from sources identified in **Section 8.2.2.2** indicate terrestrial Habitats within the Coom Green Energy Park Study Area comprise a mosaic of agricultural grassland, commercial forestry plantations, broadleaved woodland, heathlands, hedgerows, wet grassland, private roads and public roads.

The greater part of the study area consists of commercial forestry plantation, particularly in the vicinity of the proposed CGEP Development. The grid connection which will be located primarily within the public road which passes through lands characterised by a predominance of agricultural grassland and coniferous forestry plantation, as well as other habitat types associated with the public road e.g. roadside hedgerows, treelines, earth banks, dwellings, farm buildings and associated gardens, amenity grassland, hedges and lawns.

##### 8.3.2.2.1 Invasive species records

**Table 8-25** below, outlines the records of Invasive species found during the Desktop study within the 10km grid squares within which the development is located. The CGEP and CGEP grid connection route study area occupies four 10km grid squares comprising W69, W79, W89 and W68.

**Table 8-25 Invasive Species records from Desktop Review (Source: NBDC)**

| Common Name | Scientific Name | Year of Last Record | Location of Record (10km Grid Square) | Invasive Impact |
|---|---|---|---|---|
| Blackcurrant | *Ribes nigrum* | 2007 | W69 | Medium |
| Himalayan Knotweed | *Persicaria wallichii* | 2018 | W69 | High |
| Indian Balsam | *Impatiens glandulifera* | 2009 | W69 | High |
| Japanese Knotweed | *Fallopia japonica* | 2007 | W69 | High |
| Rhododendron | *Rhododendron ponticum* | 2018 | W69 | High |
| Sycamore | *Acer pseudoplatanus* | 2005 | W69 | Medium |
| Douglas Fir | *Pseuotsuga menziesii* | 2006 | W79 | Medium |
| American Skunk-cabbage | *Lysichiton americanus* | 2017 | W79 | Medium |
| Blackcurrant | *Ribes nigrum* | 2006 | W79 | Medium |
| Cherry Laurel | *Prunus laurocerasus* | 2006 | W79 | High |
| Indian Balsam | *Impatiens glandulifera* | 2009 | W79 | High |
| Japanese Knotweed | *Fallopia japonica* | 2006 | W79 | High |
| Rhododendron | *Rhododendron ponticum* | 2019 | W79 | High |
| Sycamore | *Acer pseudoplatanus* | 2009 | W79 | Medium |
| Canadian Waterweed | *Elodea canadensis* | 2009 | W89 | High |
| Cherry Laurel | *Prunus laurocerasus* | 2004 | W89 | High |
| Giant Hogweed | *Heracleum mantegazzianum* | 2018 | W89 | High |
| Indian Balsam | *Impatiens glandulifera* | 2017 | W89 | High |
| Japanese Knotweed | *Fallopia japonica* | 2018 | W89 | High |
| Rhododendron | *Rhododendron ponticum* | 1997 | W89 | High |
| Sycamore | *Acer pseudoplatanus* | 2009 | W89 | Medium |
| Traveller's-joy | *Clematis vitalba* | 2015 | W89 | Medium |
| Butterfly-bush | *Buddleja davidii* | 2017 | W68 | Medium |

| Common Name | Scientific Name | Year of Last Record | Location of Record (10km Grid Square) | Invasive Impact |
|---|---|---|---|---|
| Cherry Laurel | *Prunus laurocerasus* | 2017 | W68 | High |
| Japanese Knotweed hybrid | *Fallopia japonica* x *sachalinensis* = *F.* x *bohemica* | 2017 | W68 | High |
| Himalayan Knotweed | *Persicaria wallichii* | 2015 | W68 | Medium |
| Indian Balsam | *Impatiens glandulifera* | 2015 | W68 | High |
| Japanese Knotweed | *Fallopia japonica* | 2018 | W68 | High |
| Nuttall's Waterweed | *Elodea nuttallii* | 2008 | W68 | High |
| Sycamore | *Acer pseudoplatanus* | 2017 | W68 | Medium |
| Three-cornered Garlic | *Allium triquetrum* | 2017 | W68 | Medium |

#### *8.3.2.3 Habitat Survey*

##### 8.3.2.3.1 CGEP

Nineteen habitats were recorded within the CGEP study area, refer to **Table 8-26**. Conifer plantation (WD4) is the dominant habitat type covering 74.6% of the total 364.3ha study area. This is followed, in order of abundance, by Recently felled woodland (WS5) at 9.1%, Improved agricultural grassland (GA1) at 5.5%, Scrub (WS1) at 3.9%, Spoil and bare ground (ED2) at 3.9%, and Wet grassland at 1.2% of the wind farm study area. Other habitats detailed in Table 8-26 make up less than 3.5% of the study area i.e. are very minor in extent.

**Table 8-26: Habitats recorded within CGEP Study Area**

| Habitat | Fossitt Code | Total Area within Study Area | % habitat within study area |
|---|---|---|---|
| Conifer plantation | WD4 | 271.60 | 74.56 |
| Recently Felled Woodland | WS5 | 33.06 | 9.07 |
| Improved Agricultural Grassland | GA1 | 19.95 | 5.48 |
| Scrub | WS1 | 14.14 | 3.88 |
| Spoil and Bare Ground | ED2 | 8.56 | 2.35 |
| Wet Grassland | GS4 | 4.51 | 1.24 |
| Dense Bracken | HD1 | 2.69 | 0.74 |
| Oak-birch and holly woodland | WN1 | 2.46 | 0.68 |
| Recolonising Bare Ground | ED3 | 1.99 | 0.55 |
| Mixed Broadleaf Woodland | WD1 | 1.99 | 0.55 |
| Buildings and Artificial Surfaces | BL3 | 0.86 | 0.24 |
| Wet grassland/Dry Siliceous Heath Mosaic | GS4/HH1 | 0.84 | 0.23 |
| Dry Meadows and Grassy Verges | GS2 | 0.63 | 0.17 |
| Wet Heath/Scrub Mosaic | HH3/WS1 | 0.41 | 0.11 |

| Habitat | Fossitt Code | Total Area within Study Area | % habitat within study area |
|---|---|---|---|
| Conifer Plantation/Scrub Mosaic | WD4/WS1 | 0.19 | 0.05 |
| Wet heath | HH3 | 0.19 | 0.05 |
| Scattered trees and parkland | WD5 | 0.11 | 0.03 |
| Immature Woodland | WS2 | 0.07 | 0.02 |
| Reed and Large Sedge Swamp | FS1 | 0.03 | 0.01 |

Seven linear habitat types were identified within CGEP study area. The dominant linear habitat (7159m) has no ecological value and consists of existing hard surfaces (BL2/ ED2) i.e. tracks, hardcore surfaces etc. Other linear habitats within the windfarm study area with some ecological value comprise; 299m of Hedgerows (WL1), 633m linear scrub (WS1), 570m of Eroding/upland rivers (FW1), 340m of Earth banks (BL2), 755m of recolonising bare ground (ED3) and 249m of Treelines (WL2) occur.

See **Figures 8.12** to **8.21** showing terrestrial and linear habitats within the CGEP wind farm study area including the Grid Connection Route.

#### 8.3.2.3.2 Grid Connection Route

Twenty-six non-linear habitat types (or habitat mosaics) make up the 244.6ha grid connection study area (i.e. the 50m buffer of the ca.17km of grid connection outside the subject development planning application boundary), refer to **Table 8-27**. The most abundant habitat is Improved agricultural grassland (39.7%). Buildings and artificial surfaces (BL3) occupy 8.5% of the study area, followed by GS4 (2.8%), GA2 (1.7%), WS5 (1.5%), WS1 (1.5%), BL3/GA2 (1.3%), ED2 (1.1%). The remaining 18 habitats, each covering less than 1% individually make up the remaining 4.7% of the total study area.

**Table 8-27: Habitats recorded within GCR Study Area**

| Habitat | Fossitt Code | Total Area within Study Area | % habitat within study area |
|---|---|---|---|
| Improved Agricultural Grassland | GA1 | 97.0 | 39.7 |
| Conifer plantation | WD4 | 83.0 | 33.9 |
| Buildings and artificial surfaces | BL3 | 24.4 | 10 |
| Wet Grassland | GS4 | 8.0 | 3.3 |
| Amenity grassland (improved) | GA2 | 5.0 | 2.0 |
| Buildings and artificial Surfaces/ Amenity grassland (Improved) mosaic | BL3/GA2 | 4.4 | 1.8 |
| Recently-felled woodland | WS5 | 4.2 | 1.7 |
| Scrub | WS1 | 3.3 | 1.4 |
| Spoil and Bare Ground | ED2 | 2.6 | 1.1 |
| Mixed Broadleaf Woodland | WD1 | 2.5 | 1.0 |
| Treelines | WL2 | 1.4 | 0.60 |
| Improved Grassland/ Buildings and artificial Surfaces mosaic | GA1/BL3 | 1.3 | 0.50 |
| Improved Grassland/ Scrub (mosaic) | GA1/WS1 | 1.2 | 0.50 |
| Dry calcareous and neutral grassland | GS1 | 1.2 | 0.49 |
| Conifer Plantation/Scrub Mosaic | WD4/WS1 | 0.9 | 0.35 |
| Short rotation coppice. | WS4 | 0.8 | 0.35 |
| Active Quarry | ED4 | 0.8 | 0.32 |
| Recolonising bare ground | ED3 | 0.5 | 0.22 |
| Arable Crops | BC1 | 0.5 | 0.21 |

| Habitat | Fossitt Code | Total Area within Study Area | % habitat within study area |
|---|---|---|---|
| Scrub/ Dry Meadow and Grassy verges (mosaic) | WS1/GS2 | 0.4 | 0.15 |
| Immature woodland/ scrub (mosaic) | WS2/WS1 | 0.4 | 0.15 |
| Scrub/ artificial surfaces. | BL3/WS1 | 0.3 | 0.12 |
| Dense Bracken | HD1 | 0.2 | 0.07 |
| Amenity grassland (improved)/ Flower beds and borders (mosaic) | GA2/BC4 | 0.1 | 0.05 |
| Immature woodland | WS2 | 0.1 | 0.02 |

Seventeen linear habitat types/ habitat mosaics were recorded within the GCR corridor. These include 11.7km of Hedgerows (WL1), 5.35km of Treelines (WL2), 4.6km of Earth banks (BL2), 3.2km of linear Scrub (WS1), 960m of linear Dry meadows and grassy verges (GS2), 820m of Drainage ditches (FW4), and 22m of Eroding/upland rivers occur within the CGEP Grid connection study area. The remaining five habitat types consist of various linear habitat mosaics of those already listed.

See **Figures 8.12** to **8.21** showing terrestrial and linear habitats within the CGEP wind farm study area including the Grid Connection Route.

#### 8.3.2.3.3 Turbine Delivery Route

Turbine deliveries will be from Ringaskiddy and will be delivered along two distinct routes. One route to the west of the site, servicing the Bottlehill and Mullenaboree parts of the site and a second route to the east, servicing the Knockdoorty part of the site. Turbine deliveries utilise public roads, comprising built surfaces, however accommodation works to accommodate oversail/passage may interact with natural habitats at locations identified as "TDR Nodes". Typical habitats of note at these nodes include hedgerows (WL1), treelines (WL2) and woodland edge (WD1 and WD4). Grassy verges are oversailed at some locations.

See also **Appendix 8-C** for a more detailed description of habitat/flora findings at Nodes and locations.

### *8.3.2.4 Flora Survey*

#### 8.3.2.4.1 CGEP

*Non-native invasive plant species* listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) are herein described. Rhododendron (*Rhododendron ponticum*) was recorded at one location and Japanese knotweed or Himalayan knotweed infestations were recorded at 11 locations during habitat assessments on the CGEP Wind Farm Site (**Figure 8.22**). None of these infestations however occur within 50m of the construction works area.

Buddliea *(Buddleja davidii)* and Pheasant berry (*Leycesteria formosa*) were recorded at one and two locations respectively, these species, while not listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (as amended) is listed as a 'Medium impact' non-native invasive species (Kelly *et al.,* 2013a, O' Flynn *et al.*, 2014). Montbretia *(Crocosmia x crocosmiflora),* which is also considered an invasive species in Ireland was also recorded at one location. Of the above listed 'medium impact' invasive species, only two infestations of Pheasant berry occur within the CGEP study area.

No Flora Protection Order (FPO) species were found during surveys within the CGEP study area. A search of publicly available plant records held by the National Biodiversity Data Centre, the Botanical Society of Britain and Ireland and records provided by request from the NPWS showed 16 records of Starved Wood Sedge *(Carex depauperata)* in 10km grid square W69. This species, which is protected by the Flora Protection Order[21] was not found during field surveys of the CGEP study area. Two historic records of the FPO species Small

[21] Flora (Protection) Order, 2015

White Orchid *(Pseudorchis albida)* occur in 10km grid square W68; these records date from 1845 and it is likely that this species is no longer found in the locality due to the antiquity of these records.

#### 8.3.2.4.2 CGEP Grid Connection Route

*Non-native invasive plant species* listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (as amended) are herein described. Three Japanese knotweed infestations were recorded during habitat assessments on the CGEP Grid Connection Route, two of which occur within the CGEP Grid Connection study area. Rhododendron *(Rhododendron ponticum),* occurs at one location outside of the study area and Himalayan Balsam, also recorded at one location, within 50m of works (**Figure 8.23**).

No Flora Protection Order (FPO) species were found during field surveys within the CGEP Grid Connection study area. A search of publicly available plant records held by the National Biodiversity Data Centre, the Botanical Society of Britain and Ireland and records provided by request from the NPWS showed 3 historic records of Pennyroyal *(Mentha pulegium)* in 10km grid square W79 dating from the 1800's. Pennyroyal was not recorded during field surveys of the CGR. A single historic record of Annual Knawel *(Scleranthus annuus)* dating from 1849 was also retrieved for 10km grid square W79, however this species was not recorded during field surveys.

**Table 8-28: Invasive Species found within the study area for CGEP and GCR**

| Common Name | *Scientific Name* | Location of Record | Coordinates (ITM) | Invasive Impact |
|---|---|---|---|---|
| Pheasant Berry | *Leycesteria Formosa* | Within CGEP Study Area | 562455, 589369 | Medium Impact |
| Pheasant Berry | *Leycesteria Formosa* | Within CGEP Study Area | 562003, 589206 | Medium Impact |
| Montbretia | *Crocosmia x crocosmiflora* | Within CGEP Study Area | 561792, 587999 | Medium Impact |
| Japanese Knotweed | *Fallopia japonica* | Within Grid Connection Route Study Area | 578912, 595622 | High Impact |
| Japanese Knotweed | *Fallopia japonica* | Within Grid Connection Route Study Area | 578884, 595623 | High Impact |
| Himalayan Balsam | *Impatiens glandulifera* | Within Grid Connection Route Study Area | 582070, 494270 | High Impact |

#### 8.3.2.4.3 Turbine Delivery Route

The non-native invasive plants recorded at and in the vicinity of nodes are summarised in **Table 8-29** below; their risk of invasiveness impact and legal status are outlined, and an indication whether or not they will interact with proposed works is given.

The only legally restricted species recorded was Japanese knotweed. It is noted that this stand is >7m from proposed works and given this distance precautionary mitigation is proposed.

Cherry laurel, snowberry, winter heliotrope and old man's beard are present within the footprint of a number of nodes. Himalayan honeysuckle is present adjacent to the vegetation clearance footprint at Node 2.2

**Table 8-29 TDR Invasive plant species summary**

| Node | Species | Invasiveness impact/legal status | Interaction |
|---|---|---|---|
| 1.3 | Old man's beard | Medium impact; no legal restriction | In load-bearing footprint |
| 1.4 | Old man's beard | Medium impact; no legal restriction | In vegetation clearance footprint |
| | Cherry laurel | High impact; no legal restriction | None |

| Node | Species | Invasiveness impact/legal status | Interaction |
|---|---|---|---|
| | Japanese knotweed | High impact; Schedule III listed species* | None |
| 2.0 | Winter heliotrope | Low impact; no legal restriction | In bank re-grading footprint |
| 2.2 | Himalayan honeysuckle | Medium impact; no legal restriction | Potential- adjacent to vegetation clearance footprint |
| 2.3 | Old man's beard | Medium impact; no legal restriction | In vegetation clearance footprint |
| 2.4 | Winter heliotrope | Low impact; no legal restriction | In load-bearing footprint |

** Third Schedule listed invasive species under Regulations 49 & 50 S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011.*

#### *8.3.2.5 Habitat and Flora Evaluation*

##### 8.3.2.5.1 CGEP and Grid Connection Route

No habitats evaluated as being of international, national or county importance, including habitats listed in Annex I of the EU Habitats Directive, occur within the GCEP Wind Farm or Grid Connection study areas. Representative photographs of the habitats recorded within the CGEP and GCR are presented in **Appendix 8–D.**

Habitats of Local Importance (Higher Value) mapped within the CGEP Wind Farm study area comprise the following; Wet grassland/Dry siliceous heath mosaic (GS4/HH1), Wet grassland (GS4), Conifer plantation/scrub mosaic (WD4/WS1), Mixed broadleaved woodland (WD1), Wet heath/Scrub mosaic (HH3/WS1), Dry meadows and grassy verges (GS2), Immature woodland (WS2), Wet heath (HH3), Earth banks (BL2), Heath and dense bracken (HD1), and Freshwater swamp (FS1).

The main habitats recorded within the CGEP Windfarm and Grid Connection study area are described herein.

**Conifer Planation (WD4)**

A large portion of the study area is covered by coniferous planation, dominated by Sitka spruce *(Picaea sitchensis)*. Lodgepole Pine *(Pinus contorta)* and Larch *(Larix decidua)* occur also at some locations. The plantations are of various age classes, ranging from mature to more recently planted first and second rotation.

The coniferous plantation habitat generally comprised single age class forestry with little or no vertical structure. Understorey and field layers are generally absent or reduced due to heavy shading with areas of Bramble *(Rubus fruticosus agg.)* occurring frequently and occasionally Nettle *(Urtica dioica)* and Ivy *(Hedera helix)*. The ground layer generally consists of needle debris but with locally dominant patches of bryophyte cover.

Conifer plantations are of Local Importance (Lower Value).

**Improved Agricultural Grassland (GA1)**

Along with conifer plantation, this habitat was the most widely recorded habitat across the study area. There was some variation in the species composition of this habitat depending on the intensity of the management. The most intensively managed or recently reseeded examples of this habitat are dominated by Rye grasses *(Lolium perenne)* with frequently occurring White Clover *(Trifolium repens*). Herbs such as Broad-leaved Dock *(Rumex obtusifolius)*, Creeping Buttercup *(Ranunculus repens)* and Chickweed *(Stellaria media)* occurred rarely. Less intensively managed examples of this habitat support an abundance of Yorkshire Fog *(Holcus lanatus)*, and occasionally Ragwort *(Senecio jacobaea)*.

In some locations, improved grassland fields have Soft Rush *(Juncus effuses)* growing abundantly in damp areas where drainage is poor.

Improved grassland is of Local Importance (Lower Value).

### Wet Grassland (GS4)

This habitat type is also widespread across the study area, often associated with less intensively managed agricultural areas. The habitat occurs close to watercourses and on poorly drained ground within the study area.

The ground conditions in this habitat are damp with rushes dominating the sward. Jointed Rush *(Juncus artuculatus)* and Soft Rush *(Juncus effuses)* occur abundantly along with Yorkshire Fog *(Holcus lanatus)*. Creeping Bent *(Agrostis stolonifera)*, Tufted hair-grass *(Deschampsia caespitosa)*, Creeping Buttercup *(Ranunculus repens)* and Meadowsweet *(Filipendula ulmaria)* occur frequently. Common Sorrel *(Rumex acetosella)*, Lesser Spearwort *(Ranunclus flammula)*, and Marsh Bedstraw *(Galium palustre)* occur occasionally, while Marsh Ragwort *(Senecio aquatica)* and Marsh Thistle *(Cirsium palustre)* occur rarely.

Examples of this habitat were recorded with a relatively high sward (c. 0.6 m) but also in shorter swards where grazing had occurred.

Wet grassland is of Local Importance (Higher value).

### Wet heath (HH3)

This habitat was recorded within the CGEP Windfarm within forestry rides and at forestry track edges, frequently forming a mosaic with Scrub (HH3/WS1).

The species composition of this habitat within the study area comprises Purple moor-grass *(Molinia caerulea)* interspersed with areas of locally abundant Ling *(Calluna vulgaris)*. Tormentil *(Potentilla erecta)* occurred frequently. Bog Cotton *(Eriophorum spp,)*, Bog Asphodel *(Narthecium ossifragum)*, Sharp-flowered Rush *(Juncus acutiflorus)*, Bilberry *(Vaccinium myrtillus)*, Carnation Sedge *(Carex panicaea)*, Yellow Sedge *(Carex flacca)*, Heath Milkwort *(Polygala serpyllifolia)*, Bell Heather *(Erica tetralix)* all occurring occasionally. Heath Spotted Orchid *(Dactylorhiza maculata)*, Meadow Thistle *(Circium dissectum)* and Butterwort *(Pinguicula grandiflora)* occur rarely. Willow scrub dominated by grey willow *(Salix cinerea)* occurs frequently as a colonist of this habitat within the study area.

The area of wet heath habitat recorded within the study area was evaluated as not meeting the criteria of Annex I quality habitat due to the presence of negative indicators in vegetation composition, structure and physical structure of the habitat. The areas within wet heath occur show signs of drainage as evidenced by a cover of willow encroaching on the habitat within the study area. Cover of *Bell heather (Erica tetralix),* a species which occurs abundantly in high quality wet heath was low within the study area, as was the cover of mosses and lichens which typically indicate good examples of wet heath i.e *Cladonia sp*. Lichens, Sphagnum mosses, and the moss *Rancomitrium lanuginosum.* The absence of Annex I quality wet heath habitat within the study area is likely due to the effects of afforestation within the study area and the effects of ongoing commercial forestry activities, which causes disturbance through drainage, and tracking of machinery.

The areas of Wet heath, and wet heath mosaic habitats recorded within the study area are evaluated as being of Local Importance (Higher Value).

### Dry siliceous heath / Wet grassland mosaic (GS4 / HH1)

This habitat was recorded at several locations, primarily near the Bottlehill Landfill site. The species composition has elements of both Wet grassland (GS4) and Dry Siliceous Heath (HH1). Typical HH1 species recorded included Purple Moor-grass *(Molinia caerulea)*, Bilberry *(Vaccinium myrtillus)*, Tormentil *(Potentilla erecta)* and Heath Bedstraw *(Galium saxatile).* The heather in these areas is in good condition, generally up to 70 cm deep with no evidence of heavy grazing. Species reflective of GS4 include an abundance of Wavy Hair-grsss *(Deschapsia caespitosa).* Wild Angelica *(Anglica sylvestris)* and Marsh Thistle *(Cirsium palustre)*, both suggestive of GS4, occur frequently. Occasional species recorded within this habitat included Greater-trefoil *(Lotus pedunculatus),* Yorkshire Fog *(Holcus lanatus)* and Sweet Vernal Grass *(Anthoxanthum odouratum).* The sward height ranged from approximately 30cm – 60cm.

Dry siliceous heath/Wet grassland mosaic is of Local Importance (Higher Value).

### Conifer plantation / Scrub mosaic (WD4 / WS1)

This habitat occurs within the CGEP Wind farm study area in the vicinity of the disused Bottlehill landfill facility. Dominant species recorded within this habitat were Lodgepole Pine *(Pinus contorta,* ranging in height from 4m-6m with an understory of Grey Willow *(Salix cinerea),* Gorse *(Ulex europaea),* Brambles *(Rubus fruticosus agg.),* all of which occur abundantly. Ling Heather *(Calluna vulgaris)* was recorded as a minor component of this habitat.

Conifer plantation/Scrub mosaic is of Local Importance (Lower Value).

**Drainage Ditches (FW4)**

This habitat was observed across the study site, often in association with attempts to drain the land for agricultural or silvicultural land uses. These drains were generally c. 1 m deep but up to 1.5 m deep and c. 2 m wide. The level of vegetation within the ditch was dependant on the frequency of excavation with little vegetation growing on recent excavations to more diverse vegetation on less frequently excavated drains. Water levels in drainage ditches were generally low (c. 10 to 15 cm deep) and slow flowing or stagnant. Within the vegetated drains, Soft Rush *(Juncus effusus)* was abundant. Marsh Bedstraw *(Galium palustre)* and Water forget-me-not *(Myosotis scorpioides)* occurred frequently. Marsh Thistle *(Cirsium palustre)*, Broad-leaved Pondweed *(Potamogeron natans)* and ragged robin *(Lychnis flos-cuculii)* occurred occasionally. In some slow moving or stagnant streams, Fool's Water-cress *(Apium nodiflorum)* was locally abundant.

Drainage ditches are of Local Importance (Lower Value).

**Eroding / Upland River (FW1)**

A number of eroding river habitats were recorded during the habitat survey including the Coom, the Toor, the Chimneyfield and Bunnaglanna rivers. In addition, a number of small tributary streams and watercourses were observed. The eroding upland rivers were generally narrow (wetted width c. 0.5 to 1 m wide), shallow (up to 30 cm deep) and generally fast flowing. The bed of these channels was predominantly gravels and cobbles with some exposed bedrock in places. Evidence of re-sectioning and over deepening of these rivers was observed at some locations as part of efforts to improve land drainage. Access for cattle was observed at a number of locations with poaching and resulting siltation of the riverbed downstream. In-stream vegetation rarely occurred and the riparian vegetation was often dependent on the adjoining habitat type. Scrub habitat consisting of willow species and bramble was frequently recorded over the watercourses.

A few examples of Eroding/upland rivers are of Local Importance (Higher Value). The vast majority of streams in the vicinity of the site are Local Importance (Lower Value). There key importance is connectivity to more sensitive and important downstream streams and rivers.

**Dense Bracken (HD1)**

This habitat was recorded at one location within the CGEP grid connection study area. Bracken *(Peteridium aquilinum)* is the dominant plant species at this location.

Dense bracken is of Local Importance (Lower Value).

**Reed and large sedge swamps (FS1)**

This habitat occurs in a small pool adjacent to a road within the wind farm site. The vegetation is dominated by Greater Tussock Sedge *(Carex paniculata)*, growing up to 1.5 m in height. Other species recorded within this habitat are Wild Angelica *(Angelica sylvestris)*, Hemlock Water-dropwort *(Oenanthe croccata)*. Soft Rush *(Juncus effusus)*, Yellow Iris *(Iris pseudacoris),* Common Valerian *(Valeriana officinalis)* and Marsh Bedstraw *(Galium palustre)* were recorded rarely. This habitat also occurs in mosaic with willow scrub.

Reed and large sedge swamps are of Local Importance (Higher Value).

**Mixed broadleaved woodland (WD1)**

This habitat was recorded along the margins of conifer plantation, particularly near Chimneyfield and along the edge of the public road at Tooreen South. The linear woodland near Chimneyfield is dominated by mature

beech trees, c. 20 m high. The linear woodland at Tooreen South is younger in age with trees c. 10 m high. The edge of this woodland has a line of New Zealand Holly *(Olearia macrodontia)* screening planted along the roadside.

A separate area of WD1 occurs along the south western access road and consists of planted oak (Quercus robur) and grey willow (Salix cinerea), with an understory of gorse (*Ulex europaeus*), heather (*Calluna vulgaris*), rosebay willowherb (*Chamaenerion angustifolium*), brambles (*Rubus fruticosus*) and male fern (*Dryopteris filix-mas*). Scots pine (*Pinus sylvestris*) is also present, scattered within this habitat

Mixed broadleaved woodland is of Local Importance (Higher Value).

**Scrub (WS1)**

Areas of scrub occur frequently within the study area along the margins of access tracks and roads through coniferous plantations, along the banks of watercourses flowing through the study area, and in recolonised areas of clear-fell around Raheen and Bottlehill townland parts of the site.

The composition of the scrub habitat varies but is typically composed of willows; frequently Grey Willow *(Salix cinerea)* and occasionally Eared Willow *(Salix aurita)*. Gorse *(Ulex europaea)* scrub is also frequent along with Bramble *(Rubus fruticosus agg.)*. Hawthorn *(Crataegus monogyna)* was occasionally recorded. Immature Ash *(Fraxionus excelsior)*, Alder *(Alnus glutinosa)* and Downy Birch *(Betua pubescens)* were also recorded growing in the scrub habitat.

Scrub habitat along the margins of conifer plantation and along forestry rides supports elements of dry siliceous heath vegetation in the field layer where scrub development is less dense. These linear scrub areas are considered under WL2 (hedgerow habitat) as they are typically less than 4m wide.

Scrub is of Local Importance (Higher Value).

**Buildings and artificial surfaces (BL3)**

This habitat was recorded within the study area in the form of paved roads, dwelling houses and yards, farm buildings and yards. It also includes built surfaces associated with the completed waste management facility at Bottlehill and along the public road within the grid connection study area. This habitat occurs as a mosaic with Amenity Grassland (GA2) within the CGEP grid connection study area.

Buildings and Artificial Surfaces are not of significant ecological value.

**Spoil and bare ground (ED2)**

Forestry and farm access paths are the two main examples of this habitat within the study area. Forestry access tracks consist generally of hardcore and are approximately 4 m wide. Farm access paths were bare ground or hardcore and were c. 2 to 3 m wide. These tracks are not vegetated due to heavy traffic and/or recent construction. Tracks that are less heavily trafficked or are long-established are beginning to recolonise with vegetation.

Spoil and Bare Ground is of Local Importance (Lower Value).

**Recolonising bare ground (ED3)**

As stated above, the recolonising bare ground habitat occurs where bare ground and/or gravel tracks are less heavily trafficked or where long-established have begun to recolonise with a range of ruderal species such as Ragwort *(Senecio jacobaea)*, Ribwort Plantain *(Plantago lanceolata)*, Broad-leaved Plantain *(Plantago major)*, Selfheal *(Prunella vulgaris)*, Black Medic *(Medicago lupulina)*, Daisy *(Bellis perennis)* and Annual Meadow-grass *(Poa annua)*.

The recolonising ground along the edges of the access road to the landfill facility at Bottlehill is more floristically diverse as the imported road foundations are calcareous limestone, whereas the surrounding soils are acid in nature. As a result, a range of calcifuge and calcicole species grow in close proximity. The common species listed above are present in addition to frequently occurring Colt's-foot *(Tussilago farfara)*, Common

Quaking-grass *(Briza media)* and Purple Moor-grass *(Molinia caerulea)*. Sweet Vernal-Grass *(Anthoxanthum odouratum)*, Slender St. John's Wort *(Hypericum pulchrum)*, Square-stemmed St. John's Wort *(Hypericum tetrapterum)*, Fairy Flax *(Linum catharticum)*, Ling *(Calluna vulgaris)*, Bell Heather *(Erica cinerea)*, Butterwort species *(Pinguicula spp.)* and Eyebrights *(Euphrasia spp.)* all occurring occasionally. Red clover *(Trifolium pratense)*, Glaucous Sedge *(Carex flacca)*, Marsh Thistle *(Cirsium palustre)*, Cross-leaved Heath *(Erica tetralix)*, Common Centaury *(Centaurea erythraea)*, and Musk Mallow *(Malva moschata)* occur rarely.

Recolonising bare ground is of Local Importance (Lower Value).

**Other artificial lakes and ponds (FL8)**

This habitat was observed in the Raheen townland part of the site. In addition, a small artificial pond was recorded within the conifer plantation at Glannasack. No aquatic vegetation was recorded within these waterbodies.

Artificial Lakes and Ponds are of Local Importance (Lower Value).

**Amenity grassland (improved) (GA2)**

This habitat was recorded around dwelling houses and the Bottlehill townland. These areas are regularly maintained by cutting and support a low diversity of species.

Amenity Grassland are of Local Importance (Lower Value).

**Dry meadows and grassy verges (GS2)**

This habitat is represented on site by small areas of roadside or access track grassy verges often in association with a vegetated earth bank feature with a similar species composition. Species recorded frequently include False Oat Grass *(Arrhenatherum elatius)*, Yorkshire fog *(Holcus lanatus)*, and Cock's Foot *(Dactylis glomerate)*. Bramble *(Rubus fruticosus agg.)*, Bush Vetch *(Viccia sepium)*, Nettle *(Urtica dioica)*, Creeping Thistle *(Cirsium arvense)*, Hogweed *(Heracleum sphondylium)* and Foxglove *(Digitalis purpurea)* occur occasionally.

Dry Meadows and Grassy Verges are of Local Importance (Higher Value).

**Earth banks (BL2)**

The most common type of field and roadside boundary within the study area are vegetated earth banks. The species composition on these earth banks includes Bramble *(Rubus fruticosus)*, Ling *(Calluna vulgaris)*, Hard Fern *(Blechnum spicant)*, Scaly Male Fern *(Dryopteris felix-mas)*, Foxglove *(Digitalis purpurea)* and Cock's Foot *(Dactylis glomerata)*. Bilberry *(Vaccinium myrtilis)*, Meadowsweet *(Fillipendula ulmaria)*, Heath Bedstraw *(Galium saxatile)* occur occasionally along these banks. Patches of Devil's-bit Scabious *(Succisa pratensis)* and heath spotted-orchid occur rarely, particularly in damp areas at the base of these boundary features.

The vegetation on drier banks is grassier in composition with abundant Cock's Foot *(Dactylis glomerata)*, False Oat Grass *(Arrhenatherum elatius)* and Meadow-grass species *(Poa spp.)*. Bramble *(Rubus fruticosus agg.)* and Foxglove *(Digitalis purpurea)* occur frequently. The vegetation on these banks is often merged with a narrow strip of grassy verge (GS2) habitat along the roadsides and access tracks.

These banks occasionally have single trees or small stretches of trees growing on top consisting of Hawthorn *(Crataegus monogyna)* and Grey Willow *(Salix cinerea)*. Rowan *(Sorbus aucuparia)* and Elder *(Sambucus nigra)* occur rarely on these bank tops.

Earthen Banks are of Local Importance (Lower Value).

**Treelines (WL1)**

Treelines were recorded at various locations across the study area. These consist of mature Sitka Spruce *(Picaea sitchensis)* treelines situated around farmhouse and farmyards and along field boundaries as shelter

belts. Treeline recorded within the grid connection study area varied in specie composition with a mixture of broadleaved species including Ash *(Fraxinus excelsior)* Sycamore *(Acer pseudoplanatus)* and Beech *(Fagus sylvatica)* as well as Sitka Spruce.

Tree Lines are of Local Importance (Higher Value).

**Hedgerows (WL1)**

Hedgerows dominated by gorse, hawthorn and willow occur as field boundaries in some locations including the proposed substation at Lackandarragh.

Scrub habitat along the margins of conifer plantation and along forestry rides supports elements of dry siliceous heath vegetation in the field layer where scrub development is less dense. These linear scrub areas are considered under WL2 (hedgerow habitat) as they are typically less than 4m wide.

Hedgerow is of Local Importance (Higher Value).

**Immature woodland (WS2)**

This habitat was recorded at a number of locations within the study area in lands which have been recently planted with broadleaved trees. These trees have been planted within the last c. 5 years and are 0.75 to 1.5 m tall. The species that were recorded in this habitat included Alder *(Alnus glutinosa)*, Oak *(Quercs sp.)* and Downy Birch *(Betula pubescens)*. These trees have been planted in areas of semi-improved grassland or wet grassland habitat.

Immature woodland habitats are of Local Importance (Higher Value).

**Recently-felled woodland (WS5)**

This habitat occurs in the study area where conifer plantations have been recently felled and have yet to be replanted. The cut stumps of Sitka Spruce trees are still apparent within this habitat along with the windrows of brash left after the cutting operations. Vegetation recorded recolonising the habitat includes Rosebay Willow Herb *(Chamaenerion angustifolium)*, Foxglove *(Digitalis purpurea)*, Bramble *(Rubus fruticosus agg.)* and fern species including Broad Buckler Fern, scaly *(Dryopteris dilatate)* Male Fern *(Dryopteris felix-mas)* and Hard Fern *(Blechnum spicant)*. Developing gorse bushes *(Ulex europaeus)* also occur rarely.

Recent felled woodland habitats are of Local Importance (Lower Value).

#### 8.3.2.5.2 Turbine Delivery Route

A summary of the key findings at locations (nodes), junctions (2 locations) and offsite turning and transfer area (one location) where works are proposed that may include localised impacts (e.g. tree trimming) within natural habitats is outlined below.

Node 1.1

**BL3 Buildings and Artificial Surfaces**

Man-made artificial surface.

*Node 1.3*

**WD5 Scattered trees and parkland**

A single Cedar tree is considered to be of local importance, lower value. It is a non-native species, with low bird-nesting potential, and no/extremely low potential to provide bat roosting habitat.

**GA2 Amenity grassland (improved)**

This is considered to be of local importance, lower value. The habitat is species poor and subject to regular mowing.

**GS2 / ED3 Dry meadows and grassy verges x Recolonising bare ground mosaic.**

The species present are widespread and common. There is also the presence of a medium-risk invasive species (*Clematis vitalba).* The habitat is thus considered to be of local importance, lower value.

*Node 1.4*

**ED3 Recolonising bare ground**

Ragwort *Jacobaea vulgaris,* annual sow-thistle *Sonchus arvensis*, *Epilobium* sp., scarlet pimpernel *Anagallis arvensis* (abundant), plantain *Plantago lanceolate.*

**GA2 Amenity grassland**

This habitat is species-poor, and widespread in the area. This is considered to be of local importance, lower value The habitat is species poor and subject to regular mowing.

**WD1 Mixed broadleaved woodland**

These trees have no bat-roosting potential. The species are dominated by non-native (Sycamore *Acer pseudoplatanus,* bay laurel). Common holly (*Ilex aquifolium)*, a single large yew *Taxus baccata* are noteworthy native species. Bramble, woodrush and wood sorrel are also present. The habitat is a poor example of this habitat and may have been planted hence it is also consistent with WD1. The habitat is considered to be of local importance, higher value.

**BL3 Buildings and artificial surfaces**

Artificial, man-made structure of low ecological value.

**GS2 Dry meadows and grassy verges**

This habitat is species-poor and widespread in the area. A young horse-chestnut tree is present, but offers no bat-roosting or bird-nesting potential. This is also a non-native species.

There are two invasive species present; cherry laurel *Prunus laurocerasus* and Japanese knotweed *Fallopia japonica*. The cherry laurel *Prunus laurocerasus* is adjacent to GS2, but outside the footprint of the proposed upgrade works. The Japanese knotweed is currently >7m outside the footprint of the proposed upgrade works.

This habitat is considered to be of local importance, low value.

*Node 1.5*

**BL3 Buildings and Artificial Surfaces**

Manmade artificial surface.

*Node 1.6*

**BL3 Buildings and Artificial Surfaces**

Manmade artificial surface.

**GS2 / WS1 Dry meadows and grassy verges x Scrub matrix**

Scrub element is bank dominated by bramble *Rubus fructicosus* agg., with some hedge bindweed *Calystegia sepium*, rosebay willowherb *Epilobium angustifolium* & hogweed *Heracleum sphondylium*. There is also a single, immature *Corylus avellana*.

This habitat type is comprised of species which are widespread and common. They are also subject to some degree of regular trimming to maintain visibility at roadsides. It is, thus, considered to be of local importance, lower value.

**GS2 Dry meadows and grassy verges**

Creeping thistle *Cirsium arvense*, nipplewort *Lapsana communis*, redshank *Persicaria maculosa*, false oat *Arrhenatherum elatius*, oats *Aevena sativa*, knotgrass *Polygonum arenastrum*, Annual meadow grass *Poa annua,* Bird vetch *Vicia cracca*, prickly sow-thistle *Sonchus asper*, 1 x Irish spurge *Euphorbia hyberna*,

groundsel *Senecio vulgaris*, white clover *Trifolium repens*, creeping cinquefoil *Potentilla reptans*, scarlet pimpernel *Anagallis arvensis*.

This habitat type is comprised of species which are widespread and common. They are also subject to some degree of regular trimming to maintain visibility at roadsides. It is, thus, considered to be of local importance, lower value.

*Node 2.0*

**GA2 Amenity grassland**

Cropped perennial rye grass *Lolium perenne*, creeping cinquefoil *Potentilla reptans,* ragwort *Jacobaea vulgaris,* Yorkshire fog *Holcus lanatus*, common mouse-ear *Cerastium fontanum,* white clover *Trifolium repens*, red clover *Trifolium pratense*, selfheal *Prunella vulgaris*.

This habitat is widespread in the area. The species of which it is composed are common and widespread in the area. It is of local importance, lower value.

**GS2 x WS1 Dry meadows and grassy verges x Scrub matrix**

(some of this mosaic is within the footprint of the proposed upgrade works).

Species include prickly sow thistle *Sonchus asper,* Broad-leaved plantain *Plantago major,* colt's foot *Tussilago farfara,* bird's-foot trefoil *Lotus corniculatus*, false oat-grass *Arrhenatherum elatius*, cocksfoot *Dactylis glomerata*, Ribwort plantain *Plantago lanceolate,* knapweed *Centaurea nigra,* lesser stitchwort *Stellaria graminea,* dog rose *Rosa arvensis,* bramble *Rubus fructicosus* agg., creeping bentgrass *Agrostis stolonifera,* greater birdsfoot trefoil *Lotus pedunculatus,* tufted vetch *Vicia cracca*, alder *Alnus glutinousa* (dominant), willow *Salix* Sp., oak *Quercus* sp. (occasional), birch *Betula pendula* sp., hawthorn *Crataegus monogyna.*

Limited bird nesting potential; only edge of GS2/WS1 is within the footprint of the proposed upgrade works.

Although this habitat is relatively species-rich, the species are widespread and common in the wider area. There is, however, limited bird-nesting potential. It is of local importance, lower value.

**ED3 x GS2 Recolonising bare ground x Dry meadows and grassy verges matrix, with WS1 Scrub**

Young trees (road planting) along the edge. Alder *Alnus glutinousa*, hawthorn *Crataegus monogyna*, willow *Salix* Sp. No bat-roosting potential. Limited bird nesting potential, but birds are active in the immediate area.

An area of the bank within the footprint of the proposed upgrade works is covered in winter heliotrope *Petasites fragrans.* Part of bank will have to be lowered, also resulting in removal of some trees.

The tree species comprising this habitat are common and widespread in the area. They are immature, and offer no bat-roosting potential. They do, however, offer limited bird-nesting potential.

There is extensive winter heliotrope along the bank within the footprint of the proposed upgrade works. This is a non-native, invasive species. Therefore, this habitat is considered to be of local importance, lower value.

*Node 2.1*

**BL3 Buildings and artificial surfaces**

One drain grate present beside north island; three present to west and downhill (within 5m) of both islands (2 of these were blocked with earth & debris when observed).

Open drain to east/downhill of islands intercepted by drain inlets.

Path for direct surface runoff exists via carpark on slope adjacent to Blackwater. Highly unlikely runoff would travel this way, however, due to large number of drain grates/inlets between this area and Blackwater.

This habitat type is of no ecological value. There is a hydrological connection to the River Blackwater but the surface water from the road will be intercepted by the road drainage.

*Node 2.2*

**BL1 Stones walls and other stonework**

High (2m) stone wall with occasional crevices; ivy *Hedera helix* and ivy-leaved toadflax grow on the wall. Topped with bushy understory/outer edge of woodland behind.

The species growing on the wall are common and widespread. This habitat is considered to be of local importance, low value.

**WD1 (Mixed) broadleaved woodland**
Part near wall is lower, bushy, and regularly trimmed. Larger trees are set back several metres. Wych elm *Ulmus glabra*, sycamore *Acer pseudoplatanus*, ash *Fraxinus excelsior*, beech *Fagus sylvatica*, hawthorn *Crataegus monogyna*. Lower bushy growths of wych elm *Ulmus glabra*, beech *Fagus sylvatica* and wild privet *Ligustrum vulgare* grow over the top of the wall.

No trees with bat-roosting potential within the footprint of the proposed activities, but there is bird nesting potential. A single, small Himalayan honeysuckle *Leycesteria formosa* (small plant) growing on top of wall at 52.140778, -8.286207

The species present are relatively widespread and common. There is bird-nesting potential. The habitat is considered to be of local importance, higher value.

*Node 2.3*

**WS2 X WL1 Immature woodland x hedgerow matrix**

Ash *Fraxinus excelsior*, ivy *Hedera helix*, bramble *Rubus fructicosus* agg., Traveller's-joy *Clematis vitalba* present in most sections.

The existing habitat is subject to regular trimming. The species present are common in the wider area. The habitat is of local importance, lower value.

*Node 2.4*

**GS2 Dry meadows and grassy verges**
Trimmed verge bordered by bank (also GS2). False oat-grass *Arrhenatherum elatius*, cleavers *Galium aparine,* bracken *Pteridium aquilinum*, hedge woundwort *Stachys sylvatica*, winter heliotrope *Petasites fragrans*. There is also a single sessile oak *Quercus petraea* which has been trimmed. Winter heliotrope is present over large parts of verge and bank within the footprint of the proposed upgrade works.

The verge is subjected to regular trimming and the species present are common and widespread. The verge is above road level so earth will have to be disturbed and moved in order to widen the road.

Winter Heliotrope is an invasive species which spreads by rhizomes. Removal of earth could result in the spread of this species. This would have a long-term, significant effect on the habitat. The habitat is of local importance, lower value.

*Node 2.5*

**GA2 Amenity grassland (improved)**

Short-cropped grass (*Lolium perenne*) with creeping cinquefoil *Potentilla reptans*, red clover *Trifolium pratense* and white clover *Trifolium repens*.

Species-poor habitat, widespread and common. Local importance lower-value

**GS2 Dry meadows and grassy verges x Hedgerow mosaic**
One section is bank with false oat grass *Arrhenatherum elatius*, cleavers *Galium aparine*, bramble *Rubus fructicosus* agg., ragwort *Jacobaea vulgaris*, *Calystegia sepium*, dog rose *Rosa arvensis.*
This becomes a trimmed hawthorn *Crataegus monogyna* and bramble *Rubus fructicosus* agg. hedge as the field boundary turns the corner. Some of this hedgerow/bank will be required to be removed. Limited potential for nesting birds.

Species present are common and widespread. Limited potential for nesting birds. Habitat is considered to be of local importance, lower value.

**BL1/GS2 Stone walls and other stonework x Dry meadows and grassy verges**

Old stone wall covered in ivy *Hedera helix* in parts, bordered by *GS2.* Part of wall is newer and has been repointed; other section is constructed from larger stones with more gaps in between. Older section also has herb Robert and Silky Wall Feather-moss *Homalothecium sericium*. A section of this stone wall is required to be removed. A drain grate is present but is outside the footprint of the proposed upgrade works and not immediately adjacent to the wall.

Stone wall is covered with dense ivy in parts. This offers some bird-nesting potential to common passerine species, in which case it is considered to be of local importance, higher value.

*Node 2.6*

**BL1 Stone walls and other stone work**
Old stone wall with dense growths of ivy *Hedera helix*. Bramble *Rubus fruticosus* agg., maidenhair spleenwort *Asplenium trichomanes*, Pellitory-of-the-wall *Parietaria officinalis* and herb Robert *Geranium robertianum* also present.

The receiving environment consists of habitats (and associated species) which are widespread and common in the area. They are considered to be of local importance, lower value. However, during the bird-nesting season there is limited potential for smaller species to use this as a nesting site. At this period, it would be considered to be of local importance, higher value.

**GS2 Dry meadows and grassy verges**
On either side of the wall. False oat *Arrhenatherum elatius* abundant. Nettle *Urtica dioica*, sycamore *Acer pseudoplatanus* (sapling), Ragwort *Jacobaea vulgaris.*

The receiving environment consists of habitats (and associated species) which are widespread and common in the area. They are considered to be of local importance, lower value. However, during the bird-nesting season there is limited potential for smaller species to use this as a nesting site. At this period, it would be considered to be of local importance, higher value.

**GA1 Improved agricultural grassland**
Present in the hill behind the wall.

The receiving environment consists of habitats (and associated species) which are widespread and common in the area. They are considered to be of local importance, lower value. However, during the bird-nesting season there is limited potential for smaller species to use this as a nesting site. At this period, it would be considered to be of local importance, higher value.

*Node 2.7*

**BL1 Stone walls and other stonework**
Dense growths of ivy Hedera helix covering the wall, with abundant ivy broomrape *Orobanche* hederae growing on top (40-50 flowering stems). Dandelion *Taraxacum vulgaria*, nipplewort *Lapsana communis*, herb Robert *Geranium robertianum*, Silky Wall Feather-moss *Homalothecium sericium* , common polypody *Polypodium vulgare*, *Ribwort plantain Plantago lanceolata*, maidenhair spleenwort *Asplenium trichomanes*. Additional moss species present are Curving Feather-moss *Scorpiurium circinatum*, and Larger Mouse-tail Moss *Isothecium alopeceuroides.*

Habitats are considered to be of local importance, lower value.

**GS2 Dry meadows and grassy verges**
Along base of wall and also along section where no wall present (wire fence). False oat-grass *Arrhenatherum elatius* dominant.

Habitats are considered to be of local importance, lower value.

**GA1 Improved agricultural grassland**
Field behind wall is GA1.

No direct hydrological connection to Blackwater. The road elevates at the bridge, but there are no direct runoff paths along road. Road separated from river by walls.

Habitats are considered to be of local importance, lower value.

*Node 2.8*

**GS2 Dry meadows and grassy verges**

Separates woodland from road, also present along woodland path; dry swale present between road and woodland and road.

**GA1 Amenity grassland (Improved)**

To south of woodland

**WD1 (Mixed) broadleaved woodland**

The section of woodland proposed for clearing is mixed broadleaved woodland dominated by fully-grown beech *Fagus sylvatica* and Spanish chestnut trees. Younger trees including pedunculate oak *Quercus robur,* elder *Sambucus nigra* and Scot's pine *Pinus sylvestris* are present in the understory, in clearings and along edges. Western hemlock *Tsuga heterophylla* is also present (1-2 trees) within the footprint of the proposed upgrade works.

Wood dock *Luzula sylvatica,* Deer fern *Blechnum spicant* wood avens *Geum urbanum*, bracken *Pteridium aquilinum,* Honeysuckle *Lonicera periclymenum,* pendulous sedge *Carex pendula,* bilberry *Vaccinium myrtillus* are present in the ground and field layers, while rosebay willowherb *Chamerion angustifolium* occurred in clearings and along path edges. Moss species present include Fox-tail Feather-moss *Thamnobryum alopecurum,* Mouse-tail Moss *Isothecium myosuroides, and* Common Striated Feather-moss *Eurhynchium striatum.*

One mature, ivy- covered beech at the woodland entrance (ITM 572638.0334, 598457.0728) has moderate potential for roosting bats. Some broken limbs, and crevices formed by mature tangled ivy stems.

One chewed cone observed, indicating red squirrel present. There is also a mammal trail leading into the woodland from road.

The tree species present are both native (birch) and non-native (Spanish chestnut; beech). There is moderate bat-roosting potential within the ivy cover, and crevices (beech). These also offer potential habitat to other species including nesting bird species. They are, thus, considered to be of local importance, higher value.

**WL2 Treeline**

A section of treeline adjacent to the road. This is comprised of relatively young trees, dominated by beech *Fagus sylvatica,* with Spanish chestnut *Castanea sativa* also present. No drainage network present providing direct pathway to Blackwater; runoff along road may occur, but similarly to north bank, walls are present along roadsides, so pathway is through field gates.

The tree species present are both native (birch) and non-native (Spanish chestnut; beech). There is moderate bat-roosting potential within the ivy cover, and crevices (beech). These also offer potential habitat to other species including nesting bird species. They are, thus, considered to be of local importance, higher value.

*Node 2.9*

**WD1 (Mixed) broadleaved woodland**

Fully grown beech *Fagus sylvatica*, birch *Betula pendula*, Spanish chestnut *Castanea sativa* trees.

There are also a group of 4 Spanish chestnut *Castanea sativa* trees with low bat roosting potential at 52.135428, -8.397407. Some bat roosting opportunities in ivy *Hedera helix*. One has a crevice near the base.

The habitat is considered to be of local importance, higher value.

*Node 2.10*

**WD1 (Mixed) broadleaved woodland**

Fully grown beech *Fagus sylvatica*, Scots pine *Pinus sylvestris*, holly *Ilex aquifolium*, rowan *Sorbus aucuparia*. Foxglove *Digitalis pupurea* and hogweed *Heracleum sphondylium* along edge, *Blechnum spicant*, broad buckler-fern *Dryopteris dilitata*, soft shield-fern *Polystichum setiferum* in field layer.

The habitat is considered to be of local importance, higher value.

*Node 2.11*

**WS1/WL1/BL1 Scrub x Hedgerow X Stone walls and other stone work matrix**

Hedgerow on a bank with bramble *Rubus fruticosus* agg. and occasional hawthorn *Crataegus monogyna* trees. Stone wall covered in vegetation.

Potential for nesting birds.

False-oat grass *Arrhenatherum elatius*, soft shield-fern *Polysticum setiferum*, bramble *Rubus fructicosus* agg., wild privet *Ligustrum vulgare*, foxglove *Digitalis purpurea*, bush vetch *Vicia sepium*, wall pennywort *Umbilicus rupestris*, holly *Ilex aquifolium*, honeysuckle *Lonicera periclymenum*, nipplewort *Lapsana communis*, European gorse *Ulex europaeus* , Yorkshire fog *Holcus lanatus*, blackthorn *Prunus spinosa*, ivy *Hedera helix*, creeping buttercup *Ranunculus repens*, cow parsley *Anthriscus sylvestris*, cleavers *Galium aparine*, wild angelica Angelica sylvestris.

Habitat is of local importance, lower value as the species and habitat are common in the wider area. However, this will increase to local importance, higher value during the bird nesting season.

*Node 2.12*

**WS1 Scrub**

Goat willow *Salix caprea,* Rowan *Sorbus aucuparia.* Also a single European/hybrid larch *Larix* sp. present. Bird-nesting potential.

The habitats are widespread and local in the area. They do, however, offer nesting potential for birds. Thus, these are considered to be of local importance, higher value.

**GS2 Dry Meadows and grassy verges**

Yorkshire fog *Holcus lanatus*, ribwort plantain *Plantago lanceolata*, feather moss *Thuidium tamariscum*, bramble *Rubus fructicosus* agg., yarrow *Achillea millefolium*, big shaggy moss *Rhytidiadelphus triquetrus*.

The habitats are widespread and local in the area. They do, however, offer nesting potential for birds. Thus, these are considered to be of local importance, higher value.

*Node 2.13*

**WS1 Scrub**

Goat willow *Salix* caprea, downy birch *Betula pubescens*, rowan *Sorbus aucuparia*, sycamore *Acer pseudoplatanus*, bramble *Rubus fruticosus* agg., occasional sitka spruce *Picea sitchensis*.

Adjacent to conifer plantation dominated by sitka spruce *P. sitchensis*.

**HH1/GS2 Dry siliceous heath x Dry meadows and grassy verges**

The road verge supports dry heath species including tormentil *Potentilla erecta*, bilberry *Vaccinium myrtilus*, gorse *Ulex europaeus*. ling heather *Calluna vulgaris* and bell heather *Erica cinereal*, while a number of species commonly found in roadside verges including silverweed *Potentilla anserina* lesser stitchwort *Stellaria graminea,* herb Robert *Geranium robertianum*, greater bird's foot trefoil *Lotus pedunculatus*, selfheal *Prunella vulgaris,* creeping buttercup *Ranunculus repens*, red clover *Trifolium pratense*, knapweed and tufted vetch *Vicia cracca* are also present. A number of woodland and woodland-edge associated plants including woodrush *Luzula sylvatica,* foxglove *Digitalis purpurea* and deer fern *Blechnum spicant* are also present.

A drainage channel carrying flowing water is present along the western side of the road from 52.110507, -8.408371, flowing in a northerly direction. This can be assumed to flow into the Lisheen crossroads stream, c. 480m north. This watercourse is a tributary of the Blackwater.

WS1 Scrub is widespread and common in the area. While HH1/GS2 is relatively species-rich, it too is common in the immediate area. Proportionally, the area to be effected by the proposed upgrade works is minimal. There is, however, the potential for birds to use the habitats for nesting. The site is considered to be of local importance, higher value.

*Junction 1*

**Hedgerow (WL1)**

Hedgerow is comprised of an ornamental species of beech *Fagus* sp., with intermittent immature elder *Sambucus nigra* trees. It is assessed as being of local importance (lower value).

**Dry meadows and grassy verges (GS2)**

Common sorrel *Rumex acetosa,* creeping buttercup *Ranuculus repens,* annual meadow-grass *Poa annua*, broad-leaved dock *Rumex obtusifolius* and yarrow *Achillea millefolium*.

*Offsite Turning and Transfer area*

**Scrub (WS1) x dry meadows and grassy verges (GS2) mosaic**

This habitat is present as narrow strips at the entrance of the turning area, and either side of the forestry track. The scrub is dominated by willow *Salix caprea*, and willowherb *Epilobium hirsutum.* Alder *Alnus glutinosa* is also abundant. Lower vegetation is dominated by knapweed *Centaurea nigra* and ribwort plantain *Plantago lanceolata*. There is abundant hogweed is the main species recolonising the bare ground. Nettles *Urtica dioica*, dock *Rumex acetosa*, and hogweed *Heracleum sphondylium* are also frequent. It is assessed as being of lower importance (higher value).

**Drainage ditch (FW4)**

Narrow drainage ditches (c.a. 1m wide) run along either side of the forestry track. These were wet during the survey, though not flowing. This habitat is not of significant ecological value.

**Buildings and artificial surfaces (BL3)**

The access track and forestry road is comprised of an artificial surface. No effect is envisaged. This habitat is not of significant ecological value.

**Conifer plantation (WD4)**

A dense, mature conifer plantation (c.a. 15-20m high) comprised mainly of sitka spruce *Picea sitchensis* is present. it is deemed as being of local importance (lower value).

#### *8.3.2.6 Sensitivity*

Terrestrial Habitats are sensitive to direct land take, pollution, and environmental changes resulting from modification such as increased drainage. Groundwater dependant habitats such wetlands and peatland habitats may be sensitive to changes in groundwater regimes or changes in ground water quality. The diversity of habitats is particularly sensitive to encroachment from invasive species which may out-compete local native species. Habitats are also sensitive to Human activities such as burning and recreational use.

#### *8.3.2.7 Receiving Environment*

It is assumed in this report that the baseline environment in relation to Terrestrial Habitats, as identified above, will be the receiving environment at the time of construction and during the operational phase.

##### 8.3.2.7.1 Trends

The present survey forms a baseline classification of habitats on or near the subject development. No previous habitat information at a suitable scale is available from which trends can be identified or changes evaluated.

As such, a scenario in which the Subject Development does not take place would result in a continuation of current trends relating to habitats within the study area.

#### 8.3.2.7.2 Receiving Environment (Baseline plus trends)

It is assumed in this report that the baseline environment in relation to Terrestrial Habitats, as identified above, will be the receiving environment at the time of construction and during the operational phase.

**Table 8-30: Summary of Habitat Evaluations, Habitats by Area and Receptors within CGEP Study Area**

| Fossitt Code | Area in Hectares to be lost (ha) | Evaluation | Selected as Important Ecological Feature |
|---|---|---|---|
| WD4 Conifer Plantation | 22.76 | Local Importance (Lower Value) | No |
| WD1 Mixed Broadleaved Woodland | 0.03 | Local Importance (Lower Value) | **Yes** |
| WS5 Recently Felled Woodland | 6.91 | Local Importance (Lower Value) | No |
| ED2 Spoil and Bare Ground | 4.13 | Local Importance (Lower Value) | No |
| WS1 Scrub | 1.64 | Local Importance (Higher Value) | **Yes** |
| GA1 Improved Agricultural Grassland | 1.92 | Local Importance (Lower Value) | No |
| GS4/HH1 Wet Grassland/Dry Siliceous Heath Mosaic | 0.11 | Local Importance (Higher Value) | Yes |
| GS4 Wet Grassland | 0.34 | Local Importance (Higher Value) | **Yes** |
| BL3 Buildings and Artificial Surfaces | 0.003 | Local Importance (Lower Value) | No |
| ED3 Recolonising Bare Ground | 0.43 | Local Importance (Lower Value) | No |
| WD4/WS1 Conifer Plantation/Scrub Mosaic | 0.06 | Local Importance (Lower Value) | No |
| HH3/WS1 Wet Heath/Scrub Mosaic | 0.005 | Local Importance (Higher Value) | No |
| GS2 Dry Meadows and Grassy Verges | 0.006 | Local Importance (Higher Value) | No |

| Fossitt Code | Area in Hectares to be lost (ha) | Evaluation | Selected as Important Ecological Feature |
|---|---|---|---|
| HH3 Wet Heath | 0.000 | Local Importance (Higher Value) | No |
| HD1 Dense Bracken | 0.000 | Local Importance (Lower Value) | No |
| GA2 Amenity Grassland | 0.000 | Local Importance (Lower Value) | No |
| FL8 Other Artificial Lakes | 0.000 | Local Importance (Lower Value) | No |
| GS4/HH3 Wet Grassland/Wet Heath | 0.000 | Local Importance (Higher Value) | No |

**Table 8-31: Summary of Linear Habitat Evaluations, Habitats by Length and Receptors within CGEP Study Area**

| Fossitt Code | Length in Meters to be lost (m) | Evaluation | Selected as Important Ecological Feature |
|---|---|---|---|
| WL1 Hedgerows | 0 | Local Importance (Higher Value) | No |
| WS1 Scrub (linear) | 136 | Local Importance (Higher Value) | **Yes** |
| FW1 Eroding/Upland Rivers | 0.0 | Local Importance (Higher Value) | No |
| BL2 Earth Banks | 8.6 | Local Importance (Lower Value) | No |
| WL2 Treelines | 70 | Local Importance (Higher Value) | **Yes** |

**Table 8-32: Summary of Habitat Evaluations, Habitats by Area and Receptors within the Grid Connection Route Study Area**

| Fossitt Code | Area in Hectares to be lost (ha) | Evaluation | Selected as Important Ecological Feature |
|---|---|---|---|
| WD4 Conifer Plantation | 0.21 | Local Importance (Lower Value) | No |
| GA1 Improved Agricultural Grassland | 0.00 | Local Importance (Lower Value) | No |
| BL3 Buildings and Artificial Surfaces | 0.00 | Local Importance (Lower Value) | No |
| GS4 Wet Grassland | 0.00 | Local Importance (Higher Value) | No |
| GA2 Amenity Grassland | 0.00 | Local Importance (Lower Value) | No |
| WS5 Recently Felled Woodland | 0.00 | Local Importance (Lower Value) | No |
| WS1 Scrub | 0.00 | Local Importance (Higher Value) | No |
| BL3/GA2 Build Land/Amenity Grassland Mosaic | 0.00 | Local Importance (Lower Value) | No |
| ED2 Spoil and Bare Ground | 0.00 | Local Importance (Lower Value) | No |
| WD1 (Mixed) Broadleaved Woodland | 0.00 | Local Importance (Higher Value) | No |
| WL2 Treelines | 0.00 | Local Importance (Higher Value) | No |
| GA1/WS1 Improved Agricultural Grassland/Scrub Mosaic | 0.00 | Local Importance (Higher Value) | No |
| WD4/WS1 Conifer Plantation/Scrub Mosaic | 0.00 | Local Importance (Lower Value) | No |
| ED3 Recolonising Bare Ground | 0.00 | Local Importance (Lower Value) | No |

| Fossitt Code | Area in Hectares to be lost (ha) | Evaluation | Selected as Important Ecological Feature |
|---|---|---|---|
| GA1/BL3 Improved Agricultural Grassland/Built Land Mosaic | 0.00 | Local Importance (Lower Value) | No |
| GA2/BL3 Amenity Grassland/Built Land Mosaic | 0.00 | Local Importance (Lower Value) | No |
| BC1 Arable Crops | 0.00 | Local Importance (Lower Value) | No |
| WS2 Immature Woodland | 0.00 | Local Importance (Higher Value) | No |
| WS1/GS2 Scrub/Dry Meadows and Grassy Verges Mosaic | 0.00 | Local Importance (Higher Value) | No |
| WS2/WS1 Immature Woodland/Scrub Mosaic | 0.00 | Local Importance (Higher Value) | No |
| BL3/WS1 Built Land/Scrub Mosaic | 0.00 | Local Importance (Higher Value) | No |
| HD1 Heath and Dense Bracken | 0.00 | Local Importance (Lower Value) | No |
| GA2/BC4 Amenity Grassland/Flower Beds and Borders Mosaic | 0.00 | Local Importance (Lower Value) | No |

### 8.3.3 Avifauna

This section describes the results of bird surveys carried out for the proposed CGEP and CGEP Grid Connection Route. The study area employed for general bird species is defined, and a justification for its extent based on professional judgement and recognised best practice is provided. In addition to the bird surveys carried out a desktop review of existing available data was undertaken to identify any sensitive avifauna receptors present within the study area. The results of all surveys conducted yearly (2016 – 2019 inclusive) are summarised for each identified key bird species and all data gathered during the surveys is presented in tabular format in **Appendix A.**

#### *8.3.3.1 Study Area*

The study area extents are presented in **table 8-35** below.

**Table 8-33: Study area for general bird species and justification for study area extent,**

| Study Area for General Bird Species | Justification for the Study Area Extents |
|---|---|
| 1. 100m area around and incorporating the construction works areas - species numbers and density<br>2. 50m area around and incorporating the construction works areas - habitat suitability evaluations<br>3. 50m area around and incorporating the construction works areas -Barn Owl Building Suitability<br>4. 500m area around and incorporating the construction works areas- Kingfisher<br>5. Watercourse Crossing Locations (bridge and adjacent riparian) - Grey Wagtail and Dipper<br>6. Within viewshed of vantage points (see **Figure 8.27)**<br>7. Within suitable habitat within the 2km hinterland for Merlin | 1. Professional judgement and as per Best Practice (BWI, 2012; CIEEM, 2016; NRA, 2008; Lusby et al., 2010; SNH 2017; TII, 2017; EPA, 2006) |

#### *8.3.3.2 Desktop Study*

Results of the desktop study for bird records are presented in **Table 8-34** overleaf. The receiving environment in the CGEP and CGEP Grid Connection Route study area supports a wide variety of general bird species of open countryside, farmland and woodland. Some migratory species are only present during the summer or winter months within which they disperse widely over suitable habitat, whilst other sedentary species are present throughout the year. A number of Annex I bird species and red and amber listed species of conservation concern have been recorded in the four hectads (10km x 10km Irish grid squares) covering the CGEP project study area, this represents a typical assemblage of bird species for such an extensive study area. Of note however is the high number of Hen Harrier records (39) retrieved; this is reflective of the known occurrence of breeding Hen Harriers within the study area.

**Table 8-34: Species of Birds recorded historically within the 10km squares (W68, W69, W79 and W89) in which CGEP is located, from desktop review**

| Common name | Scientific Name | Birds Directive | BoCCI | W68 | | W69 | | W79 | | W89 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Max | Date | Max | Date | Max | Date | Max | Date |
| Mute Swan | *Cygnus olor* | | Amber | 1 | 29/2/84 | 17 | 31/12/11 | 10 | 31/12/11 | 25 | 31/12/11 |
| Whooper Swan | *Cygnus Cygnus* | Annex I | Amber | | | 1 | 31/12/01 | | | 5 | 08/02/15 |
| Shelduck | *Tadorna tadorna* | | Amber | | | 1 | 31/12/01 | | | | |
| Wigeon | *Anas Penelope* | | Red | | | 1 | 31/12/01 | | | 2 | 31/12/11 |
| Shoveler | *Anas clyptea* | | Red | | | 1 | 31/12/01 | | | | |
| Teal | *Anas crecca* | | Amber | 1 | 29/02/84 | 5 | 31/12/11 | 5 | 31/12/11 | 11 | 31/12/11 |
| Pochard | *Aythya farina* | | Red | | | 1 | 31/12/01 | | | | |
| Tufted Duck | *Aythya fuligula* | | Red | | | 1 | 31/12/01 | 2 | 31/12/11 | | |
| Scaup | *Aythya marila* | | Amber | 1 | 29/02/84 | | | | | | |
| Goldeneye | *Bucephala clangula* | | Red | 1 | 29/02/84 | 1 | 31/12/01 | | | | |
| Red Grouse | *Lagopus lagopus* | | Red | | | 1 | 31/07/72 | | | | |
| Grey Partridge | *Perdix perdix* | | Red | | | | | | | 2 | 31/12/11 |
| Little Grebe | *Tachybaptus ruficollis* | | Amber | | | | | 1 | 31/07/72 | 2 | 31/12/11 |
| Cormorant | *Phalacrocorax carbo* | | Amber | 3 | 31/12/11 | 9 | 31/12/11 | 10 | 31/12/11 | 12 | 31/12/11 |
| Sparrowhawk | *Accipiter nisus* | | Amber | 16 | 04/08/17 | 15 | 31/12/11 | 8 | 31/12/11 | 14 | 31/12/11 |
| Goshawk | *Accipiter gentilis* | | Amber | 2 | 31/12/11 | 1 | 31/12/11 | | | | |
| Hen Harrier | *Circus cyaneus* | Annex I | Amber | 11 | 31/12/11 | 16 | 26/6/26 | 12 | 10/04/16 | | |
| Corncrake | *Crex crex* | Annex I | Red | 1 | 31/07/72 | | | | | 1 | 31/07/72 |
| Coot | *Fulica atra* | | Amber | | | 3 | 31/12/11 | 2 | 31/12/11 | | |
| Lapwing | *Vanellus vanellus* | | Red | 4 | 31/12/11 | 1 | 31/12/01 | 2 | 29/02/84 | 5 | 31/12/11 |
| Golden Plover | *Pluvialis aprocaria* | Annex I | Red | | | 1 | 31/12/01 | 4 | 31/12/11 | 5 | 31/12/11 |
| Woodcock | *Scolopax rusticola* | | Red | 2 | 31/12/11 | 6 | 31/12/11 | 3 | 31/12/11 | 3 | 31/12/11 |
| Jack Snipe | *Lymnocryptes minimus* | | Amber | | | | | 2 | 31/12/11 | 2 | 31/12/11 |
| Snipe | *Gallinago gallinago* | | Amber | 7 | 31/12/11 | 7 | 31/12/11 | 4 | 31/12/11 | 10 | 31/12/11 |
| Black-tailed Godwit | *Limosa limosa* | | Amber | | | 1 | 31/12/01 | | | | |
| Curlew | *Numenius arquata* | | Red | 3 | 03/08/17 | 4 | 31/12/11 | 3 | 31/07/91 | 1 | 29/02/84 |

| Common name | Scientific Name | Birds Directive | BoCCI | W68 | | W69 | | W79 | | W89 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Max | Date | Max | Date | Max | Date | Max | Date |
| Redshank | *Tringa totanus* | | Red | | | 1 | 31/12/01 | | | | |
| Common Sandpiper | *Actitis hypoleucos* | | Amber | | | 1 | 31/12/01 | | | 3 | 31/12/11 |
| Dunlin | *Calidris alpina* | Annex I | Red | | | 1 | 31/12/01 | | | | |
| Black-headed Gull | *Chroicocephalus ridibundus* | | Red | 1 | 29/02/84 | 2 | 31/12/01 | 4 | 31/07/91 | 3 | 31/12/11 |
| Common Gull | *Larus canus* | | Amber | | | 1 | 31/12/01 | 1 | 29/02/84 | 2 | 31/12/11 |
| Great Black-backed Gull | *Larus marinus* | | Amber | | | 1 | 29/02/84 | | | 1 | 29/02/84 |
| Herring Gull | *Larus argentatus* | | Red | 1 | 29/02/84 | 1 | 29/2/84 | 1 | 29/02/84 | | |
| Lesser Black-backed Gull | *Larus fuscus* | | Amber | 1 | 31/12/01 | | | | | 7 | 31/12/11 |
| Stock Dove | *Columba oenas* | | Amber | 4 | 31/12/11 | 5 | 31/12/11 | 4 | 31/12/11 | 14 | 31/12/11 |
| Barn Owl | *Tyto alba* | | Red | 3 | 30/11/17 | 1 | 27/07/16 | 4 | 31/12/11 | 3 | 31/12/11 |
| Short-eared Owl | *Asio flammeus* | Annex I | Amber | | | | | | | 2 | 31/12/11 |
| Nightjar | *Caprimulgus europeaus* | | Red | | | 1 | 31/7/72 | | | | |
| Swift | *Apus apus* | | Amber | 1 | 31/07/72 | 5 | 31/12/11 | 5 | 31/12/11 | 14 | 31/12/11 |
| Kingfisher | *Alcedo atthis* | Annex I | Amber | | | 9 | 31/12/11 | 11 | 31/12/11 | 18 | 31/12/11 |
| Kestrel | *Falco tinnunculus* | | Amber | 14 | 11/06/17 | 28 | 22/09/16 | 14 | 31/12/11 | 15 | 31/12/11 |
| Merlin | *Falco colimbarius* | Annex I | Amber | 3 | 31/12/11 | | | 1 | 31/12/11 | | |
| Peregrine | *Falco peregrinus* | Annex I | Green | 4 | 31/12/11 | 3 | 31/12/11 | 3 | 31/12/11 | 7 | 31/12/11 |
| Skylark | *Alauda arvensis* | | Amber | 7 | 31/12/11 | 10 | 31/12/11 | 10 | 31/12/11 | 10 | 31/12/11 |
| Sand Martin | *Riparia riparia* | | Amber | 3 | 31/12/11 | 14 | 31/12/11 | 8 | 21/05/16 | 14 | 31/12/11 |
| Swallow | *Hirundo rustica* | | Amber | 13 | 04/08/17 | 31 | 31/12/11 | 13 | 31/12/11 | 24 | 03/07/16 |
| House Martin | *Delichon urbicum* | | Amber | 7 | 31/12/11 | 8 | 31/12/11 | 10 | 31/12/11 | 9 | 31/12/11 |
| Goldcrest | *Regulus regulus* | | Amber | 19 | 31/12/11 | 27 | 31/12/11 | 14 | 31/12/11 | 31 | 31/12/11 |
| Starling | *Sturnus vulgaris* | | Amber | 23 | 22/05/16 | 21 | 31/12/11 | 10 | 31/12/11 | 34 | 31/12/11 |
| Mistle Thrush | *Turdus viscivorus* | | Amber | 11 | 22/05/16 | 15 | 31/12/11 | 10 | 31/12/11 | 21 | 31/12/11 |

| Common name | Scientific Name | Birds Directive | BoCCI | W68 | | W69 | | W79 | | W89 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Max | Date | Max | Date | Max | Date | Max | Date |
| Spotted Flycatcher | *Muscicapa striata* | | Amber | 4 | 04/08/17 | 12 | 31/12/11 | 4 | 31/12/11 | 11 | 31/12/11 |
| Robin | *Erithracus rubecula* | | Amber | 28 | 31/12/11 | 32 | 31/12/11 | 21 | 31/12/11 | 38 | 03/07/16 |
| Stonechat | *Saxicola rubicola* | | Amber | 6 | 31/12/11 | 19 | 31/12/11 | 7 | 31/12/11 | 12 | 31/12/11 |
| Dipper | *Cinclus cinclus* | | Green | 9 | 31/12/11 | 31 | 31/12/11 | 12 | 31/12/11 | 36 | 08/02/15 |
| House Sparrow | *Passer domesticus* | | Amber | 12 | 01/07/17 | 18 | 31/12/11 | 16 | 31/12/11 | 31 | 31/12/11 |
| Grey Wagtail | *Motacilla cinerea* | | Red | 10 | 14/06/16 | 32 | 31/12/11 | 19 | 31/12/11 | 45 | 21/03/12 |
| Meadow Pipit | *Anthus pratensis* | | Red | 13 | 31/12/11 | 29 | 31/12/11 | 14 | 31/12/11 | 18 | 31/12/11 |
| Greenfinch | *Carduelis chloris* | | Amber | 9 | 10/06/17 | | | 10 | 31/12/11 | 30 | 31/12/11 |
| Linnet | *Linaria cannabina* | | Amber | 13 | 31/12/11 | 18 | 31/12/11 | 8 | 31/12/11 | 13 | 31/12/11 |
| Yellowhammer | *Emberiza citrinella* | | Red | | | 6 | 31/12/11 | 6 | 31/12/11 | 16 | 31/12/11 |

#### *8.3.3.3 Survey Results*

##### 8.3.3.3.1 General Breeding Birds

A standardised Breeding bird transect survey (BirdWatch Ireland, 2012) was undertaken along seven 1-km transects within the CGEP study area during 2016 and 2017.

A total of 42 species were recorded from these transects surveys. Of these, four species (Herring Gull, Cuckoo, Jackdaw and Siskin) were only recorded in flight, or over 100m from the transect route. One further species (Lesser Black-backed Gull) breeds on coasts or large inland waterbodies in Ireland and are likely to have been recorded on passage through the survey area. Due to the distance from the surveyor and bird behaviour, these species are not considered further here.

Of the remaining 37 species, one (Meadow Pipit) is Red-listed as a Bird of Conservation Concern in Ireland (BoCCI; Colhoun & Cummins, 2013). A further nine Amber-listed BoCCI species were recorded (Skylark, Swallow, Goldcrest, Starling, Mistle Thrush, Robin, Stonechat, Wheatear and Linnet). Although breeding status was not confirmed during this survey effort it is likely that all these species could potentially breed within or in proximity to the survey area due to the presence of suitable habitats.

The species recorded during the surveys within the survey area are all representative of common and widespread terrestrial breeding bird communities in Ireland, being typical of the mosaic of farmland and woodland found adjacent to the transects routes.

##### 8.3.3.3.2 General Wintering Birds

A repeat of the breeding bird survey within the CGEP area was undertaken in the winter period (December 2106 – February 2017). For these surveys, a total of 33 species were recorded from the seven, 1-km transects surveyed. As with summer, Meadow Pipit was the only BoCCI Red-listed species recorded, along with ten BoCCI Amber-listed species (Teal, Hen Harrier, Snipe, Kestrel, Goldcrest, Starling, Mistle Thrush, Robin, Stonechat and Linnet).

Based on the range of terrestrial habitats mapped and based on observations made during these surveys, the general wintering bird community is typical of common and widespread bird communities found in the wider countryside in Ireland.

##### 8.3.3.3.3 Buzzard

Buzzard are resident to Ireland with a widespread distribution. Observations of Buzzard were recorded during Vantage Point surveys of the proposed CGEP and grid connection route. Buzzard were frequently recorded during Vantage Point surveys and are therefore likely to nest in the area. A minimum of 1-2 pairs occur, however no nests were recorded within 500m of proposed turbine locations.

Within the CGEP study area, from March 2016 to September 2019 there were a total of 199 sightings of Buzzard during Vantage Point surveys amounting to a total of 82,106s of observation. A total of 51 sightings of Buzzard, amounting to a total of 7,306 seconds of observation were recorded from the CGEP Grid Connection route study area From October 2017 to August 2018.

##### 8.3.3.3.4 Whooper Swan

Whooper Swan were historically recorded proximal to the CGEP and GCR area and were included as a target species for VP watches, due to potential impacts from the proposed development on migratory or commuting birds. A survey of wetlands in the hinterland of the study area, particularly along the River Blackwater to the north of the site, was also undertaken in winter (of 2016/17 and also 2017/18) to look for foraging or roosting Whooper Swans. These surveys (the dedicated swan/goose surveying, as well as VP watches) included both dawn and dusk periods when Whooper Swans may be commuting between roosting and foraging areas.

No Whooper Swans were recorded during these surveys. Two Mute Swans were recorded at Killavullen during the River Blackwater surveys. However, as Mute Swan are typically more sedentary than Whooper Swans, this species was not considered to be at risk from the proposed development.

#### 8.3.3.3.5 Goshawk

Goshawk is a very rare breeder in Ireland, with fewer than five pairs confirmed annually. Goshawks need woodland edge and open country habitats for hunting but use mature woodlands or mature conifer plantations for nesting.

Data from the CGEP VP surveys would suggest that Goshawk may have nested in the vicinity of the CGEP area in 2017, with several observations from the breeding season.

- March 2017: One bout on-site lasting 97 seconds;
- April 2017: Three bouts (on- and off-site) lasting a combined duration of 841 seconds;
- July 2017: One bout on-site lasting 25 seconds
- August 2017: Two bouts on-site lasting 41 seconds
- October 2017: One bout on-site lasting 9 seconds

In 2018, targeted surveys to look for breeding Goshawk were undertaken in April. This involved walking transects through a representative sample of suitable habitat to look for displaying birds. No Goshawk were recorded during these surveys. Furthermore, there were relatively few sightings in 2018 from VP surveys (despite some VP surveys being timed to target the most active dawn period for displaying Goshawk), with records largely restricted to the winter months. Collectively, these suggest that breeding that year was unlikely, although the breeding behaviour of this species, coupled with habitat selection for nesting sites, can make detection of breeding birds difficult and this constraint is recognised.

Four bouts of Goshawk were observed from VP surveys in 2018. Goshawk were only observed once during 2019, although the sighting in May suggests that breeding may have been possible. No Goshawk were observed in 2020. Sightings of Goshawk from VP surveys in 2018 and 2019 were:

- February 2018: One bout off-site lasting 6 seconds
- March 2018: Two bouts, both on-site, lasting a total of 123 seconds
- October 2018: One bout on-site lasting 14 seconds
- May 2019: One bout off-site lasting 30 seconds
- September 2019: Two bouts, both onsite, but less than 15m in height, of total duration 22s.

Goshawk flightlines recorded from 2016 to 2019 are presented in **Figure 8.33**.

No Goshawk were observed during any of the bird survey work undertaken in the CGEP Grid Connection Route Study Area.

#### 8.3.3.3.6 Golden Plover

Golden Plover breed in heather moors, blanket bogs and acidic grasslands and disperse widely over the winter months. Wintering Golden Plover use wide open expanses of pasture and tilled land. Golden Plover have a very restricted breeding distribution in Ireland (typically located on upland blanket bogs in the north and west of the country).

No suitable breeding habitat for Golden Plover was recorded within the CGEP survey area. However, suitable winter habitat for Golden Plover, consisting of pasture in large open fields was recorded.

A total of four bouts of Golden Plover were observed during VP surveys on the wind farm:

- January 2017: Two bouts on-site, both comprising flocks of Golden Plover with a flock of 40 observed for 49 seconds and a flock of 30 observed for 9 seconds; and
- October 2017: Two bouts on-site, both comprising flocks of Golden Plover with a flock of 9 observed for 44 seconds and a flock of 25 observed for 62 seconds.

Golden plover flightlines recorded during surveys of the CGEP are illustrated in **Figure 8.35.** No other Golden Plover were recorded during field surveys.

As with the CGEP study area, no suitable breeding habitats were recorded within the Grid Connection Route Study Area for Golden Plover. However, suitable foraging habitat for wintering birds was present.

Five bouts of Golden Plover activity were observed during VP watches on the CGEP grid connection route:

- October 2017: One bout lasting 12 seconds
- November 2017: Two bouts involving two flocks of birds (73 and 60), lasting 160 seconds
- January 2018: Two bouts involving a flock of 40 individuals and two individuals, lasting a combined total of 31 seconds.

Golden Plover flightlines recorded during surveys of the CGEP Grid Connection Route are presented in **Figure 8.35**.

#### 8.3.3.3.7 Snipe

Snipe typically like well-vegetated, damp habitats for nesting and feeding, with the nest usually concealed within a tussock or similar, herbaceous vegetation. They are more tolerant of trees than other wader species, although still prefer open habitats where these are available.

For the CGEP study area, the only records for Snipe obtained for bird surveys were during the winter period, with six birds recorded from three wintering bird transects (one on Transect T1 and T3 and four on Transect T2). A total of nine bouts were also recorded during VP surveys:

- November 2018: one bout on-site lasting 10 seconds;
- December 2018: two bouts (one on-site and one off-site) involving three birds (one on-site and two off-site) lasting a combined total of 17 seconds (7 seconds on-site and 10 seconds off-site);
- January 2019: One bout off-site lasting 10 seconds;
- February 2019: Three bouts (one on-site and two off-site) involving seven birds (two on-site and five off-site) lasting a combined total of 37 seconds (30 seconds on-site and 7 seconds off-site); and
- March 2019: Two bouts on-site lasting 42 seconds.

The only record of Snipe noted during fieldwork within the CGEP Grid Connection Route study area was of a single bird flushed and caught by a juvenile Peregrine in October 2017 during VP surveys.

#### 8.3.3.3.8 Woodcock

Woodcock are currently Red-listed Birds of Conservation Concern in Ireland (Colhoun & Cummins, 2013) due to a decline (73%) in their breeding range between the 1970 and 2007-11 breeding bird atlases (Sharrock, 1974; Balmer *et al.*, 2013). Woodcock nest in woodland habitats, preferring open, mixed woodland or pre-thicket conifer plantations (Hoodless et al., 2009). They will forage in open woodland habitats, and grassland areas adjacent to woodlands during summer and winter.

The Bird Atlas 2007-11 (Balmer *et al.*, 2013) records "Possible" breeding in one of the 10km squares covering the site (W79) and were widely present during the winter. However, no Woodcock were recorded during any of the bird surveys undertaken for the work described here in the CGEP or Grid Connection Route. A Woodcock was recorded on a trail camera in winter 2016/17 (ITM co-ordinates of woodcock record: 568556-591720). See **Figure 8.62** for the location of this record.

#### 8.3.3.3.9 Eurasian Curlew

Curlew nest on the ground in a range of habitats in Ireland, from rough pasture, meadows and heather. Extensive changes to land-use in the upland areas, such as the harvesting of peat bogs, afforestation, intensive management of farmland and the abandonment of some lands, leading to encroachment by scrub, gorse and dense rushes, have all affected Curlew breeding habitats. In Ireland, the Curlew is not a common breeder, however it is found in most parts of the country.

Recent records for Curlew in the area (e.g. Balmer *et al.*, 2013) all relate to winter records. No Curlew were recorded during any of the bird survey fieldwork undertaken in the CGEP or Grid Connection Route Study Areas, including VP surveys.

#### 8.3.3.3.10 Barn Owl

Barn Owls are Red-listed in Ireland as a species of Conservation Concern (Colhoun & Cummins, 2013). Most known nesting sites in Ireland are in derelict buildings, but they can also nest in suitable trees where cavities exist and will use artificially provided nesting boxes.

Data form the Bird Atlas 2007-11 notes that breeding was confirmed for Barn Owl in one 10km square (W79) to the north of the site (c. 5km from the proposed windfarm boundary). There was also a "Possible" breeding record c.3km south of the proposed wind farm boundary.

During field surveys, Barn Owl were confirmed roosting at one location, over 2km to the north of the proposed CGEP and CGEP Grid Connection Route. However, no breeding sites were recorded during any of the bird survey work undertaken within the CGEP or Grid Connection Route avifauna study area.

#### 8.3.3.3.11 Short-eared Owl

Short-eared Owl are very rare, irregular breeders in Ireland with most records referring to migratory or non-breeding individuals. A single wintering Short-eared Owl was noted during Bird Atlas 2007-11 fieldwork in proximity to the survey area and a breeding season record (but not necessarily confirmed breeding attempt) was noted in 2016 (Newton, 2016). No Short-eared Owls were observed during any of the field survey undertaken on the CGEP or grid connection study areas.

#### 8.3.3.3.12 Kingfisher

Kingfisher is on Annex I of the EU Birds Directive and Amber-listed in Ireland as a species of Conservation Concern (Colhoun & Cummins, 2013). Kingfishers require sandy or earth banks alongside the watercourse to establish their tunnel/burrow nests, and are typically associated with slow-flowing, depositing rivers with deep channels or pool systems for foraging (Snow & Perrins, 1998).

Kingfisher survey work along the River Coom and the River Bride did not identify any nesting Kingfishers (either birds seen or possible nesting holes). Although Kingfisher were recorded along the River Bride in the Bird Atlas 2007-11 (Balmer *et al.*, 2013) no Kingfisher were recorded anywhere upstream (i.e. to the west of) the River Bride crossing by the M8 (south of Fermoy) during this survey, indicating that Kingfishers, if present in this part of the Bride river system, are scarce. See **Figure 8.52** for the results of Kingfisher surveys (nil results).

#### 8.3.3.3.13 Kestrel

Kestrel is a raptor species which is widespread and common throughout the Irish countryside. Kestrels nest in trees, buildings and in cracks on cliffs and will utilise old crows' nests. Kestrel forage over moorland, farmland, wetlands and roadside verges. Kestrel is Amber-listed in Ireland as a species of Conservation Concern (Colhoun & Cummins, 2013).

Kestrels were recorded frequently during VP surveys of the CGEP study area. From March 2016 July 2019 a total of 550 bouts of Kestrel were recorded. These Kestrel sightings were observed for a total of 28856 seconds. A single Kestrel was recorded during winter transect surveys in 2017 on Transect 3.

Kestrels were also frequently recorded during VP surveys of the Grid Connection Route. From December 2017 to September 2018 a total of 73 bouts of Kestrel were recorded, 31 of these bouts were recorded as off-site.

#### 8.3.3.3.14 Merlin

Merlin typically nest on the ground in open areas of heather-covered bogs, although they will also nest in trees at the edge of such habitats. They forage over bog habitats as well as semi-natural grasslands for small bird prey species. Merlin disperse widely in the non-breeding season, with many immigrants arriving in Ireland from the north and east.

Merlin were recorded occasionally during the winter from Vantage Point surveys:

- March 2016: Two bouts (one on-site and one off-site) lasting 18 seconds (8 seconds on-site and 10 seconds off-site);
- April 2016: One bout off-site lasting 25 seconds;
- October 2016: One bout on-site lasting 7 seconds;
- February 2017: One bout off-site lasting 10 seconds;
- April 2017: Two bouts (one on-site and one off-site) lasting 8 seconds (5 seconds on-site and 3 seconds off-site);
- November 2017: One bout on-site lasting 5 seconds; and
- March 2018: One bout on-site lasting 27 seconds.

None of these records relate to the breeding season. Nevertheless, with a small area of potentially suitable habitat (bog) to the north of the CGEP around Knocknaskagh, and a possible breeding record made during fieldwork for the 2007-11 Bird Atlas (Balmer *et al.*, 2013 – identified during desktop study), a breeding Merlin survey in line with Best Practice was conducted during the breeding season of 2019. No evidence of breeding Merlin was observed during this survey. See **Figure 8.36** which illustrates all Merlin flightlines recorded during vantage point surveys from 2016 to 2019.

No suitable nesting habitats for Merlin were recorded in the Grid Connection Study Area, and no Merlin were observed during any of the bird survey work undertaken.

#### 8.3.3.3.15 Peregrine

Peregrine hunt over a variety of habitats, but typically nest on ledges or on crevices or holes on tall vertical structures (such as quarries, cliff-faces and tall buildings). Peregrine were recorded occasionally during VP surveys covering the CGEP study area, with observations more frequent during the winter period:

- March 2016: One bout on-site lasting 30 seconds;
- July 2016: One bout on-site lasting 54 seconds;
- December 2016: Three bouts (one on-site; two off-site) totalling 109 seconds (15 seconds on-site; 94 seconds off-site);
- January 2017: One bout of 360 seconds, including bird perching off-site for 240 seconds;
- February 2017: Two bouts on-site lasting 348 seconds (including one bird perching for 251 seconds);
- April 2017: One bout off-site lasting 247 seconds;
- July 2017: One juvenile observed perching (on site) for 1.5 hours;
- September 2017: Two bouts (one on-site and one off-site) lasting 96 seconds (6 seconds off-site and 90 seconds on-site);
- October 2017: Two bouts on-site lasting 51 seconds;
- April 2018: Pair observed displaying together (off-site) for 10 seconds;
- January 2019: Three bouts on-site lasting 586 seconds; and
- April 2019: Two bouts on-site lasting 46 seconds.

See **Figure 8.37** for Peregrine flightlines recorded during 2016 - 2019 vantage point surveys.

Although Peregrine have been confirmed breeding to the north of the project area (Balmer *et al.*, 2013), no suitable habitat for nesting exists within the study area or surrounding lands (within 2km). This is supported by the lack of breeding season records, with only two records in July of which the one in 2017 was of a juvenile (the age of the bird involved in the July 2016 sighting was not aged).

The pair observed displaying in April 2018 (for 10 seconds) were north of survey area and may be linked to confirmed breeding sites indicated by the Bird Atlas 2007-11 (Balmer *et al.*, 2013) further north (c.5km) of the survey area. Peregrines take 70% of their prey from within 2km of the nest (Pendlebury *et al.* 2008).

A single sighting of Peregrine was made during October 2017 from VP surveys on the CGEP Grid Connection Route study area; see **Figure 8.38**. This sighting was of a juvenile Peregrine hunting, and the bird was observed for a total of 20 seconds.

#### 8.3.3.3.16 Skylark

In summer, Skylarks prefer open areas devoid of trees (including hedgerows), with a dense ground cover of vegetation that usually has some tussocks for nesting, such as semi-natural grassland or bog habitats. In winter, Skylarks may be found in such habitats at lower densities, but most are found in foraging flocks in stubble fields.

Skylarks were recorded from two transects during the breeding season. In 2016, a single bird was recorded on Transect T4, with a single bird also recorded here in 2017. Also, in 2017, two birds were recorded from Transect T4. As might be expected, no Skylarks were recorded from transects in winter, reflecting this species tendency to move to agricultural stubble habitats at this time.

No Skylark were recorded during transect surveys and VP surveys of the Grid Connection Route.

#### 8.3.3.3.17 Dipper

Dippers are a widespread resident along rocky streams and rivers throughout Ireland and breed along fast flowing streams and rivers with plenty of exposed rocks. In Ireland, the majority of breeding pairs are found in uplands.

Survey work along rivers in proximity to CGEP and the Grid Connection Route involved checking bridges on rivers to look for Dipper nests. Old Dipper nests were found on two bridges, the closest of which was c.4.5km downstream from the proposed CGEP. See **Figure 8.55** for the location of old Dipper nests recorded. No occupied nests or observations of birds were made in spite of the presence of suitable habitat.

#### 8.3.3.3.18 Grey Wagtail

Grey Wagtail are Red-listed in Ireland as a species of Conservation Concern (Colhoun & Cummins, 2013). They are often associated with wetland habitats, including rivers, canals, lakes and other waterbodies, including intertidal areas. They typically nest in vegetation or cracks and crevices in riparian areas, although can also be found in drier areas away from the proximity of wetlands. As insect-eaters, they are susceptible to cold weather, often moving from upland areas to lower-lying valleys or coastal areas during winter.

Grey wagtails were recorded on trial cameras deployed on the Inchinanagh river (IE_SW_18B050320) and Bunnaglanna river (IE_SW_18B050320) in June 2018 (ITM of co-ordinates of trail camera deployment: 568612 590844 and 570287 593721 respectively).

Grey Wagtails were observed from Vantage Point VP8 in October 2016 and VP3 in October 2018. No other observations of Grey Wagtail were recorded during VP surveys.

No Grey Wagtails were recorded during transect surveys of the CGEP study area; however this is typical of the habitats surveyed.

All sightings of Grey Wagtail are presented in **Figure 8.63**.

A single Grey Wagtail was observed from Vantage Point VPC covering the CGEP Grid Connection in February 2018. No other observations of Grey Wagtail were made during VP surveys or transect surveys.

#### 8.3.3.3.19 Meadow Pipit

Meadow Pipit prefer open areas devoid of trees (including hedgerows), with a dense ground cover of vegetation that usually has some tussocks for nesting, such as semi-natural grassland or bog habitats. This species is generally site-faithful, although there is some post-breeding dispersal in winter months, particularly from upland areas to lowland habitats.

Breeding bird surveys indicate that Meadow Pipit habitat is widespread along within the CGEP area, with birds recorded on five of the seven transects surveyed in both 2016 (Meadow Pipit were absent from Transects T2 and T5) and 2017 (Meadow Pipits were absent from Transects T2 and T5). The maximum number of birds recorded across the transects was 22 (in 2016), but numbers were relatively constant between years, with 18 recorded in 2017.

A maximum of 20 Meadow Pipit were recorded during winter 2016-17 from, again, five of the seven transects (no Meadow Pipit were recorded on Transect T6 or T7 during the winter survey).

Meadow Pipits were recorded from Vantage Point surveys of the Grid connection route on seven occasions. Observations of Meadow Pipit were made in February 2018 from VPB, March 2018 from VP D, May 2018 from VP A and VP D, June 2018 from VP B, D and A. No Meadow Pipits were recorded during transect surveys of the grid connection route.

#### 8.3.3.3.20 Eurasian Sparrowhawk

Sparrowhawk are a widespread and common raptor species in Ireland occupying habitats with some tree cover, such as woodlands, farmland with woods, large parks and gardens. It nests in trees and, although resident in the country, its population abundance increases in winter as a result of migrating birds from Britain and other parts of Europe.

Sparrowhawks are abundant in the area which is reflected by the recording of a total 6,295 seconds of flight activity on 124 bouts during the Breeding and Vantage Point surveys (combined for both study areas, CGEP and GCR) from 2016 to 2019.:

- 2016: 1,280 seconds in 43 bouts;
- 2017: 1,741 seconds in 19 bouts;
- 2018: 845 seconds in 17 bouts; and
- 2019: 2,429 seconds in 45 bouts.

No breeding activity has been observed during the surveys nor the identification of Sparrowhawk nests. However, data from the Bird Atlas 2007-2011 (Rodewald & Shumar, 2014) confirms breeding activity within the study area, indicating a generally stable/increasing Sparrowhawk local population[22,23].

#### *8.3.3.4 Avifauna Evaluation (Excluding Hen Harrier)*

All wild bird species are protected by legislation under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000. Whooper Swan, Hen Harrier, Corncrake, Golden Plover, Dunlin, Short-eared Owl, Kingfisher, Merlin and Peregrine are listed on Annex I of the EU Birds Directive 2009/147/EC. Eurasian Curlew is now classified on the IUCN Red List as 'near threatened'.

Notwithstanding the protection afforded to some bird species at EU level, the importance of each species in relation to the CGEP Wind Farm and Grid Connection takes account of international classifications and the occurrence of the species at the site within the context of resident or regularly occurring local populations, county populations or those at a national or international level.

Despite the lack of historical and recent records, Whooper Swan are evaluated as of **Medium** (County) Importance due to being listed on Annex I of the EU Birds Directive. They are also known from locations (Blackwater River Valley) within 5km of the site and were a target species for all bird surveys.

As a rare breeder in Ireland, Goshawk are evaluated as **High** (National) Importance.

Although listed on Annex I of the EU Birds Directive, due to an unfavourable conservation status in the EU, Golden Plover is provisionally listed as secure at pan-European level. Nevertheless, wintering Golden Plover in Ireland are evaluated as of National Importance and were recorded in the study area and hence assigned a sensitivity rating of **High**.

Although not recorded as breeding in the area, as an Amber-listed species in Ireland, Snipe are evaluated as being of Local Importance (High Value) and assigned a sensitivity rating of **Low.**

Although Woodcock are not listed in Annex I of the Birds Directive, they are Red-listed in Ireland and are therefore assigned a sensitivity rating of **High** (National Importance).

Listed on the IUCN (global) Red List of Conservation Concern, as well as the Red List of the Birds of Conservation Concern in Ireland, Eurasian Curlew is evaluated as of National Importance and assigned a sensitivity rating of **High**.

Barn Owl are Red-listed in Ireland due to short- and long-term population declines. Barn Owl are assigned a sensitivity rating of **High.**

Despite the lack of historical and recent breeding records, Short-eared Owl are evaluated as of **Low** (Local Importance; High Value) due to being listed on Annex I of the EU Birds Directive and Amber-listed in Ireland.

Kingfishers are on Annex I of the EU Birds Directive and are Amber listed in Ireland, due to having an unfavourable conservation status in Europe from historical declines. However, Kingfisher were not recorded within the survey area and, thus a sensitivity rating of **Low** (Local Importance; High Value) is applied. Habitat for this species is generally unsuitable.

Kestrel: In spite of being Amber listed due to declining numbers, Kestrel are assigned a sensitivity rating of **Low** (Local Importance (High Value) due to their abundance and widespread distribution.

[22] Available at https://maps.biodiversityireland.ie/Map. Accessed in January 2020.
[23] Available at https://app.bto.org/mapstore/StoreServlet?id=109. Accessed in January 2020.

Merlin: Although listed on Annex I of the EU Birds Directive, due to population declines across Europe (including Ireland), Merlin are evaluated as of Local Importance (High Value) and assigned a sensitivity rating of **Low**.

Peregrine: Although listed on Annex I of the EU Birds Directive, due to historical population declines Peregrine populations are on the increase in Ireland and are therefore Green-listed. Given the density recorded here they are evaluated as of Local Importance (High Value) and assigned a sensitivity rating of **Low**.

Skylark are Amber-listed in Ireland and are therefore evaluated with a sensitivity rating of **Low** (Local Importance (High Value)).

Dipper are Green-listed in Ireland, and due to their widespread population in Ireland are assigned a sensitivity rating of **Low** (Local Importance), given downstream hydrologically connected water courses are used by this river specialist species.

Meadow Pipit: Although not listed on either Annex I or II of the EU Birds Directive, they are Red-listed and due to its importance as a prey item for Hen Harrier, Meadow Pipit have been evaluated as of Local Importance.

Grey Wagtail are Red-listed in Ireland due to short-term population declines. With a recovering Irish population, and a secure European and global population, a sensitivity rating of **Low** (Local Importance) is applied, given downstream hydrologically connected water courses are used by this river specialist species.

Eurasian Sparrowhawk is Green-listed in Ireland, reflecting the fact that it is generally regarded as the most abundant bird of prey in the country. It is referred as vulnerable to potential impacts of wind power generation but, with a current stable and secure population, it is not considered that such potential impacts would be significant in terms of the conservation of the local population. A sensitivity rating of **Low** is then applied.

#### *8.3.3.5 Sensitivity*

General breeding birds are sensitive to habitat loss and disturbance/displacement from noise and/or visual intrusion. Wintering birds are similarly sensitive.

Whooper Swan are sensitive to disturbance at both foraging and roosting sites during the winter. Such sites are usually traditional areas, with a well-established complex of sites that are utilised for both foraging and roosting, and often regularly used corridors for commuting between sites.

Goshawk are sensitive to persecution, with records of illegally killed Goshawks in the UK. However, in Europe Goshawk have been cited as being highly adaptable to human-altered habitats, in the absence of prosecution, and can tolerate intense human activities including urban landscapes. Although, some studies suggested that tolerance shown by urban pairs was unlikely to be a regular occurrence in rural pairs although it had been recorded, albeit infrequently. Forestry activities near nests may cause breeding failure, especially during incubation and early nestling stages (Ruddock & Whitfield, 2007)

Golden Plover are sensitive to changes in land cover or land use of suitable foraging or roosting habitats such as improved agricultural grassland, wet grassland or grassland mosaics, and upland blanket bog, where land cover/use change may cause reductions in foraging success, increased exposure to predation through displacement to less viable feeding areas, and also reduction in survival rates of wintering birds. Wintering Golden Plover are also sensitive to disturbance or displacement effects due to noise, visual intrusion, and anthropogenic sources.

Lowland breeding waders such as Snipe and Curlew are sensitive to habitat loss or fragmentation through afforestation, habitat loss from peat extraction, ground based predation, destruction from agricultural machinery and abiotic variables such as flooding.

Barn Owl are well studied in Ireland and face a number of threats. Loss of nesting sites and prey-rich foraging habitats is likely to be one of the main issues, as well as the ingestion of second-generation rodenticides that such prey may have consumed. These can build upon with the tissues of the Barn Owl to lethal levels. Barn

Owls are also susceptible to road mortality, particularly from hunting along embankments and verges of motorways and other major roads.

Kingfishers are known be particularly sensitive to disturbance at their nests, although can tolerate disturbance in the vicinity (e.g. on the bank or within the watercourse) provided that the actual nest is not interfered with. Water quality issues, such as nutrification from agricultural run-off or point-source pollution, may also impact on prey availability and water clarity (Kingfishers hunt by observing prey within the water).

Merlin are sensitive to habitat loss, particularly the intensification of agriculture in upland areas which may impact on prey-rich foraging habitats. The impact of upland afforestation are less clear, as Merlin have adapted to nest in such forested landscapes, although it seems likely that such landscapes reduce the density and availability of prey. Merlin are also sensitive to disturbance during the breeding season.

Peregrine remain sensitive to persecution at breeding sites, with several cases of illegal killing reported annually. They are also susceptible to secondary poisoning through the food chain (although this appears to be less of an issue now since the ban (and reduction in use) of certain chemicals).

Skylark and Meadow Pipit are sensitive to changes in land cover or land use which results in a decrease of suitable nesting habitat (improved agricultural grassland, wet grassland or grassland mosaics, and upland blanket bog), these changes can affect breeding numbers, foraging success, and increased exposure to predation through displacement to less viable feeding areas, and local population level declines.

Dipper and other species such as Grey Wagtail which associate with freshwater are sensitive to secondary water quality degradation, including nutrification from agricultural run-off or point source pollution and acidification of the water. These may alter prey assemblages which in turn can impact upon breeding success. Such riverine birds may also be impacted by severe weather events, such as localised flooding (which can wash away nests) or very cold snaps during the winter (which limits prey availability).

Sparrowhawk: this species is reported to be highly vulnerable to wind energy developments (Strix, 2012) and fatalities through direct collision with turbines have been reported (e.g. Cullen & Williams, 2010). Secondary poisoning from lead through the ingestion of shot prey is also considered a threat for Sparrowhawks (Fisher et al. 2006), which was also amongst the species that were affected by the use of organochlorine pesticides in Europe, with population declines in the middle of the 20th century.

#### *8.3.3.6 Receiving Environment*

##### 8.3.3.6.1 Trends

In trend analyses on General Breeding Birds undertaken on 53 species within the most recent Countryside Bird Survey report (Crowe *et al.,* 2014) some 20 species showed increasing trends in population over the 16-year period since 1998, while 17 species remained relatively stable.

The most recently published Atlas (Balmer *et al.,* 2013) has shown that the species with the largest winter range are still the Hooded Crow, Wren, Robin and Blackbird. In Ireland the Atlas found that 74% of species had increased their winter range.

The abundance and diversity of the bird species within the baseline environment is evaluated as following the general trend of species populations throughout Ireland as described in published literature such as cited above.

##### 8.3.3.6.2 Receiving Environment (Baseline plus trends)

It is assumed in this report that the baseline environment in relation to general bird species, as identified above, will be the receiving environment at the time of construction as no noticeable change is expected to occur within the relatively short time period prior to commencement of construction. Identified longer term trends, such as declines in breeding Curlew is likely to overlap the operational phase, as are trends in respect of general breeding birds and wintering birds,- identified in publications such as the 2007-11 Atlas. Avifauna evaluations are summarised below in **Table 8-35**.

**Tab-le 8-35: Avifauna Evaluation**

| Common Name | Conservation Status | NRA Evaluation *** | Rationale | Important Ecological Feature | Receptor Evaluation for Impact Assessment (Sensitivity) |
|---|---|---|---|---|---|
| Whooper Swan | Protected Species: Wildlife Acts, Annex I, Amber Listed | County Importance | Listed on Annex I of the EU Birds Directive; have been recorded in area, but not in nationally important numbers; Amber-listed | No | Medium |
| Goshawk | Protected Species: Wildlife Acts, Amber Listed | National Importance | Rare breeder in Ireland; probability of breeding in vicinity of site makes them nationally important; Amber-listed | Yes | High |
| Golden Plover | Protected Species: Wildlife Acts, Annex I, Red Listed | National Importance | Listed on Annex I of the EU Birds Directive; Red-listed in Ireland; have been recorded in vicinity of site in successive winters | No | low |
| Snipe | Protected Species: Wildlife Acts, Amber Listed | Local Importance (High Value) | Amber-listed in Ireland; not breeding in vicinity of site but wintering records | No | Low |
| Woodcock | Protected Species: Wildlife Acts, Red Listed | National Importance | Red-listed in Ireland and national population in sharp decline. Potential breeding habitat on the site though no breeding evidence recorded. | Yes | Low |
| Curlew | Protected Species: Wildlife Acts, red Listed | National Importance | IUCN Global Red list and Irish Red list; not recorded in survey area (breeding or wintering) | No | low |

| Common Name | Conservation Status | NRA Evaluation *** | Rationale | Important Ecological Feature | Receptor Evaluation for Impact Assessment (Sensitivity) |
|---|---|---|---|---|---|
| Barn Owl | Protected Species: Wildlife Acts, Red Listed | National Importance | Red-listed in Ireland and national population in sharp decline | No | Low |
| Short-eared Owl | Protected Species: Wildlife Acts, Annex I, Amber Listed | Local Importance (High Value) | Rare breeder in Ireland; probability of breeding in vicinity of site makes them nationally important; Amber-listed | No | Low |
| Kingfisher | Protected Species: Wildlife Acts, Annex I, Amber Listed | Local Importance (High Value) | Listed on Annex I of the EU Birds Directive; Amber-listed in Ireland. Suitable habitat is at a significant distance downstream of the site | No | Low |
| Merlin | Protected Species: Wildlife Acts, Annex I, Amber Listed | Local Importance (High Value) | Listed on Annex I of the EU Birds Directive; Amber-listed in Ireland. No breeding evidence recorded on the site. | No | Low |
| Peregrine | Protected Species: Wildlife Acts, Annex I, Green Listed | Local Importance (High Value) | Green-listed in Ireland. Populations trends have improved since a historic decline in the 1950's and 60's | No | Low |
| Skylark | Protected Species: Wildlife Acts, Amber Listed | Local Importance (High Value) | Amber-listed in Ireland. Common species throughout Ireland. | No | Low |

| Common Name | Conservation Status | NRA Evaluation *** | Rationale | Important Ecological Feature | Receptor Evaluation for Impact Assessment (Sensitivity) |
|---|---|---|---|---|---|
| Dipper | Protected Species: Wildlife Acts, Green Listed | Local Importance (Low Value) | Green-listed in Ireland. No records of Dipper, (with the exception of two disused nests) within the CGEP, and CGEP Grid Connection Route. | No | Low |
| Meadow Pipit | Protected Species: Wildlife Acts, Red Listed | Local Importance (Low Value) | Red listed in Ireland but widespread and abundant due to improving population trends. Habitat predominantly unsuitable on the site. | No | Low |
| Grey Wagtail | Protected Species: Wildlife Acts, Red Listed | Local Importance | Red listed in Ireland recorded within hydrological zone of influence of the CGEP project. | No | Low |

#### *8.3.3.7 Hen Harrier*

The study areas for Hen Harrier in relation to the CGEP are described in **Table 8-36.**

Study areas have been derived from sources such as published literature on Hen Harrier, in addition to Best Practice Guidance available within the Irish and UK Guidance, in particular Scottish Natural Heritage (SNH).

**Table 8-36 Study Area for Hen Harrier.**

| Study Area for Hen Harrier | Justification for the Study Area Extents |
|---|---|
| 1. Proposed rotor swept area and lands within 500m of the turbine locations for flight activity, and collision risk modelling<br>2. Within 2km from the CGEP proposed development site, for breeding sites (confirmed nest site or centre point of observed evidence of breeding behaviour identified during the breeding season), territories, and communal winter roost sites;<br>3. Suitable habitat within 2km from the CGEP Grid Connection construction works area, for breeding sites (confirmed nest site or centre point of observed evidence of breeding behaviour identified during the breeding season), territories, availability of foraging (hunting) habitats and communal winter roost sites;<br>4. Within 2km of identified nests in relation to the availability of suitable breeding and foraging Habitat<br>5. Within 150m of the CGEP construction works area boundary in all directions- in relation to disturbance displacement to foraging Hen Harrier during the breeding season, and effective habitat loss as a result.<br>6. Within 150m of the CGEP construction works area boundary in all directions in relation to secondary effects via reductions in Prey Item availability.<br>7.Within 50m of the CGEP Connection construction works area boundary in all directions in relation to habitats proximal to the general settings of works. | 1. The extent of the study area is defined in accordance with SNH Guidelines (2017[24])<br>2. The extent of the study area is defined in accordance with SNH Guidelines (2017), the use of the centre point of observed evidence to determine nest site is based on the Hen Harrier Project (2019[25]).<br>3. The extent of the study area is defined in accordance with SNH Guidelines (2017)<br>4. Foraging habitat loss within 2km of a Hen Harrier nest may potentially have negative effects on breeding success (Arroyo et al.,2014). Habitat composition at this scale has previously been interrogated in research in the Irish context to investigate nest site selection at a landscape scale (Wilson et al. 2010).<br>5. 150m is the Minimum Approach Distance (MAD) (Livesey et al., 2016) indicated for likely disturbance in respect of Falconiformes (the family of birds with characteristics most similar to Hen Harrier).<br>6. Professional Judgement, based on the MAD recommended for Hen Harrier as outlined at 2. above.<br>7. Professional Judgement and as per Best Practice (CIEEM, 2016) |

##### 8.3.3.7.1 Character

The harriers (genus *Circus)* are all fairly large hawks with long, broad wings, long tails and legs and slim bodies (Watson 1977). The Hen Harrier *Circus cyaneus* is a medium sized, ground nesting bird which is specifically suited to foraging (hunting) at low height over open ground containing preferred prey species. Their long wings and hunting technique do not equip them for hunting in closed woodland. They were once

[24] Scottish Natural Heritage (2017). Recommended bird survey methods to inform impact assessment of onshore wind Farms. Version 2. SNH, Battleby.

[25] Hen Harrier Project, (2019). *HARRIER HEN PROGRAMME Terms and Conditions 2nd Edition April 2019.* Hen Harrier Project, Oranmore, Co. Galway. Note 6, Pg. 22.

widespread throughout Ireland but by the early 20th century their numbers had been substantially reduced (O'Flynn, 1983).

In Ireland the Hen Harrier is confined largely to heather moorland and young forestry plantations, where they nest on the ground. They are found mainly in Counties Laois, Tipperary, Cork, Clare, Limerick, Galway, Monaghan, Cavan, Leitrim, Donegal and Kerry. The current national breeding population is estimated at 108 - 157 breeding pairs (Ruddock *et al.,* 2016). The most recent estimate of the national wintering population, from Irelands Article 12 submission to the EU, is 269-349 individuals. Wintering birds may comprise native breeding birds but also birds from overseas which visit Ireland during the winter months (Wernham *et al.*, 2002; Etheridge & Summers, 2006).

Ireland holds the most westerly breeding population of Hen Harrier in Europe.

It has been shown in Ireland (Wilson *et al*., 2006) that breeding Hen Harriers avoid areas where less than 30% of the landscape comprises suitable habitats such as bog (used for foraging and nesting), rough pasture (used for foraging) or young forest (used for foraging and nesting).

Studies have also shown that Hen Harrier demonstrate high nest fidelity (faithfulness) and use nest sites on a traditional basis (which may include different birds using sites on an annual or irregular basis over many years (e.g. Amar & Redpath, 2002, Hardey *et al.,* 2014).

The mechanism for the selection of nesting sites by Hen Harrier is not perfectly understood and is thought to relate to micro-climatic and habitat variables (e.g. shelter, aspect, vegetation present at the actual nest location) as well as macro-habitat determinants (larger scale landscape related influences such as showing a preference for open moorland, heath, young conifer etc.) (Redpath *et al*., 1998).

Hen Harrier foraging habitat preferences during the breeding season are generally biased towards moorland, grassland mosaics and pre-thicket forest habitats which support larger numbers of prey species. Ruddock *et al*., 2016, reported that Hen Harrier were more frequently recorded foraging over heather moorland (30%), second rotation forest (18.7%), rough grassland (12.4%) and thicket stage forest (12.4%). In a published study of 900 Hen Harrier pellets in Ireland covering winter and breeding seasons, Hen Harriers were found to have a diverse diet, which varies between areas and seasons and includes small mammals, birds, amphibians and reptiles - up to 78% of the diet of Hen Harriers in Ireland was shown to comprise passerine species of birds (Irwin *et al.,* 2012).

Hen Harrier are considered as 'central-place' foragers with most foraging taking place during the breeding season within a 'core range' of 2km from nests (SNH, 2018, Irwin *et al.* ,2012). During the breeding season females hunt closer to nest locations (typically <1km) whereas males hunt further away (Arroyo et al., 2006). In a remote tracking study in the Irish context, the concentration of Hen Harrier hunting behaviour was more than 10 times higher within 1 km of the nest than it was between 2 and 5 km from the nest (Irwin *et al.* 2012).

Hen Harrier wintering grounds are typically lowland sites below 100m. During winter, Hen Harriers gather at communal or solitary roost sites. In Ireland the majority of these roost sites are located in reed beds, heather/bog and rank/rough grassland but also fen, bracken, gorse or saltmarsh. Approximately 20% of known roosting sites in Ireland occur within close proximity to core nesting areas. In 2014, approximately 96 confirmed solitary and communal roosts were known in Ireland, and were estimated to support between 219 – 313 individuals (B. O'Donoghue, pers comm cited in NPWS, 2015). Within continental Europe maximum numbers of up to 50 birds have been recorded at winter roosts, and in the Irish context, up to 10 birds has been documented (Watson, 1977). Winter hunting grounds cover a much wider range and greater variety of habitats than Summer (Watson, 1977).

#### 8.3.3.7.2 Context

The proposed CGEP is located within an upland area of north Cork known to have supported breeding Hen Harrier on a recent and historical[26] basis. Habitats within the area are generally suitable for breeding however in recent years, agricultural intensification and forestry maturation may have resulted in reduced availability of foraging and nesting habitat respectively. In particular foraging habitat may be limited within 2km of

[26] See O'Flynn (1983). *Population changes of the Hen Harrier in Ireland*. Irish Birds Vol.2. No. 3.

regularly occupied nesting territories, in comparison to other comparable upland areas which support a regularly occurring population of nesting Hen Harrier. Where it occurs outside the proposed development application boundary, the CGEP Grid Connection Route does adjoin some suitable nesting and foraging habitat at its western extremity, however the availability of nesting and foraging habitat decreases as the route follows a local road eastwards towards Fermoy, where much of the adjacent lands are more intensively farmed and therefore offer substantially less opportunity for foraging or nesting Hen Harriers.

#### 8.3.3.7.3 SPA Connectivity

Guidance is available from Scottish Natural Heritage (SNH) to assist in establishing levels of connectivity to designated SPA's. Connectivity distances per species included are set out from a literature review that examined ranging behaviour. SNH specifically recommends that "*in most cases the core range should be used when determining whether there is connectivity between the proposal and the qualifying interests*". A core foraging range of 2km from nests sites during breeding is presented for Hen Harrier in this Best Practice Guidance (SNH 2018).

The proposed development is not located within the boundary of the SPA designated for Hen Harrier, nor within 2km of any site designated for Hen Harrier, with the nearest such site being at a distance of ca.30km (Mullaghanish to Musheramore Mountains SPA). Therefore the CGEP does not include core habitat for breeding hen harrier in any SPA and no significant connectivity is likely..

#### 8.3.3.7.4 Desktop Study

To inform the current EIAR a review of available desktop information on Hen Harrier was undertaken. This included datasets such as monitoring results in respect of the Bottlehill Landfill (located close to and outside the proposed CGEP development application boundary) for the period 2005-2015, which were provided by the applicant. In particular, the more recent monitoring reporting in respect of Bottlehill Landfill (consented and built but not operational) provided information on nesting attempts close to proposed turbine locations in the townlands of Bottlehill, Tooreen, Glashaboy and Raheen (i.e. within a 2km study area surrounding Bottlehill Landfill) and informed both project scoping and the current appraisal.

Results of National Surveys of Hen Harrier available on the NPWS website, plus sources such as published reports from the Irish Rare Breeding Bird Panel, published annually in the journal *Irish Birds,* were reviewed to inform an evaluation of the numbers of nesting pairs of harriers likely to occur in the environs of the proposed CGEP.

**Table 8.37** and **Table 8.38**, below respectively summarise the results of surveys undertaken as part of National Hen Harrier Surveys (1998-2000, 2005, 2010 and 2015), and also monitoring in respect of Bottlehill Landfill.

We note that the area designated as 'the Nagles' within National Surveys refers to a *larger* geographical area than the current study area for CGEP (comprising up to 30km$^2$[27]) whilst the monitoring of Bottlehill Landfill utilises a study area *smaller* than that for the current baseline study (i.e. surveys conducted for Bottlehill focused on lands located within 2km of Bottlehill Landfill and hence did not include all the CGEP study area).

**Table 8-37: Summary of Results for 'the Nagles' from National Hen Harrier Surveys**

| Year | Number of Possible Breeding pairs | Number of Confirmed breeding pairs | Total Estimated Pairs |
|---|---|---|---|
| 1998-2000 | 3-5 | Not available | Not available |
| 2005 | 0 | 9 | 9 |
| 2010 | 4 | 7 | 7-11 |
| 2015 | 5 | 5 | 5 |

[27] The designation 'the Nagles' reflects a 'region' based on a number of 10km squares utilised in past National Surveys per regional mountain range or site complex- for the Nagles this appears to comprise 3 no. 10km squares i.e. 30km$^2$.

**Table 8.38** below summarises the results of breeding season monitoring within 2km of the Bottlehill landfill for the period 2005-2015 inclusive.

**Table 8-38: Summary of Hen Harrier breeding success within 2km of the Bottlehill Landfill site between 2005 and 2015***

| Year | Number of Territorial Pairs Confirmed | Number of Successful Breeding Attempts | Number of Fledged Juveniles |
|---|---|---|---|
| 2005 | 2 | 2 | 3 |
| 2006 | 2 | 1 | 2 |
| 2007 | 3 | 1 | 1 |
| 2008 | 2 | 0 | 0 |
| 2009 | 2 | 2 | 2 |
| 2010 | 1 | ? | ? |
| 2011 | 1 | 0 | 0 |
| 2012 | 2 | 1 | 1 |
| 2013 | 1 | 0 | 0 |
| 2014 | 2 | 1 | 3 |
| 2015 | 2 | 2 | 2+ |

*reproduced from Table 2 of report titled '*Final report on Hen Harrier breeding activity at Bottlehill Landfill, County Cork in 2015'* by Cork Ecology (2015), individual authors not cited.

#### 8.3.3.7.5 Site Survey Results

*Nest Sites*

Results of present studies to inform the current EIAR have been combined with information obtained on historical nests (2014-2015) within a 2km radius of the proposed CGEP (i.e. the study distance outwith a proposal site within which data should be collected, as specified in SNH Guidance 2017) and are summarised with some detail in **Table 8.39 (Full details Appendix 8 – K CONFIDENTIAL)**. All known breeding attempts are presented. A nest reference ID is applied to each nesting *attempt*. Nesting attempt location grid references or townland names are not provided to ensure the protection of breeding Hen Harriers. For the avoidance of doubt all breeding attempts, regardless of outcome are included in line with a precautionary approach, including any failed but relocated nesting attempts in the same breeding year.

**Table 8-39: Summary of Hen Harrier breeding attempts within 2km of CGEP (turbine location or any associated infrastructure) for the period 2014 to 2019 inclusive***

| Nest Attempt _ID | Year | Distance Band to CGEP boundary (m) | Distance to nearest turbine (m) | Nearest Turbine_ID |
|---|---|---|---|---|
| **A** | 2019 | CONFIDENTIAL | CONFIDENTIAL | T18 |
| **B** | 2019 | CONFIDENTIAL | CONFIDENTIAL | T23 |
| **C** | 2018 | CONFIDENTIAL | CONFIDENTIAL | T5 |
| **D** | 2017 | CONFIDENTIAL | CONFIDENTIAL | T23 |

| Nest Attempt _ID | Year | Distance Band to CGEP boundary (m) | Distance to nearest turbine (m) | Nearest Turbine_ID |
|---|---|---|---|---|
| **E** | 2016 | CONFIDENTIAL | CONFIDENTIAL | T5 |
| **F** | 2015 | CONFIDENTIAL | CONFIDENTIAL | T3 |
| **G** | 2015 | CONFIDENTIAL | CONFIDENTIAL | T2 |
| **H** | 2015 | CONFIDENTIAL | CONFIDENTIAL | T18 |
| **I** | 2014 | CONFIDENTIAL | CONFIDENTIAL | T2 |
| **J** | 2014 | CONFIDENTIAL | CONFIDENTIAL | T2 |
| **K** | 2014 | CONFIDENTIAL | CONFIDENTIAL | T5 |
| **L** | 2014 | CONFIDENTIAL | CONFIDENTIAL | T23 |
| **M** | 2014 | CONFIDENTIAL | CONFIDENTIAL | T23 |

*2014 and 2015 information is presented from desktop review/results of consultation. No breeding hen harrier were recorded in 2020 including within 2km of CGEP.

No probable or confirmed hen harrier nest sites were recorded in 2020.

Surveys were also conducted during April to June (inclusive) 2020 to determine nesting activity of hen harrier focussed on the site and 2km buffer. No nest sites were determined and the best-case scenario was that just one nest territory was occupied temporarily in 2020 c.a. 1km north of T23 (Knocknascagh townland).

In summary, a total of 13 nesting attempts, across 6 breeding seasons are described. No breeding attempts took place within 500m of any proposed turbine location, however 1 no. nesting attempt (Nest ID G in 2015) did occur inside the development boundary for the subject application.

Nesting attempts were recorded within a range of distances from the proposed development (0m to 2768m). The calendar year or breeding season with the greatest number of nesting attempts within 2km was 2014 (n=5, collated from consultation or desktop review); whilst in the period for the current appraisal (2016-2020 inclusive) the number of confirmed breeding attempts in any given calendar year within 2km ranged from 1-3. The range of breeding attempts suggests an estimate of 3-5 regularly occupied breeding territories within 2km of the proposed development is reasonable (average = 2.2 per annum for the period 2014-2019). 2020 is excluded as none were recorded and this was an atypical result. Note average figure is based on data up to 2019 i.e. based on maximum likely nos. breeding hen harrier pairs.

*Flight Activity*

Flight activity is described for the period 2016-2019 inclusive.

All flight activity by Hen Harrier, regardless of distance to turbine, and across all seasons totalled 44781s from 437 no. observations. Seventy percent of all flight activity recorded (31496s in total) occurred at heights below 30m (the proposed rotor envelope is 30m-170m), whilst 30% (13285s) occurred at heights above 30m. We note that, spatially, this sample of flight activity represents a viewshed area covering 69km$^2$ in total, within which only ca.8% is comprised of lands within the development application boundary, it is therefore not to be taken as representative of flight activity solely within areas where turbines are proposed to be located.

When considered by season, regardless of distance to turbine, flight activity at heights of 30m or greater is highest within the breeding season. Total Hen Harrier flight activity covering the period March-August of Yrs. 1 ,2 and 3, and April-September of Year 4 was 35,662s, of which 23,590s (66% of total) was below 30m whilst 12,072s (34% of the total recorded) occurred at heights between 30m and 170m.

During the winter season (covering the period September 2016 to February 2017, October 2017 to February 2018 and October 2018 to March 2019) flight activity below 30m is higher (84% or 6279s) with only 16% (1206s) recorded at heights of 30m-170m.

In summary, in terms of general flight activity, potential pathways for collision risk to Hen Harrier are considered to be of greater likelihood during the breeding season, dependant on the proportion of flight activity at rotor height which also occurs in proximity to rotating turbine blades (for the purpose of this appraisal taken as within 1000m of turbine location).

Detail on flight activity data used to inform Collision Risk modelling is further provided within **Appendix 8-A** (data) and **Appendix 8-J** (Collision Risk Model) of this report.

*Nesting Habitat (within 2km core range of identified Nesting attempts)*
Hen Harrier are essentially central place foragers, with most foraging taking place during the breeding season within 2km of nests. They are also faithful to traditional nesting sites or territories and regularly nest year after year in the same general location (Hardey *et al.*, 2014). The heretofore identified nests (A-M) are therefore reasonably considered to accurately reflect any short-term nesting or likely nesting territories which may overlap the proposed time period for construction of CGEP.

Cognisance is being given in the current evaluation to the general availability of nesting habitat within 2km of the identified nesting attempts A-M. This to provide contextual information on the general availability of nesting habitats and to allow for evaluation if required of the degree of displacement habitat available for nesting harrier.

All habitats within 2km of the identified nesting attempts (i.e. within 2km of a confirmed nest site or centre point of observed evidence of breeding behaviour identified during the breeding season), were evaluated for their suitability as nesting habitat for Hen Harrier.

Methods for this exercise following that in the Hen Harrier SPA Mapping Project undertaken by NPWS (Moran & Wilson-Parr, 2015). A similar mapping exercise was undertaken to examine habitat within 2km of each nest attempt. Habitats were identified from aerial photos and categorised as to their suitability. A ground-truthing exercise was also undertaken to confirm in some cases the habitats actually present.

The area (HA) of all habitat parcels, including polygon's for fields (or areas-based habitats) were estimated. Hedgerows and treelines were excluded from consideration for this exercise as they are unsuitable for nesting.

The identified habitats were classed as suitable or unsuitable for nesting (see **Table 8.40**). Habitats classified as suitable for nesting by Hen Harriers were peatland habitats (including heath), scrub, dense bracken and both pre- and post-thicket forestry (as per Ruddock *et al.*, 2016). Habitats considered or classed as unsuitable for nesting included agricultural grasslands (including improved grasslands and rough grazing), clearfell, hedgerows and treelines (Ruddock *et al.*, 2016). **Table 8-40**, below, provides original NPWS Mapping codes along with classifications used in the current appraisal for nesting suitability.

**Table 8-40: Habitat classifications used for nesting habitat availability evaluation**

| NPWS Habitat[28] (habitats present within the SPA) | NPWS Code[29] | Habitats as mapped for the current appraisal | Code | Suitability for: Nesting |
|---|---|---|---|---|
| Improved agricultural grassland | GA1 | Improved grassland | GA1 | N |
| Amenity grassland/buildings and artificial surfaces | BL3/GA2 | (Not included)[30] | | N |
| Marsh | GM1 | (Not recorded)[31] | | N |
| Dry humid-acid grassland | GS3 | Heath | HH | Y |
| Heath | HH | | | Y |

[28] Based on Moran & Wilson-Parr (2015)
[29] Derived from Fossit (2000) within Moran & Wilson-Parr (2015)
[30] Included in NPWS SPA mapping but not included in the current study due to being unsuitable for Hen Harrier nesting and foraging
[31] Not recorded in areas outside of the SPA during mapping and ground truthing excesice

| | | | | |
|---|---|---|---|---|
| Mosaic grassland; Clustered Juncus 30-39% | MG_C3 | Rough Grassland | RG | N |
| Mosaic grassland; Clustered Juncus 40-49% | MG_C4 | | | N |
| Mosaic grassland; Dispersed Juncus 30-39% | MG_D3 | | | N |
| Mosaic grassland; Dispersed Juncus 40-49% | MG_D4 | | | N |
| Rough Grassland | RG | | | N |
| Upland blanket bog | PB2 | Bogs | PB | Y |
| Cutover bog | PB4 | | | Y |
| Bracken | HD1 | Bracken | HD1 | Y |
| Scrub | WS1 | Scrub | WS1 | Y |
| Mixed broadleaved woodland | WD1 | Mixed broadleaved woodland | WD1 | N |
| Riparian woodland | WN5 | Riparian woodland | WN5 | N |
| Conifer plantation (unknown age) | FOR_UNK | (Not recorded) | | Unknown |
| Unproductive sparse conifer plantation | FOR_UNPRO | Pre-thicket conifer plantation | PRE | Y |
| Conifer plantation (<3 yrs old) | FOR<3YR | | | Y |
| Conifer plantation (4-8 yrs old) | FOR4_8 | | | Y |
| Conifer plantation (9-12 yrs old) | FOR9_12 | | | Y |
| Conifer plantation (13-14 yrs old) | FOR13_14 | Post-thicket conifer plantation | POST | Y |
| Conifer plantation (>15 yrs old) | FOR>15yr | | | Y |
| Clear-fell conifer plantation | FOR_CL | Clear-fell | CF | N |

**Table 8.41**, below, summarises the extent of suitable breeding habitat within 2km of nesting attempts A-M inclusive, based on the analysis described above.

**Table 8-41: Breeding habitat suitability within 2km of nesting attempts A-M**

| Nesting Attempt | Suitable Habitat (ha) | Unsuitable Habitat (ha) | % of 2km core range suitable |
|---|---|---|---|
| Nest A | 561 | 695 | 44.7 |
| Nest B | 968 | 288 | 77.1 |
| Nest C | 657 | 599 | 52.3 |
| Nest D | 580 | 676 | 46.2 |
| Nest E | 557 | 699 | 44.3 |
| Nest F | 742 | 514 | 59.1 |

| | | | |
|---|---|---|---|
| Nest G | 773 | 483 | 61.5 |
| Nest H | 568 | 688 | 45.2 |
| Nest I | 582 | 674 | 46.3 |
| Nest J | 695 | 561 | 55.3 |
| Nest K | 667 | 589 | 53.1 |
| Nest L | 832 | 424 | 66.2 |
| Nest M | 603 | 653 | 48.0 |

#### 8.3.3.7.6 Foraging Habitat (within 2km core range of identified Nesting attempts)

A similar exercise to that conducted in respect of breeding habitat was carried out with regard to availability of foraging habitat within 2km of nesting attempts. As central place foragers, the extent of available core foraging habitat potentially affected through any habitat loss, disturbance or displacement pathways is of key consideration. - It has been shown in Ireland (Wilson et al., 2006) that breeding Hen Harriers avoid areas where less than 30% of the landscape comprises suitable habitats such as bog (used for foraging and nesting), rough pasture (used for foraging) or young forest (used for foraging and nesting).

Methods for this exercise also follow that in the Hen Harrier SPA Mapping Project undertaken by NPWS (Moran & Wilson-Parr, 2015). A similar mapping exercise was undertaken to examine habitat within 2km of each nest attempt. Habitats were identified from aerial photos and categorised as to their suitability.

All habitat parcels, including polygon's for fields (or areas-based habitats) were digitised, allowing accurate measurement of area or length. Linear features were excluded however this is not considered a constraint as the result is an under-estimate of potential foraging habitat available. Magnitude evaluations based on the results will therefore err on the precautionary side.

The identified habitats were classed as suitable or unsuitable for foraging (see **Table 8-42** below). Habitats classified as suitable for foraging by Hen Harriers were wet grassland, peatland habitats (including heath), scrub, dense bracken, clearfell and pre- thicket forestry (as per Ruddock *et al.,* 2016). Habitats considered or classed as unsuitable for foraging included agricultural grasslands (including improved grasslands), (Ruddock et al., 2016), riparian and broadleaf woodland and amenity or built surfaces. **Table 8-42**, below, provides original NPWS Mapping codes along with classifications used in the current appraisal for nesting suitability.

**Table 8-42: Habitat classifications used for foraging habitat availability evaluation**

| NPWS Habitat[32] (habitats present within the SPA) | NPWS Code[33] | Habitats as mapped for the current appraisal | Code | Suitability for: Foraging |
|---|---|---|---|---|
| Improved agricultural grassland | GA1 | Improved grassland | GA1 | N |
| Amenity grassland/buildings and artificial surfaces | BL3/GA2 | (Not included)[34] | | N |
| Marsh | GM1 | (Not recorded)[35] | | Y |
| Dry humid-acid grassland | GS3 | Heath | HH | Y |
| Heath | HH | | | Y |
| Mosaic grassland; Clustered Juncus 30-39% | MG_C3 | Rough Grassland | RG | Y |
| Mosaic grassland; Clustered Juncus 40-49% | MG_C4 | | | Y |

[32] Based on Moran & Wilson-Parr (2015)

[33] Derived from Fossit (2000) within Moran & Wilson-Parr (2015)

[34] Included in NPWS SPA mapping but not included in the current study due to being unsuitable for Hen Harrier nesting and foraging

[35] Not recorded in areas outside of the SPA during mapping and ground truthing excesice

| | | | | |
|---|---|---|---|---|
| Mosaic grassland; Dispersed Juncus 30-39% | MG_D3 | | | Y |
| Mosaic grassland; Dispersed Juncus 40-49% | MG_D4 | | | Y |
| Rough Grassland | RG | | | Y |
| Upland blanket bog | PB2 | Bogs | PB | Y |
| Cutover bog | PB4 | | | Y |
| Bracken | HD1 | Bracken | HD1 | Y |
| Scrub | WS1 | Scrub | WS1 | Y |
| Mixed broadleaved woodland | WD1 | Mixed broadleaved woodland | WD1 | N |
| Riparian woodland | WN5 | Riparian woodland | WN5 | N |
| Conifer plantation (unknown age) | FOR_UNK | (Not recorded) | | Unknown |
| Unproductive sparse conifer plantation | FOR_UNPRO | Pre-thicket conifer plantation | PRE | Y |
| Conifer plantation (<3 yrs old) | FOR<3YR | | | Y |
| Conifer plantation (4-8 yrs old) | FOR4_8 | | | Y |
| Conifer plantation (9-12 yrs old) | FOR9_12 | | | Y |
| Conifer plantation (13-14 yrs old) | FOR13_14 | Post-thicket conifer plantation | POST | N |
| Conifer plantation (>15 yrs old) | FOR>15yr | | | N |
| Clear-fell conifer plantation | FOR_CL | Clear-fell | CF | Y |

**Table 8-43**, below, summarises the extent in hectares of suitable foraging habitat within 2km of nesting attempts A-M inclusive, based on the analysis described above.

**Table 8-43: Foraging habitat Suitability within 2km of nesting attempts A-M**

| Nest | Suitable Habitat (ha) | Unsuitable Habitat (ha) | % of 2km core range suitable |
|---|---|---|---|
| Nest A | 235 | 1021 | 18.7 |
| Nest B | 490 | 766 | 39.0 |
| Nest C | 267 | 989 | 21.3 |
| Nest D | 226 | 1030 | 18.0 |
| Nest E | 252 | 1004 | 20.1 |
| Nest F | 287 | 969 | 22.9 |
| Nest G | 268 | 988 | 21.3 |
| Nest H | 238 | 1018 | 18.9 |
| Nest I | 191 | 1065 | 15.2 |
| Nest J | 245 | 1011 | 19.5 |

| Nest | Suitable Habitat (ha) | Unsuitable Habitat (ha) | % of 2km core range suitable |
|---|---|---|---|
| Nest K | 244 | 1012 | 19.4 |
| Nest L | 419 | 837 | 33.4 |
| Nest M | 365 | 891 | 29.1 |

As noted, at least 30% suitable habitat is required for an area to be attractive to Hen Harrier. Foraging habitat analysis demonstrate that there is foraging habitat greater than this threshold available within the core foraging range comprising a 2km radius of nests B (occupied 2019) & L (last known to be occupied pre-2015), whilst nest M (last known to be occupied pre-2015) is at 29.1%, marginally below this threshold. All these nest attempt locations are located within the Nagle Mountains proper, reflecting the availability of suitable foraging habitat within the mountain range. The majority of forest areas outside the Nagles, and where the development is located, are now (2020) grown into post thicket mature coniferous forest, which is poor forage habitat for this species.

Remaining nest attempts as described occur at locations where suitable foraging habitat within 2km comprises 15.2-21.3% of available habitat within 2km, or an average of 19.5% across 10 no. nesting attempts. The geographical spread of these nest attempts, to the east and west of Bottlehill and further east again in the foothills of the Nagle Mountains, is no doubt reflected in the analyses as more intensive agriculture is present within their core ranges. Nest A (occupied 2019) and H (occupied 2015) comprise the same effective territory, and the fidelity to this location in respect of the limited availability of foraging habitat within 2km(ca.19ha), suggests birds utilising this location may have to forage at greater distance from the nest than normal and/or may be limited in nesting success.

*Winter Roosting habitats (general within the study area)*

In the winter months harriers often roost communally, typically in habitats such as reedbeds and heather less than 100m above sea level (ASL). However, small numbers of communal roosts exist at higher altitudes. Roosts are often traditionally used sites (Clarke & Watson, 1990), and selection of same may not be based on habitat suitability alone, with other factors such as land use change, levels of disturbance, etc. being critical determinants (Clarke & Watson, 1990).

In relation to potential winter roost sites, suitable roosting habitats (reed beds, heather/bog and rank/rough grassland but also fen, bracken, gorse) around CGEP are not widely available, with small fragmented patches of habitat only within the environs of CGEP- in particular some heath or bog. Specific roosts are described in Section 8.3.4.6.6 below - it is considered that these comprise the only roost locations likely to be used with sufficient frequency to be considered in terms of possible source impact pathways.

*Winter roosts*

Three roosts are described and assigned as Roost A, Roost B and Roost C. Two winter roosts (Roost A and Roost C) occur within 2km of the proposed CGEP, whilst a third (Roost B) occurs 3km from the boundary (with the distance measurement taken to a 150m buffer of works).

Roost A, located to the north of the proposed CGEP, is perhaps the best-known roost in the area and was identified prior to the commencement of surveys through consultation with local experts. Birds were recorded utilising this roost on 44% of watches (n=16) at either dawn or dusk. Watches averaged 1.2 harriers per dawn or dusk watch (range 1-2). On at least one occasion, in Dec 2016, this roost was known to have held 3 birds (BOM, personal communication).

Roost B, located to the north of CGEP, is known to the authors from prior surveys in the area, and has also held up to 3 birds. From 6 watches in the winter period of 2017/18, single birds of either sex were recorded on 5 no. occasions. On at least one prior occasion, in Dec 2016, it is known to the authors that Roost B held 3 birds on the same night as Roost A held 3 different birds, suggesting a maximum of 6 birds may occur at roosts within 3km of the proposed development.

Roost C, located to the east of CGEP, is historically known but no observations were recorded of birds going to roost at this location during current studies. Nonetheless it is assumed to be potentially available to birds seeking to roost in addition to the two already described locations.

A number of other potentially suitable locations were surveyed at a number of locations in the winter period of 2016/17, including lands in the townlands of Cloghvoolia North, Carrigane, and Glashaboy, however no birds were confirmed roosting.

It is assumed for baseline purposes, in line with a precautionary principle, that the wintering population within 3km of the proposed CGEP may comprise up to 6 individuals in any given winter period, and that these birds may utilise up to 3 roosting locations within the greater hinterland of CGEP.

*Importance Evaluation*

Hen Harrier is listed on Annex I of the EU Birds Directive 2009/147/EC. In 2007, six Special Protection Areas were designated across the country with breeding populations of Hen Harrier as the sole Special Conservation Interest to ensure the conservation of the species − although it is note that the proposed development is not in one of these sites. The breeding population of Hen Harrier is Amber listed on the most recent Birds of Conservation Concern in Ireland 2014 − 2019 (Colhoun and Cummins, 2013). The wider area including the site to the southern Nagles hills supports regularly a minimum of 2 pairs (>1% National population), and hence is nationally important for breeding hen harrier. No areas are designated solely in respect of wintering populations. Based on the findings of the desktop and field surveys conducted to date at CGEP and environs, both breeding and wintering Hen Harrier present are evaluated as Nationally Important and assigned a sensitivity rating of **High** (equivalent to NRA National Importance) for the purpose of evaluation.

## 8.3.4 Terrestrial Mammals (excluding bats)

This section provides a description of the baseline environment in respect of terrestrial mammals, excluding bats.

### *8.3.4.1 Study area*

There are a number of study areas relevant here: the CGEP study area for direct or indirect effects; the CGEP Grid Connection Route study area for direct or indirect effects and the TDR study area for direct and indirect effects. Study areas where applicable in respect of cumulative effects are presented in **Section 8.6.**

The study areas are described in the **Table 8-44** below.

**Table 8-44 Study Areas in respect of Terrestrial Mammals (excluding bats).**

| CGEP Study Area (direct or indirect effects, alone or cumulatively) | CGEP Grid Connection Route Study Area (direct or indirect effects, alone or cumulatively) | TDR Study Area (direct or indirect effects, alone or cumulatively) |
|---|---|---|
| Study Area Extent:<br>Badger and other mammals including Otter: Site Area 1 & 2 Boundaries.<br>Otter: Watercourses within 150m (the ZOI) of proposed turbines and infrastructure.<br>Badger, Red Squirrel and Pine Marten: construction works area of access roads and turbine bases plus 150m in all directions | Study Area Extent:<br>Otter: Watercourse crossing locations plus 300m in either direction<br>Badger and other mammals: 50m survey corridor either side of the proposed grid connection route. | Study Area Extent:<br>The oversail and load-bearing areas and immediate surroundings for each node, including drainage features. Otter: 150 metres up and down-stream at node locations with a water crossing. |
| Justification for Study Area Extent:<br>General Mammal walkover and camera deployment: Professional judgement and as per Best Practice (NRA, 2009c, CIEEM, 2016, 2018, 2019).<br>Otters: Best Practice guidelines published by the Highways Agency (1999) and NRA (2009c).<br>Badgers: Best Practice guidelines published by the NRA (2009c).<br>Other mammal species: Professional judgement and as per Best Practice (NRA, 2009c, CIEEM, 2018,2019). | Justification for Study Area Extent:<br>Professional Judgement and as pertinent:<br>Otters: Best Practice guidelines published by the Highways Agency (1999) Badgers: Best Practice guidelines published by the NRA (2005)<br>Other mammal species: professional judgement and as per Best Practice (CIEEM,2016,2018,2019). | Justification for Study Area Extent:<br>Footprint of the proposed works and Professional Judgement |

### *8.3.4.2 Desktop Study*

The desktop study for mammal records involved the review of databases and Peer-reviewed papers including the following;

- National Biodiversity Data Centre online database and map viewer. Available at https://maps.biodiversityireland.ie/.
- Smiddy, P. 2016 Distribution of the otter Lutra Lutra in the Munster River Blackwater catchment. Biology and En-vironment: Proceedings of the Royal Irish Academy 2016. DOI: http://dx.doi.org/ 10.3318/BIOE.2016.09

The principal habitats within the context of Non-Volant (non-flying) Mammals include open grassland and heath which provides foraging habitat, and coniferous and deciduous forestry, mixed woodland, hedgerows, and scrub, which provide shelter and provide locations for breeding and resting. Opportunities for breeding Pine Marten may occur in some of the buildings which occur within the CGEP study area and the Grid Connection Route study area.

Results from a desktop review of data held by the National Biodiversity Centre (NBDC) are present in **Table 8-45** to **Table 8-52**. A review of peer-reviewed papers resulted in the findings of local Otter records within the catchment of the Munster River Blackwater. According to Smiddy (2016) there were three locations within the wider extent of the wind farm and Grid Connection study area that were "positive" for Otter.

*CGEP Study Area*

Baseline surveys of the wind farm study area and wider environs recorded evidence of Otter *(Lutra lutra),* Badger *(Meles meles),* Fox *(Vulpes vulpes)*, Deer species, Rat *(Rattus Norvegicus),* Stoat *(Mustela erminea Hibernica),* Hare, Greater White-toothed Shrew (*Crocidura russula)*, Bank Vole (*Clethrionomys glareolus*) and Squirrel species, however limited evidence of breeding or resting sites is present. No active breeding or resting sites for Badger (setts) or Otter (Couches and/or holts) were recorded within the wind farm turbine locations. One inactive outlier Badger sett was recorded 60 metres from the construction works boundary.

*Grid Connection Route Study Area*

Along the Grid Connection study area, evidence of mammals was limited to mammal pathways/runs, which is typical evidence of roadside usage. A Red Squirrel was observed within a hedgerow along a track within the survey area. No protected sites in respect of Badger and other general mammals were recorded within the study area. The Blackwater River (Cork/Waterford) SAC (site code 002170), which is located 1.3 km from the grid connection route, is designated for Otter.

**Table 8-45: Desktop results of mammals within the 10km grid square W69.**

| Mammal Name | Legal Protection | Conservation Status (Marnell *et al*. 2009) |
|---|---|---|
| Badger (*Meles meles)* | Wildlife Acts | Least Concern |
| Eurasian Pygmy Shrew (*Sorex miutus*) | Wildlife Acts | Least Concern |
| Eurasian Red Squirrel (*Sciurus vulgaris*) | Wildlife Acts | Near Threatened |
| European Otter (*Lutra lutra*) | EU Habitats Directive Annex II, IV<br>Wildlife Acts | Favourable |
| West European Hedgehog (*Erinaceus europaeus*) | Wildlife Acts | Least Concern |

**Table 8-46: Desktop results of mammals within the 10km grid square W79.**

| Mammal Name | Legal Protection | Conservation Status (Marnell *et al*. 2009) |
|---|---|---|
| Badger (*Meles meles)* | Wildlife Acts | Least Concern |
| Eurasian Pygmy Shrew (*Sorex minutus*) | Wildlife Acts | Least Concern |
| Eurasian Red Squirrel (*Sciurus vulgaris*) | Wildlife Acts | Near Threatened |
| European Otter (*lutra lutra*) | EU Habitats Directive Annex II, IV<br>Wildlife Acts | Near Threatened |
| West European Hedgehog (*Erinaceus europaeus*) | Wildlife Acts | Least Concern |

**Table 8-47: Desktop results of mammals within the 10km grid square W89.**

| Mammal Name | Legal Protection | Conservation Status (Marnell *et al*. 2009) |
|---|---|---|
| Badger (*Meles meles)* | Wildlife Acts | Least Concern |
| Eurasian Pygmy Shrew (*Sorex minutus*) | Wildlife Acts | Least Concern |
| Eurasian Red Squirrel (*Sciurus vulgaris*) | Wildlife Acts | Near Threatened |
| European Otter (*Lutra lutra*) | EU Habitats Directive Annex II, IV | Near Threatened |

**Table 8-48: Desktop results of mammals within the 10km grid square W68.**

| Mammal Name | Legal Protection | Conservation Status (Marnell *et al*. 2009) |
|---|---|---|
| Badger (*Meles meles)* | Wildlife Acts | Least Concern |
| Eurasian Red Squirrel (*Sciurus vulgaris*) | Wildlife Acts | Near Threatened |
| European Otter (*Lutra lutra*) | EU Habitats Directive Annex II, IV | Near Threatened |
| West European Hedgehog (*Erinaceus europaeus*) | Wildlife Acts | Least Concern |

**Table 8-49: Desktop results of invasive mammals within 10km grid square W69.**

| Mammal Name | Legislation | Conservation Status (Marnell *et al*. 2009) | Invasiveness (NBDC) |
|---|---|---|---|
| American mink (*Mustela vision*) | Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). | None | High Impact |
| Bank Vole (*Myodes glareolus*) | N/A | None | Medium Impact |
| European Rabbit (*Oryctolagus cuniculus*) | N/A | Least Concern | Medium Impact |
| Fallow Deer (*Dama dama*) | Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended),<br>Wildlife Acts. | Least Concern | High Impact |
| Greater White-toothed Shrew (*Crocidura russula*) | N/A | None | Medium Impact |
| Wild Boar (*Sus scrofa*) | Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). | None | High Impact |

**Table 8-50: Desktop results of invasive mammals within the 10km grid square W79.**

| Mammal Name | Legislation | Conservation Status (Marnell *et al*. 2009) | Invasiveness (NBDC) |
|---|---|---|---|
| American mink (*Mustela vision*) | Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). | None | High Impact |
| Brown Rat (*Rattus norvegicus*) | N/A | None | High Impact |
| European Rabbit (*Oryctolagus cuniculus*) | N/A | Least Concern | Medium Impact |
| Fallow Deer (*Dama dama*) | Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).Wildlife Acts. | Least Concern | High Impact |
| Greater White-toothed Shrew (*Crocidura russula*) | N/A | None | Medium Impact |

**Table 8-51: Desktop results of invasive mammals within the 10km grid square W89.**

| Mammal Name | Legislation | Conservation Status (Marnell *et al*. 2009) | Invasiveness (NBDC) |
|---|---|---|---|
| American mink (*Mustela vision*) | Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). | None | High Impact |
| Brown Rat (*Rattus norvegicus*) | N/A | None | High Impact |
| Eastern Grey Squirrel (*Sciurus carolinensis*) | Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). | None | High Impact |
| European Rabbit (*Oryctolagus cuniculus*) | N/A | Least Concern | Medium Impact |
| Fallow Deer (*Dama dama*) | Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended),<br>Wildlife Acts | Least Concern | High Impact |
| Feral Ferret (*Mustela furo*) | N/A | None | High Impact |
| Greater White-toothed Shrew (*Crocidura russula*) | N/A | None | Medium Impact |

**Table 8-52: Desktop results of invasive mammals within the 10km grid square W68.**

| Mammal Name | Legislation | Conservation Status (Marnell *et al.* 2009) | Invasiveness (NBDC) |
|---|---|---|---|
| American mink (*Mustela vision*) | Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). | None | High Impact |
| Bank Vole (*Myodes glareolus*) | N/A | None | Medium Impact |
| European Rabbit (*Oryctolagus cuniculus*) | N/A | Least Concern | Medium Impact |
| Fallow Deer (*Dama dama*) | Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended),<br>Wildlife Acts | Least Concern | High Impact |
| Greater White-toothed Shrew (*Crocidura russula*) | N/A | None | Medium Impact |
| Sika Deer (*Cervus nippon*) | Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).,<br>Wildlife Acts | None | High Impact |

### *8.3.4.3 Site Survey Results*

*Otter*

The territories of otters can stretch for several 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. Within their territories an individual otter may utilise a number of resting sites; these can be hidden refuges above ground (couches), or under-ground chambers (holts). Holts tend 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.

*CGEP Study Area*

A survey of suitable watercourses within the wind farm survey area was carried out in November 2016 and April 2018. Updated surveys were conducted in 2020. Suitable watercourses were surveyed for Otter, 150m upstream and downstream. The areas surveyed for Otter are illustrated in **Figure 8.70**. No active breeding or resting sites (Holts or Couches) or other evidence of Otter was recorded within the wind farm study area.

*Grid Connection Route Study Area*

A survey of suitable watercourses along the proposed grid route was carried out in June 2018. Updated surveys were conducted in 2020. Suitable watercourses were surveyed for Otter, 150m upstream and downstream of the proposed CGEP Grid Connection Route. No active breeding or resting sites (Holts or Couches) or other evidence of Otter were identified within 150m of any watercourse crossing of the Grid Connection Route.

Wider environs

There was one record of an Otter within the wider environs outside of the study areas. The record was of an Otter recorded on a trail camera deployed along the River Bride, located 1.2 km south of the proposed CGEP footprint. This record was in the same location as a desktop study result. The location of the Otter record within the study area is presented on **Figure 8.77.**

*Badger*

Badgers are found throughout Ireland in areas of suitable habitat: large swathes of the Irish countryside provide ideal conditions for badgers, with their mosaic of pasture grasslands, hedgerows, and areas of scrub and woodland. Badger densities are lower in upland and mountainous areas, areas of bog, and marginal pasturelands along the Atlantic fringe. Several setts will be present within a badger group's territory, but the focus of the badger group is known as the 'main' sett. The main sett is situated roughly central within the group territory and is usually occupied throughout the year and used as the principal breeding sett. Annex setts or outlier setts are smaller and may only be used intermittently or seasonally. An active main sett is characterised by considerable signs of activity, such as copious bedding, nearby latrine (defecation) sites, and well-used paths. Studies in several Irish counties have shown that territory size can vary from as little as 15ha to almost 300ha, with a mean of about 80ha.

A review of data available on the National Biodiversity data centre website indicates that Badger setts have been recorded previously within 1km of the proposed development.

*CGEP Study Area*

Records of four Badger latrines, prints, snuffle holes and an inactive outlier sett were recorded within and outside of the Wind Farm study area during walkover surveys undertaken in November 2016, April 2018 and March and April of 2019. Updated surveys were conducted in 2020. Observations of Badgers were recorded on trail cameras in 2016, 2017 and 2018. Signs of Badger activity were mainly concentrated in the southern section of the CGEP development. No active breeding or resting sites for Badger (setts) were recorded within the wind farm turbine locations. A single inactive outlier Badger sett was recorded 60 metres from the red line planning boundary. The location of Badger evidence records within and around the study area are presented on **Figure 8.71**.

*Grid Connection Route Study Area*

A survey along the proposed grid route was carried out in June 2018. No active breeding or resting sites for Badger (setts) were recorded within the Grid Connection Route Study Area.

*Red Squirrel*

Red Squirrel has a widespread distribution in Ireland and is mainly found in coniferous or mixed woodland. The diet of red squirrel comprises of the seeds of conifer and broadleaf trees. Red squirrels live in nest structures called dreys and produce 1 − 2 litters in a year depending on the availability of food. Red squirrel are classified as having a conservation status of least concern in Ireland (Marnell et al. 2019).

*CGEP Study Area*

Evidence of Red Squirrel was noted at 14 locations within and outside of the CGEP study area, consisting of feeding stations, possible dreys, and field and trail camera observations. These signs of squirrel activity were largely concentrated in the northern part of the CGEP, with many records in close proximity to the development footprint. Red Squirrel records are presented in **Figure 8.78**.

*Grid Connection Route Study Area*

One observation of a Red Squirrel was noted within the Grid Connection Route Study Area. See **Figure 8.83** for all mammal records from the grid connection study area.

*Other Mammals*

Fallow Deer are generally found mainly in mature deciduous or mixed woodlands close to open grassland. Pine Marten generally occur in coniferous or mixed forestry and scrub. Red Fox is found in a wide range of habitats, while Irish Hare is generally found in bog, moor, heath and marsh in addition to mixed farmland, pastoral farmland and more marginal habitats. Hedgehog are associated with edge habitat and pasture, with coniferous woodland, marsh and arable land being least favourable. However, in rural Ireland, hedgehogs select arable land prior to hibernation to build up fat reserves. Irish stoat occurs in habitat with suitable cover, in natural areas such as woodland as well as urban areas.

Evidence of Deer were recorded frequently within and outside of the study area. Evidence included records of droppings, prints, tracks and crossings and field and trail camera observations. All of these records are most likely of Fallow Deer. The location of Deer evidence records within and around the study area are presented on **Figure 8.72**.

Evidence of Red Fox (*Vulpes Vulpes*) was noted frequently within and outside the CGEP study area, consisting of prints, scat and trail camera records. The location of Fox evidence records within and around the study area are presented on **Figure 8.73**.

Irish hare is common on grassland in the study area and was recorded infrequently along forest tracks. Evidence of Hare was recorded frequently within and outside of the Wind Farm study area. Evidence included records of droppings, prints and trial camera observations. The location of Hare evidence records within and around the study area are presented on **Figure 8.75**.

One observation of a dead Bank Vole was recorded within the Wind Farm construction work boundary. See **Figure 8.81** for the location of the Bank Vole record.

One observation of a rat *(Rattus norvegicus)* was recorded outside of the Wind Farm study area. This record was observed on a trail camera located on the River Bride. See **Figure 8.80** for the location of this observation.

General mammal observations within and outside of the Wind Farm study area included records of mammal pathways/runs, most likely used by various mammal species. Small mammal burrows were also recorded, these most likely belong to rabbit or rat. These general mammal observations are presented in **Figure 8.76**.

While no confirmed evidence of Pine Marten was recorded during the survey, they are likely to be present throughout the receiving environment due to the presence of suitable habitat within the study area, including grassland, heath, and coniferous and broadleaved woodland.

*Grid Connection Route Study Area*

Mammal pathways/runs were also recorded within the CGEP Grid Connection Route study area, refer to **Figure 8.83**.

*TDR*

Node 2.8: One chewed cone was observed, indicating red squirrel presence. There is also a mammal trail leading into the woodland from road.

#### *8.3.4.4 Invasive Species*

The following sections describe invasive species recorded during field surveys in the CGEP and GCR study area;
Fallow dear are common and widespread in forestry and were recorded regularly.
European rabbit is a common species of farmland in the study area.

The invasive Greater White-toothed Shrew is known to occur in the wider area and is considered as present within suitable habitat (grassland and woodland). Two observations of deceased Greater White-toothed Shrews were recorded within and outside of the wind farm study area. White-toothed Shrew recorded during survey of the CGEP are presented in **Figure 8.74**. No records of Greater White-toothed Shrews were recorded within the grid connection study area.

No other invasive mammal species as outlined in Table 8-49 were recorded in field surveys. American Mink are likely to be widespread. Bank vole are also likely to be common. This species is an important prey item for hen harrier.

**Table 8-53: Mammals and their field signs observed within the study area and wider environs**

| Observation | Date | Coordinates (E-ITM) | Coordinates (N-ITM) | Details |
|---|---|---|---|---|
| **Badger:** | | | | |
| Field sign | 23/01/2017 | 564681 | 590609 | Badger Print |
| Field sign | 23/01/2017 | 564240 | 592479 | Badger Print |
| Field sign | 24/01/2017 | 567447 | 593851 | Badger Print |
| Field sign | 12/07/2017 | 566110 | 590311 | Badger Print |
| Field sign | November 2016 | 564608 | 593125 | Badger Print |
| Field sign | November 2016 | 564648 | 593083 | Badger Print |
| Field sign | November 2016 | 564675 | 593050 | Badger Print |
| Field sign | November 2016 | 564888 | 593003 | Badger Print |
| Field sign | November 2016 | 564420 | 592213 | Badger Print |
| Field sign | November 2016 | 564863 | 591963 | Badger Print |
| Field sign | November 2016 | 564862 | 591968 | Badger Print |
| Field sign | November 2016 | 564942 | 592132 | Badger Print |
| Field sign | November 2016 | 562390 | 589842 | Badger Print |
| Field sign | November 2016 | 562605 | 589487 | Badger Print |
| Field sign | November 2016 | 562908 | 590494 | Badger Print |
| Field sign | November 2016 | 563108 | 590883 | Badger Print |
| Field sign | November 2016 | 563374 | 590870 | Badger Print |
| Field sign | November 2016 | 563700 | 590722 | Badger Print |
| Field sign | November 2016 | 563563 | 591246 | Badger Print |
| Field sign | November 2016 | 563563 | 589775 | Badger Print |

| Observation | Date | Coordinates (E-ITM) | Coordinates (N-ITM) | Details |
|---|---|---|---|---|
| Field sign | November 2016 | 563261 | 589789 | Badger Print |
| Field sign | November 2016 | 563414 | 589065 | Badger Print |
| Field sign | November 2016 | 564758 | 592223 | Badger Print |
| Field sign | November 2016 | 564656 | 593063 | Badger Scat |
| Field sign | November 2016 | 564552 | 592473 | Badger Scat |
| Field sign | November 2016 | 563108 | 590883 | Snuffle holes |
| Camera Observation | 2016/17 | 564763 | 593058 | Badger observation by trail camera |
| Camera Observation | 2016/17 | 564573 | 592451 | Badger observation by trail camera |
| Camera Observation | March-April 2018 | 562159 | 590219 | Badger observation by trail camera |
| Field sign | April 2018 | 562151 | 590231 | Snuffle Hole |
| Field sign | April 2018 | 562974 | 587468 | Snuffle Hole |
| Field sign | April 2018 | 563016 | 589453 | Snuffle Hole |
| Field sign | April 2018 | 563173 | 589356 | Snuffle Hole |
| Field sign | April 2018 | 563243 | 589364 | Snuffle Hole |
| Field sign | April 2018 | 563111 | 589721 | Badger Fur |
| Field sign | April 2018 | 567022 | 594564 | Badger Print |
| Field sign | April 2018 | 571297 | 593546 | Deceased animal |
| Field sign | April 2018 | 569501 | 591881 | Badger Scat |
| Field sign | April 2019 | Widespread on Site | Widespread on Site | Badger Footprints |
| Field sign | April 2019 | 5648 | 5926 | Outlier Sett *(Full coordinates not shown)* |

| Observation | Date | Coordinates (E-ITM) | Coordinates (N-ITM) | Details |
|---|---|---|---|---|
| Field sign | April 2019 | Widespread on Site | Widespread on Site | Badger Footprints |
| **Otter:** | | | | |
| Camera Observation | 17/05/18 | 571897 | 588806 | Otter observation by trail camera off site. |
| **Squirrel:** | | | | |
| Field sign | July 2016 | 564770 | 588433 | Squirrel feeding station |
| Field sign | July 2016 | 566667 | 594489 | Squirrel feeding station |
| Surveyor Observation | April 2017 | 566856 | 596187 | Red Squirrel observation |
| Camera Observation | 2016/17 | 564573 | 592451 | Red Squirrel observation by trail camera |
| Field sign | 25/04/2019 | 568043 | 593932 | Squirrel Feeding Stations |
| Field sign | 25/04/2019 | 567825 | 593880 | Squirrel Feeding Stations |
| Field sign | 25/04/2019 | 567825 | 593880 | Squirrel Feeding Stations |
| Field sign | 25/04/2019 | 568048 | 593820 | Squirrel Feeding Stations |
| Field sign | 29/03/2019 | 570547 | 594432 | Squirrel Feeding Station |
| Field sign | 29/03/2019 | 570543 | 594439 | Possible squirrel drey |
| Field sign | 29/03/2019 | 570516 | 594437 | Squirrel Feeding Station |
| Field sign | 29/03/2019 | 570496 | 594455 | Squirrel Feeding Station |
| Field sign | 29/03/2019 | 570456 | 594449 | Possible squirrel drey |
| Field sign | 29/03/2019 | 570348 | 594383 | Squirrel Feeding Station |
| Field sign | 29/03/2019 | 570189 | 594297 | Squirrel Feeding Station |
| Field sign | 29/03/2019 | 569891 | 594044 | Squirrel Feeding Station |
| Field sign | 29/03/2019 | 571060 | 593728 | Squirrel Feeding Station |

| Observation | Date | Coordinates (E-ITM) | Coordinates (N-ITM) | Details |
|---|---|---|---|---|
| Field sign | 29/03/2019 | 563280 | 590075 | Squirrel Feeding Station |
| **Hare:** | | | | |
| Field Sign | November 2016 | 566814 | 594332 | Hare print |
| Field Sign | November 2016 | 563378 | 590876 | Hare print |
| Field Sign | November 2016 | 563563 | 591691 | Hare print |
| Field Sign | November 2016 | 563496 | 590843 | Hare print |
| Field Sign | November 2016 | 563502 | 590841 | Hare print |
| Field Sign | November 2016 | 563575 | 590801 | Hare print |
| Camera Observation | 2016/17 | 570486 | 594067 | Hare observed on trail camera |
| Camera Observation | 2016/17 | 564763 | 593058 | Hare observed on trail camera |
| Camera Observation | 2016/17 | 564573 | 592451 | Hare observed on trail camera |
| Camera Observation | March - April 2018 | 562159 | 590219 | Hare observed on trail camera |
| Field Sign | April 2018 | 562903 | 589511 | Hare droppings |
| Field Sign | April 2018 | 562924 | 589497 | Hare droppings |
| Field Sign | April 2018 | 563049 | 589435 | Hare droppings |
| Field Sign | April 2018 | 563069 | 589421 | Hare droppings |
| Surveyor observation | August 2020 | 563117 | 590894 | Two hares sighted |

| Observation | Date | Coordinates (E-ITM) | Coordinates (N-ITM) | Details |
|---|---|---|---|---|
| **Fox:** | | | | |
| Field Sign | July 2016 | 564694 | 591161 | Fox evidence |
| Field Sign | July 2016 | 564018 | 592869 | Fox evidence |
| Field Sign | July 2016 | 566712 | 594395 | Fox evidence |
| Field Sign | November 2016 | 563849 | 589814 | Fox evidence along fence |
| Field Sign | November 2016 | 563595 | 589777 | Holes in fence used by Fox |
| Camera Observation | 2016/17 | 570486 | 594067 | Fox observed on trail camera |
| Camera Observation | 2016/17 | 568555 | 591716 | Fox observed on trail camera |
| Camera Observation | 2016/17 | 564763 | 593058 | Fox observed on trail camera |
| Camera Observation | 2016/17 | 564573 | 592451 | Fox observed on trail camera |
| Field Sign | April 2018 | 561939 | 590005 | Fox Scat |
| Field Sign | April 2018 | 563488 | 590854 | Fox Scat |
| Field Sign | April 2018 | 563505 | 590839 | Fox Scat |
| Field Sign | April 2018 | 563567 | 590836 | Fox Scat |
| Field Sign | April 2018 | 563576 | 590834 | Fox Scat |
| Field Sign | April 2018 | 563060 | 590783 | Fox Scat |
| Field Sign | April 2018 | 562879 | 589516 | Fox Scat |
| Field Sign | April 2018 | 562909 | 589505 | Fox Scat |
| Field Sign | April 2018 | 563019 | 589529 | Fox print |
| Field Sign | April 2018 | 563019 | 589529 | Fox Scat |

| Observation | Date | Coordinates (E-ITM) | Coordinates (N-ITM) | Details |
|---|---|---|---|---|
| Field Sign | April 2018 | 563033 | 589543 | Fox Print |
| Field Sign | April 2018 | 563033 | 589543 | Fox Print |
| Field Sign | April 2018 | 563067 | 589422 | Fox Scat |
| Field Sign | April 2018 | 567041 | 594628 | Fox Scat |
| Field Sign | April 2018 | 569340 | 592212 | Fox Scat |
| Field Sign | March 2019 | 563548 | 589787 | Fox Print |
| **Deer:** | | | | |
| Field Sign | July 2016 | 566650 | 594477 | Deer evidence |
| Field Sign | July 2016 | 568056 | 593260 | Deer evidence |
| Field Sign | July 2016 | 568315 | 593706 | Deer evidence |
| Field sign | 12/07/16 | 566650 | 594477 | Deer droppings and prints |
| Field sign | 12/07/16 | 568056 | 593260 | Deer droppings and resting areas |
| Surveyor observation | July 2016 | 568315 | 593706 | Female and juvenile deer observed |
| Field sign | November 2016 | 570325 | 594360 | Deer Crossing |
| Field sign | November 2016 | 570509 | 594588 | Deer Crossing |
| Field sign | November 2016 | 568469 | 592173 | Deer Crossing |
| Field sign | November 2016 | 568669 | 591860 | Deer Crossing |
| Field sign | November 2016 | 566976f | 594413 | Deer Crossing |
| Field sign | November 2016 | 566980 | 594417 | Deer Crossing |
| Field sign | November 2016 | 568227 | 594507 | Deer Crossing |
| Field sign | November 2016 | 567706 | 595100 | Deer Crossing |
| Field sign | November 2016 | 564653 | 591903 | Deer Crossing |

| Observation | Date | Coordinates (E-ITM) | Coordinates (N-ITM) | Details |
|---|---|---|---|---|
| Field sign | November 2016 | 562384 | 589357 | Deer Crossing |
| Field sign | November 2016 | 562335 | 589357 | Deer Crossing |
| Field sign | November 2016 | 562309 | 589597 | Deer Crossing |
| Field sign | November 2016 | 562373 | 589842 | Deer Crossing |
| Field sign | November 2016 | 562416 | 589929 | Deer Crossing |
| Field sign | November 2016 | 562802 | 590116 | Deer Crossing |
| Field sign | November 2016 | 563049 | 590722 | Deer Crossing |
| Field sign | November 2016 | 563073 | 590820 | Deer Crossing |
| Field sign | November 2016 | 563954 | 590826 | Deer Crossing |
| Field sign | November 2016 | 562993 | 589666 | Deer Crossing |
| Field sign | November 2016 | 569807 | 594846 | Deer Droppings |
| Field sign | November 2016 | 569895 | 594700 | Deer Droppings |
| Field sign | November 2016 | 571099 | 593761 | Deer Print |
| Field sign | November 2016 | 571013 | 593868 | Deer Print |
| Field sign | November 2016 | 570456 | 504245 | Deer Print |
| Field sign | November 2016 | 570383 | 594559 | Deer Print |
| Field sign | November 2016 | 569766 | 594257 | Deer Print |
| Field sign | November 2016 | 569764 | 594016 | Deer Print |
| Field sign | November 2016 | 568426 | 592071 | Deer Print |
| Field sign | November 2016 | 568629 | 592641 | Deer Print |
| Field sign | November 2016 | 568602 | 592548 | Deer Print |
| Field sign | November 2016 | 568772 | 592382 | Deer Print |
| Field sign | November 2016 | 564552 | 502771 | Deer Print |

| Observation | Date | Coordinates (E-ITM) | Coordinates (N-ITM) | Details |
|---|---|---|---|---|
| Field sign | November 2016 | 563683 | 591135 | Deer Print |
| Field sign | November 2016 | 563979 | 590022 | Deer Print |
| Field sign | November 2016 | 571202 | 593619 | Deer Print & Track |
| Field sign | November 2016 | 570988 | 593911 | Deer Print & Track |
| Field sign | November 2016 | 571186 | 593654 | Deer Track |
| Field sign | November 2016 | 570942 | 593970 | Deer Track |
| Field sign | November 2016 | 569866 | 594905 | Deer Track |
| Field sign | November 2016 | 569807 | 594836 | Deer Track |
| Field sign | November 2016 | 566814 | 594332 | Deer Track |
| Field sign | November 2016 | 566758 | 594710 | Deer Track |
| Field sign | November 2016 | 563849 | 589814 | Deer evidence along a fence |
| Field sign | November 2016 | 563595 | 589777 | Holes in fence used by deer |
| Camera Observation | 2016/17 | 570486 | 594067 | Deer observation by trail camera |
| Camera Observation | 2016/17 | 568555 | 591716 | Deer observation by trail camera |
| Camera Observation | 2016/17 | 566720 | 594359 | Deer observation by trail camera |
| Field sign | April 2018 | 566669 | 564898 | Mammal path |
| Field sign | April 2018 | 566129 | 595261 | Mammal path |
| Field sign | April 2018 | 567022 | 594564 | Deer Print |
| Field sign | April 2018 | 567006 | 594378 | Deer Print |
| Field sign | April 2018 | 569290 | 592225 | Deer Print |

| Observation | Date | Coordinates (E-ITM) | Coordinates (N-ITM) | Details |
|---|---|---|---|---|
| Surveyor Observation | April 2018 | 567307 | 594092 | Herd of Deer observed by surveyor. |
| Surveyor observation | August 2020 | 568009 | 593262 | Doe and fawn fallow deer observed by surveyor. |
| **Greater white-toothed Shrew** | | | | |
| Field Sign | 11/04/2018 | 566812 | 595229 | Deceased Greater White-toothed Shrew |
| Field Sign | 28/03/2019 | 562175 | 589259 | Deceased Greater White-toothed Shrew |
| **Stoat:** | | | | |
| Surveyor Observation | 16/05/2018 | 562621 | 589112 | Stoat observed by field surveyor |
| Camera Observation | 12/06/2018 | 570287 | 593721 | Stoat observation by trail camera |
| **Bank Vole:** | | | | |
| Surveyor Observation | 17/07/2017 | 564995 | 593740 | Deceased Bank Vole |

**Table 8-54: Badger Sett Locations**

| Sett | Entrance No. | Activity | Sett Type | Closest Turbine | Distance from construction Activities |
|---|---|---|---|---|---|
| 1 | 1 | Unlikely to be active | Outlier sett | 15 | Outlier Badger sett was recorded 60 metres from the construction works boundary |

#### 8.3.4.5 Fauna Evaluation

All native mammals are protected by legislation under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000.

Otter, Badger, Pine Marten, Red Squirrel, Irish Hare, Hedgehog and all deer species are afforded protection under the Wildlife Act (as amended). Otter, Pine Marten and Irish hare are also protected under the EU Habitats Directive 92/43/EEC. Otter is further protected under the Convention on Trading in Endangered Species. Otter is also listed as a qualifying interest of the Lower River Shannon SAC and, hence, is evaluated as of International Importance, which is equivalent to a Very High sensitivity rating.

The following mammals are afforded protection under the Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats): Otter, Pine Marten, Irish Hare, Badger, Red Squirrel, Hedgehog and Irish Stoat.

Local populations of Irish Hare and Badger are evaluated as of Local Importance (Higher Value), which is equivalent to Low sensitivity, as it is considered unlikely that based on recorded evidence, those populations which occur in close proximity to the proposed development comprise 1% or more of the County population.

Local populations of Pine Marten, Red Squirrel, Hedgehog, and Irish Stoat are evaluated as Local Importance (Higher Value), which is equivalent to Low sensitivity, due to their protection under the Wildlife Act.

Red Fox is not protected under the Wildlife Act and is therefore evaluated as Local Importance (lower Value) and does not require further evaluation. Fallow Deer is listed as a High Impact Invasive Species under the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) in Republic of Ireland. Local populations of Fallow Deer are evaluated as Local Importance (lower value), which is equivalent to Negligible sensitivity, due to their non-native status and do not require further evaluation.

The Greater White-toothed Shrew is an Amber-listed invasive species rated as 'medium risk' however their impact on conservation goals remains uncertain due to lack of data (Kelly et al 2013b, 2017). As an invasive species no importance evaluation is assigned to this species. As a high impact invasive species American Mink is similarly not assigned an importance evaluation.

#### 8.3.4.6 Sensitivity

The conservation status of each of the protected species recorded or assumed to be present in the study area was obtained from the International Union for Conservation of Nature (IUCN) red list, the Habitat Directive Article 17 Reporting, and the NPWS 2009 Red List for Mammals. According to the IUCN Red List: all mammals recorded/assumed to be present are listed as 'Least Concern', with the exception of Otter which is listed as 'Near Threatened'. According to Habitats Directive Article 17 Reporting, Otter, Pine Marten and Irish Hare are all listed as having 'Favourable' conservation status.

All mammals are sensitive to the direct effects from disturbance/displacement from breeding and foraging ranges as a result of noise and visual intrusion. Some species show variable or flexible responses such as Otter where research from English Nature (Chain, 2013) suggests indicate that Otters will rest under roads, in industrial buildings, close to quarries, and at other sites close to high levels of human activity.
Mammals are also sensitive to habitat loss and additive mortality from inadvertent contact with operating machinery or vehicles.

Otter: The National Parks & Wildlife Service's Threat Response Plan for the Otter (Marnell *et al*. 2009). a review of and response to the pressures and threats to Otters in Ireland, categorized three principal risks implicated in Otter declines across Europe: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution. Biodiversity Ireland identifies roads, motorways, professional passive fishing, pollution to surface waters, along with the removal of riparian habitats and a decline in eel numbers as the main threats to Otter.

Badger: Setts are sensitive to land take/machinery operations within 30-50m of sett location due to the potential for inadvertent disturbance and/or mortality with distances increasing to 150m if activities such as piling or blasting are proposed (none in this instance). Habitat loss greater than 25% of any social group's territory size is deemed as significant. Disturbance to foraging individuals when foraging from construction noise and visual intrusion especially during periods of night time working. Habitat loss or the construction of significant barriers may also dissect territories. The Department of Agriculture, Food and the Marine has previously conducted vaccination trials of Badgers in certain counties in Ireland and carries out culling in areas where severe cattle TB outbreaks occur. Badgers may also be killed or injured by road traffic as they attempt to access foraging areas- a review of roadkill records on the Biology.ie website[36] found no submitted records of badger mortality on roads which overlap the proposed development

Red Squirrel: Biodiversity Ireland identifies the main threat to Red Squirrel are competition for food and space with the invasive Grey Squirrel species. The squirrel pox virus (SQPV) which is lethal to Red Squirrel is also carried by the Grey Squirrel. According to NPWS, Loss of suitable habitat and unsympathetic woodland management are also considered threats (Marnell *et al*. 2009).

Pine Marten: Biodiversity Ireland identifies the main threat to Pine marten as forest and plantation management and use, roads and motorways, and predator control/incidental poisoning, along with habitat loss and fragmentation are the most serious threats.

Irish Hare: Biodiversity Ireland identifies the main threat to Irish hare as the modification of cultivation practices and intensive mowing or intensification of farming are identified as high-level threats to Irish hare. Other threats include invasive species, roads and motorways, urbanised areas/human habitation, and hunting, along with habitat loss and fragmentation leading to isolation and inbreeding. Climate change is also identified as a threat, resulting in increased competitive relationships between Irish Hare and Brown Hare species

#### *8.3.4.7 Receiving Environment*

According to the Red List of Irish terrestrial mammals (Marnell, et al, 2019), Otter and Red Squirrel, Fallow Deer, Hedgehog, Irish Hare, Pine Marten, Badger, Irish Stoat and Red Fox are classified as least concern.

Data on Otter trends showed a 20-25% decline between 1980-2005, most of the decline occurred within the first decade, however the cause for decline was unclear (Bailey & Rochford, 2006). More recent data however shows a population recovery and widespread distribution, justifies the improved assessment of least concern (Marnell et al. 2019).

Pine Marten population is thought to be increasing, with a recent population estimate of 3,000 individuals (O'Mahony et al., 2017).

Red Squirrel population is estimated at 40,000 (NPWS & EHS, 2008). Approximately 20% decline in range since 1911 with as much as half of that lost in last decade (C. Lawton, unpublished data as cited in Marnell *et al*. 2009). Recent surveys however have shown the red squirrel has expanded its range once again in the midlands of Ireland, following the loss of grey squirrels in those areas (Lawton et al., 2015). This recovery, plus the overall widespread distribution across the island of Ireland justify a change of status to least concern (Marnell et al. 2019).

Badger population is considered stable (Marnell *et al*. 2009), estimated in the Republic of Ireland as 84,000 (Sleeman et al., 2009).

There are no population estimates available for Ireland regarding the Irish Stoat, however, there is no evidence of a population decline (Marnell *et al*. 2009).

There are no accurate statistics available for Red Fox. However, breeding populations are estimated at between 150,000 to 200,000 (Hayden & Harrington, 2000, cited in Marnell *et al*. 2009). There is no evidence of a decline.

[36] Biology.ie, Road Kill Survey, National Biodiversity Data Centre, Ireland, accessed 24 July 2019, <https://maps.biodiversityireland.ie/Dataset/44>

The Irish Hare population is considered stable, but, with population fluctuations. Most recent estimates of 535,000 for Republic (Reid et al., 2007 cited in Marnell *et al*. 2009).

For fallow Deer, no national population data available. However, steady year on year increase in numbers being shot under licence is apparently having no impact on continued range expansion. Population is likely to be > 150,000 (Marnell *et al*. 2009).

It is assumed in this report that the baseline environment in relation to mammal species, as identified above, will be the receiving environment at the time of construction as no noticeable change is expected to occur within the relatively short time period prior to commencement of construction. Identified longer terms trends, such as declines in breeding Red Squirrel is likely to overlap the operational phase, as are trends in respect of other mammals, identified in publications such as the Marnell *et al*. (2009).

### 8.3.5 Bats

#### *8.3.5.1 Study Area*

**Table 8-55 Definition of study area for CGEP project bat surveys**

| Study Area for Bats | Justification for the Study Area Extents |
|---|---|
| Buildings within 150m of the construction works area boundary<br><br>Mature trees within 50m of the construction works area boundary;<br><br>Linear vegetation features (e.g. hedgerows) of high suitability for foraging bats within the construction works area boundary;<br><br>Bridges within the construction works area boundary and along material haulage routes on the local road network between the concrete/stone suppliers and the works locations. | Professional Judgement and as per Best Practice:<br><br>Bat Surveys for Professional Ecologists: Good Practice Guidelines, Collins, (2016), and<br><br>The Conservation of Bats in Bridges Project – A Report on the survey and conservation of bat roosts in bridges in Cumbria, Billington and Norman (1997). |

#### *8.3.5.2 Desktop Study*

Desktop Survey of Landscape Suitability

Bats are common and widespread throughout Ireland, and occupy a wide variety of habitats.

Online national landscape suitability maps for Irish bat species (Lundy *et al.,* 2010) were reviewed and indicate that the suitability index for the 'all bats combined' layer varies within the 10km squares within which the proposed CGEP and CGEP Grid Connection are located from low to medium to high, with most proposed turbines located in a 'low' suitability landscape (https://maps.biodiversityireland.ie/Map).

A desktop review identified the following information in respect of Bat species present within the receiving environs for the proposed CGEP and CGEP Grid Connection Route - as provided in **Tables 8-56** to **8-59.**

**Table 8-56: Desktop records of bats within and adjacent to the proposed development (NBDC's 10km grid square W69)**

| Bat Name | Legal Protection | Conservation Status (Marnell *et al*. 2009) |
|---|---|---|
| Daubenton's Bat (*Myotis daubentonii*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |
| Natterer's Bat (*Myotis nattereri*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |

**Table 8-57: Desktop records of bats within and adjacent to the proposed development (NBDC's 10km grid square W79)**

| Bat Name | Legal Protection | Conservation Status (Marnell *et al*. 2009) |
|---|---|---|
| Common Pipistrelle (*Pipistrellus pipistrellus sensu stricto*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |
| Daubenton's Bat (*Myotis daubentonii*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |
| Lesser Noctule (*Nyctalus leisleri*) | EU Habitats Directive Annex IV, Wildlife Acts | Near Threatened |
| Pipistrelle (*Pipistrellus pipistrellus sensu lato*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |
| Soprano Pipistrelle (*Pipistrellus pygmaeus*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |

**Table 8-58: Desktop records of bats within and adjacent to the proposed development (NBDC's 10km grid square W89)**

| Bat Name | Legal Protection | Conservation Status (Marnell *et al*. 2009) |
|---|---|---|
| Brown long-eared bat (*Plecotus auratus*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |
| Daubenton's Bat (*Myotis daubentonii*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |
| Lesser Noctule (*Nyctalus leisleri*) | EU Habitats Directive Annex IV, Wildlife Acts | Near Threatened |
| Natterer's Bat (*Myotis nattereri*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |
| Pipstrelle (*Pipistrellus pipistrellus sensu lato*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |
| Soprano Pipistrelle (*Pipistrellus pygmaeus*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |

**Table 8-59: Desktop records of bats within and adjacent to the proposed development (NBDC's 10km grid square W68)**

| Bat Name | Legal Protection | Conservation Status (Marnell *et al*. 2009) |
|---|---|---|
| Brown long-eared bat (*Plecotus auratus*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |
| Daubenton's Bat (*Myotis daubentonii*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |
| Lesser Noctule (*Nyctalus leisleri*) | EU Habitats Directive Annex IV, Wildlife Acts | Near Threatened |
| Pipistrelle (*Pipistrellus pipistrellus sensu lato*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |
| Soprano Pipistrelle (*Pipistrellus pygmaeus*) | EU Habitats Directive Annex IV, Wildlife Acts | Least Concern |

### *8.3.5.3 Site Survey Results*

#### 8.3.5.3.1 Transect Surveys

The survey area was surveyed on eight occasions: May, July, August and September 2016, June and October 2017, and in August and September 2020. Maps of bat records in each month are provided in Figures 1 - 6. A count of bat passes in each survey is presented in **Table 8-60**, and the results are standardised in relation to the distance covered.

**Table 8-60 Summary of results from transect surveys**

| Species* | May-16 | Jun-17 | Jul-16 | Aug-16 | Sep-16 | Oct-17 | Aug-20 | Sep-20 |
|---|---|---|---|---|---|---|---|---|
| Leisler's | 15 | 62 | 27 | 21 | 3 | 3 | 6 | 5 |
| Common pipistrelle | 116 | 127 | 196 | 289 | 178 | 73 | 7 | 20 |
| Soprano pipistrelle | 24 | 25 | 77 | 137 | 75 | 45 | 3 | 3 |
| Unidentified pipistrelle | 5 | 0 | 10 | 24 | 13 | 0 | 0 | 0 |
| Nathusius' pipistrelle | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Myotis* spp | 8 | 6 | 40 | 24 | 46 | 9 | 2 | 0 |
| Unidentified bat | 0 | 1 | 3 | 18 | 17 | 3 | 0 | 0 |
| Total | 168 | 223 | 353 | 513 | 332 | 133 | 18 | 28 |
| Distance | 83,748 | 118,000 | 94,800 | 89,800 | 95,600 | 120,578 | 39380 | 39380 |
| Bats / km | 2.0 | 1.9 | 3.7 | 5.7 | 3.5 | 1.1 | 0.46 | 0.7 |

Common pipistrelles were the most abundant species (1,006 passes, 57% of all records), followed by soprano pipistrelles (389 passes, 22%), *Myotis* bats (135 passes, 8%) and Leisler's bat (142 passes, 8%). There were two passes (<1%) by Nathusius' pipistrelles, and all other records were unidentified.

There is a clear seasonal trend to activity, with a peak of activity for most species in July, August and September, and lower counts in May, June and October. Leisler's bats had a slightly different trend, with a peak in June, moderate numbers in May, July and August, and low counts in September and October.

The spatial distribution of all species was relatively uniform throughout the survey area. Common pipistrelles, soprano pipistrelles and *Myotis* spp were recorded in highest abundance along forest roads within conifer plantations, but were also present in non-forested areas. Leisler's bats were slightly more abundant in the forestry, but the effect was less pronounced than for other species.

#### 8.3.5.3.2 Preliminary automated detector surveys (2017)

This section refers to the first year of automated detector surveys in 2017, in which six detectors were spread across the study area (**Figure 8-94**), and left in position for at least eight nights on three occasions. In total, 11,197 bat passes were recorded over the 28 sampling nights, which is equivalent to 66.6 bat passes per sampling location per night, on average. A full table of results is provided in **Appendix 8 – H.**

The vast majority of passes were common pipistrelle bats (7,644 passes, 68% of all passes), followed by soprano pipistrelle (1,530 passes, 14%), Leisler's bat (1,141 passes, 10%), *Myotis* spp. (782 passes, 7%). Of the *Myotis* species, Natterer's bat was the most abundant, but some whiskered bats were also recorded. 100 passes (1%) were very faint or could not be identified to species level, and were listed as unidentified bats.

Leisler's bat, common pipistrelle and soprano pipistrelle were the most abundant species during the survey. These species are also considered to have a 'high collision risk' with wind turbines, as outlined in the SNH 2019 guidelines. A breakdown of the counts for each of these species at each sampling point on each date is provided in **Table 8-61**. For ease of reference, the counts on each night are colour-coded using the abundance categories in **Table 8-4**.

Leisler's bat typically had negligible or low activity on most of the sampling points in June and July, and moderate activity on only two occasions. Activity levels were negligible in September and October.

Common pipistrelles had high activity at sampling site A2 (situated alongside a road in a mature conifer plantation) throughout the July sampling period and part of September. However, this was a highly localised effect, because activity was low at all other sampling sites during the July sampling period. There were some occasional moderate or high counts in September and October, likely to be related to the suitability of weather conditions on each night.

Soprano pipistrelles had negligible or low activity in July, and some occasional moderate or high counts in September and October. There was no clear spatial or temporal pattern in activity.

**Table 8-61 Breakdown of preliminary automated detector surveys (2017) by species.**

*Leisler's bats*

| | Jun | Jul | | | | | | | | | | Sep | | | | | | | | | Oct | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | 30 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| SD1 | 2 | | 11 | | 13 | 19 | 11 | 72 | 35 | 6 | 10 | 7 | 7 | 2 | 2 | 1 | | 2 | | 1 | | | | | | 2 | | |
| SD2 | 2 | 5 | 23 | 8 | 7 | 8 | 6 | 16 | 5 | 5 | 6 | 1 | 1 | 2 | | 1 | 1 | 1 | | 1 | | | | | | | | |
| SD3 | 1 | 9 | 14 | 4 | 27 | 18 | 18 | 18 | 22 | 20 | | 3 | 11 | 4 | 2 | 6 | | 3 | 1 | 1 | | | | | | | | |
| SD4 | | 6 | 10 | 7 | 22 | 38 | 29 | 25 | 28 | 21 | 24 | 3 | 1 | 2 | | 5 | | 1 | | | | | | | | 1 | | |
| SD5 | 1 | 5 | 36 | 11 | 20 | 23 | 28 | 20 | 36 | | 79 | 6 | 16 | 2 | | 8 | 2 | | 3 | 1 | 1 | | | | | 7 | | 3 |
| SD6 | 1 | 1 | 1 | 1 | 10 | 17 | 38 | 9 | 2 | 1 | 42 | 1 | | | | 1 | | | | | 1 | | | | | | | |

*Common pipistrelles*

| | Jun | Jul | | | | | | | | | | Sep | | | | | | | | | Oct | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | 30 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| SD1 | 1 | 2 | 6 | | 13 | 25 | 12 | 54 | 20 | | 2 | 117 | 53 | 2 | | 10 | | 1 | 1 | 3 | 2 | | | | | 76 | | |
| SD2 | 344 | 423 | 152 | 124 | 293 | 400 | 393 | 334 | 378 | 403 | 219 | 250 | 128 | 10 | 7 | 75 | | 3 | 1 | 1 | | 43 | | 7 | | 60 | | |
| SD3 | 5 | 17 | 32 | 11 | 40 | 52 | 48 | 48 | 17 | 3 | 2 | 36 | 69 | 7 | 10 | 33 | 4 | 9 | 1 | 5 | 1 | | | | | 197 | 1 | |
| SD4 | 18 | 29 | 24 | 9 | 19 | 18 | 14 | 18 | 15 | 24 | 24 | 60 | 144 | 7 | 5 | 45 | 3 | 6 | 2 | | 9 | 4 | | | | 237 | 1 | |
| SD5 | 3 | 2 | 23 | 72 | 7 | 43 | 25 | 12 | 5 | | 39 | 187 | 213 | 9 | 1 | 159 | | 11 | | | 6 | | | | | 38 | 11 | 3 |
| SD6 | 1 | 1 | 5 | 2 | 8 | 40 | 23 | 19 | | | 28 | 5 | 39 | 1 | | 11 | | 26 | | | 40 | 1 | 3 | | 5 | 401 | 8 | 277 |

*Soprano pipistrelles*

| | Jun | Jul | | | | | | | | | | Sep | | | | | | | | | Oct | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | 30 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SD1 | | | | 5 | | 7 | 7 | 5 | 11 | 10 | | | 37 | 52 | | | 4 | | | 1 | | 11 | | | | 10 | | | |
| SD2 | | 2 | 7 | 1 | 3 | 3 | 4 | 3 | 4 | 13 | 7 | 7 | 42 | 10 | | 2 | 6 | | 2 | | | 1 | 20 | | 2 | 6 | | | |
| SD3 | | 4 | 24 | 11 | 3 | 33 | 16 | 21 | 18 | 23 | 10 | 2 | 44 | 81 | 10 | 13 | 24 | 6 | 12 | 8 | 2 | | | | | 57 | 9 | | |
| SD4 | | 7 | 3 | 3 | 2 | 7 | 2 | 8 | 14 | 19 | 4 | 2 | 69 | 46 | 2 | 6 | 23 | 4 | 19 | 7 | 3 | 2 | 37 | | | 148 | | | |
| SD5 | | 3 | | 11 | 7 | 4 | 11 | 4 | 1 | 5 | | 13 | 44 | 29 | | | 152 | 1 | 9 | 3 | | 3 | 15 | | 4 | 21 | 8 | 2 | |
| SD6 | | | | | | | | | 2 | | | | 1 | 3 | | | 1 | | | | | | | | | | | | |

#### 8.3.5.3.3 Automated detector surveys along the grid connection route (2018)

This section refers to the second year of automated detector surveys in 2018, in which eight detectors were spread across the proposed grid connection route (**Figure 8-96**) and left in position for five nights on three occasions. In total, 13,115 bat passes were recorded over the 15 sampling nights, which is equivalent to 109.3 bat passes per sampling location per night. A full table of results is provided in **Appendix 8 – H, Table 8-62**.

The majority of records were soprano pipistrelle (5,756 passes, 44% of all passes) and common pipistrelle bats (5,597 passes, 43% of all passes), followed by Leisler's bat (1,206 passes, 9%), *Myotis* spp (predominantly Natterer's bats, 395 passes, 3%). 161 passes (1%) were unidentified bats.

Most of the sampling points were along the side of public roads. The highest counts were at locations with extensive linear habitat features, including hedgerows and the edges of conifer plantations. The lowest counts were in open areas or habitats with low connectivity. Nonetheless, bats were recorded at all sampling points, and they are considered to be abundant throughout the landscape, particularly common pipistrelles and soprano pipistrelles.

#### 8.3.5.3.4 Detailed automated detector surveys (2019)

This section refers to the third year of automated detector surveys in 2019, in which fourteen detectors were placed at proposed turbine locations, and left in position for ten nights in spring, summer and autumn months. The results for each season are described below.

*Spring (22-31 May)*

In total, 23,685 bat passes were recorded over the 10 sampling nights, which is equivalent to 169.2 bat passes per sampling location per night. A full table of results is provided in **Appendix 8–H**.

The majority of passes were common pipistrelle bats (11,849 passes, 50% of all passes), followed by Leisler's bat (8,503 passes, 36%), soprano pipistrelle (1,237 passes, 5%), *Myotis* spp (predominantly Natterer's bat, with some whiskered bats, 1,803 passes, 8%), and 2 Nathusius' pipistrelle records (<1%). 287 passes (1%) were unidentified.

A breakdown of the seasonal counts for Leisler's bat, common pipistrelle and soprano pipistrelle is provided in **Table 8-62** below and coloured in accordance with the abundance categories.

*Summer (16-25 August)*

In total, 13,076 bat passes were recorded over the 10 sampling nights, which is equivalent to 93.4 bat passes per sampling location per night. A full table of results is provided in **Appendix 8–H**.
The majority of passes were common pipistrelle bats (7,705 passes, 59% of all passes), followed by soprano pipistrelle (2,200 passes, 17%), Leisler's bat (1,668 passes, 13%), *Myotis* spp (predominantly Natterer's bat, 1,213 passes, 9%), and 1 Nathusius' pipistrelle (<1%). 289 passes (2%) were unidentified.

*Autumn (17-26 October)*

There was significantly less activity during this sampling period, with 5,402 passes over the 10 sampling nights, equivalent to 38.6 bat passes per sampling location per night. A full table of results is provided in **Appendix 8–H.**

The majority of passes were common pipistrelle bats (3,021 passes, 55% of all passes), followed by soprano pipistrelle (1528 passes, 28%), Leisler's bat (305 passes, 6%), and *Myotis* spp (453 passes, 8%). 150 passes (3%) were unidentified.

## Table 8-62 Breakdown of detailed automated detector surveys (2019) by species

*Leislers*

| | Spring | | | | | | | | | | Summer | | | | | | | | | | Autumn | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Location** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** | **31** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | **26** |
| T2 | 37 | 28 | 127 | 5 | 2 | | | 4 | | | | 3 | | | | | | | | 1 | 1 | | | 1 | | | | | | |
| T3 | 162 | 67 | 199 | 41 | 53 | 1 | 1 | 11 | 1 | 5 | 99 | 17 | 7 | 14 | | 13 | 338 | 67 | 84 | 21 | 13 | 6 | | | | 9 | | | | |
| T4 | 43 | 20 | 38 | 4 | | | 1 | 3 | | 3 | 9 | 5 | | 2 | 17 | | 8 | 15 | 4 | 3 | 5 | 3 | 3 | 3 | | | | | | |
| T8 | 24 | 5 | 11 | 2 | 2 | | 3 | 5 | | 1 | 2 | | | 3 | 5 | 1 | 4 | 5 | 2 | 2 | | 1 | 1 | | | | | | | |
| T10 | 7 | 32 | 13 | 18 | 9 | 11 | | 17 | | 4 | 14 | 17 | 9 | 17 | 31 | 2 | 30 | 44 | 19 | 16 | 1 | 2 | 3 | 2 | | 5 | | | | |
| T11 | 49 | 511 | 395 | 615 | 353 | 120 | | 772 | 502 | 181 | | | | 14 | | | | 59 | | 19 | 28 | 5 | 11 | 8 | | 32 | 2 | | | |
| T12 | 39 | | 341 | 32 | 2 | | | 8 | | | 4 | 10 | | | | | | | | 27 | 15 | 9 | 1 | 1 | | 12 | | | | |
| T13 | 2 | | 4 | | 1 | | | 1 | 1 | 1 | 4 | 9 | 3 | 4 | 11 | 2 | 15 | 9 | 5 | 9 | 33 | 13 | 2 | 2 | | 3 | | | | |
| T15 | 61 | 60 | 62 | 21 | 5 | | | 9 | 1 | 15 | | | | | | | | | | 10 | | | | | | | | | | |
| T17 | 71 | 66 | 76 | 55 | 36 | | 4 | 42 | 25 | 8 | 1 | 15 | 6 | 7 | 4 | 2 | 16 | 2 | 2 | 3 | 2 | 1 | | | | | | | | |
| T18 | 184 | 137 | 166 | 250 | 112 | 11 | 101 | 183 | 86 | 51 | 11 | 20 | | 8 | 6 | | 29 | 13 | 11 | 11 | 8 | 2 | | 1 | | | | | | |
| T19 | 105 | 136 | 223 | 145 | 71 | | 26 | 57 | 32 | 97 | 20 | 11 | 8 | 5 | 26 | 3 | 20 | 17 | 2 | 16 | 15 | 16 | 6 | 3 | | 14 | 1 | | | |
| T20 | 193 | | 136 | 160 | 12 | | 3 | 17 | 49 | 29 | 16 | 21 | 12 | 10 | 33 | 4 | 65 | 10 | 18 | 20 | | | | | | | | | | |
| T23 | 38 | | | 55 | 67 | | | 1 | | 3 | | | | | | | | | | | | | | | | | | | | |

*Common pipistrelles*

| | Spring | | | | | | | | | | Summer | | | | | | | | | | Autumn | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Location** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** | **31** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | **26** |
| T2 | 3 | 1 | 12 | 1 | | | | | | | 1 | 5 | | | | | | | | 10 | 11 | 8 | 1 | | | | | | | |
| T3 | 75 | 83 | 139 | 303 | 165 | 85 | 3 | 150 | 278 | 117 | 621 | 344 | 77 | 66 | | 196 | 283 | 48 | 33 | 186 | 98 | 138 | 128 | | | 127 | | | | 8 |
| T4 | 10 | 7 | 5 | 2 | 5 | | 1 | 1 | | 1 | 2 | 1 | | | 5 | | | 1 | | 5 | 4 | 5 | 4 | | | 4 | | | | |
| T8 | 789 | 656 | 1038 | 199 | 573 | 316 | 473 | 376 | 112 | 597 | 60 | 192 | 18 | 83 | 153 | | 19 | 77 | 21 | 86 | 32 | 44 | 48 | 2 | | | | | | |
| T10 | 155 | 200 | 234 | 128 | 215 | 111 | 7 | 142 | 70 | 75 | 60 | 72 | 59 | 273 | 78 | 11 | 37 | 8 | 343 | 567 | 63 | 101 | 25 | 4 | | 163 | | | | |
| T11 | 414 | 362 | 242 | 137 | 246 | 189 | 2 | 84 | 13 | 16 | | | | 5 | | | | 10 | | 5 | 5 | 10 | 12 | | | 10 | | | | |
| T12 | 119 | | 296 | 119 | 105 | 1 | | 70 | 47 | | | | | | | | | | | | 24 | 99 | 83 | 1 | | 135 | | | | |
| T13 | 15 | | 8 | | 2 | 2 | | 3 | 3 | 5 | 2 | 4 | 1 | 4 | 11 | | 2 | 1 | 3 | 6 | 12 | 13 | 16 | 10 | | 11 | | | | |
| T15 | 11 | 5 | 9 | 7 | 6 | | | 7 | 2 | 9 | | | | | | | | | | | | | | | | | | | | |
| T17 | 3 | 2 | 26 | | 22 | 2 | 1 | 23 | 21 | 23 | 5 | 2 | | 3 | 3 | 5 | 3 | 3 | 1 | | 4 | 3 | 2 | 3 | | | | | | |
| T18 | 28 | 18 | 55 | 4 | 3 | 5 | 3 | 2 | 1 | 12 | | 1 | | 5 | 4 | | 5 | 1 | 2 | 10 | | 4 | 3 | | | | | | | |
| T19 | 31 | 123 | 83 | 35 | 55 | 16 | 3 | 16 | 21 | 339 | 79 | 124 | 36 | 258 | 429 | 19 | 183 | 15 | 262 | 739 | 202 | 525 | 182 | 74 | 1 | 358 | 122 | 16 | 8 | 55 |
| T20 | 28 | | 47 | 24 | 72 | | | 59 | 16 | 77 | 183 | 316 | 41 | 155 | 67 | 5 | 25 | 262 | 82 | 217 | | | | | | | | | | |
| T23 | 9 | | | 2 | 2 | 21 | | | | 47 | | | | | | | | | | | | | | | | | | | | |

*Soprano pipistrelles*

| | Spring | | | | | | | | | | Summer | | | | | | | | | | Autumn | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| T2 | | | | | | | | | | | | 6 | | | | | | | | 4 | 1 | 1 | | | | | | | | |
| T3 | 5 | 4 | | 4 | 4 | 1 | | 1 | 1 | 4 | 10 | 22 | 47 | 8 | | 7 | 9 | 9 | 10 | 42 | 13 | 10 | 4 | 3 | | 10 | 6 | | | 6 |
| T4 | | | | | | 1 | | | | | 1 | 1 | | | 3 | | 3 | 2 | | 2 | 1 | | 1 | | | | 8 | | | |
| T8 | 35 | 115 | 55 | 59 | 80 | 7 | 1 | 24 | 30 | 19 | | 1 | | 14 | 7 | 1 | 3 | 1 | | | 3 | 1 | 1 | | | | | | | |
| T10 | 30 | 7 | 32 | 33 | 14 | 9 | 1 | 23 | 12 | 13 | 10 | 28 | 19 | 52 | 53 | 7 | 15 | 6 | 211 | 127 | 32 | 84 | 6 | 2 | | 69 | | | | |
| T11 | 25 | 31 | 17 | 8 | 24 | 2 | | 1 | | 2 | | | | 3 | | | | 3 | | 9 | 4 | 3 | 3 | 2 | | 1 | | | | |
| T12 | 2 | | 3 | 1 | 1 | | | | | | | | | | | | | | | | 5 | 12 | 2 | | | 5 | | | | |
| T13 | 3 | | | | | | | | | | 2 | 3 | 1 | 3 | 10 | | 1 | 1 | 1 | 3 | 6 | 11 | 8 | 11 | | 3 | | | | |
| T15 | 2 | 2 | 3 | 1 | 1 | | | | 4 | 3 | | | | | | | | | | | | | | | | | | | | |
| T17 | | 6 | 1 | 3 | | 1 | | | 16 | | | | | | | | | | | | 1 | | 1 | | | 1 | | | | |
| T18 | | 1 | 1 | | | | | | 1 | | | | | | 2 | | 1 | 4 | 4 | 5 | | 4 | 3 | | | | | | | |
| T19 | 29 | 49 | 32 | 37 | 43 | 5 | 29 | 42 | 40 | 132 | 27 | 89 | 15 | 47 | 269 | 24 | 87 | 38 | 165 | 204 | 165 | 122 | 202 | 121 | 31 | 242 | 47 | 9 | 44 | 197 |
| T20 | 1 | | 1 | | | | | | 2 | 1 | 114 | 46 | 32 | 32 | 33 | 4 | 12 | 4 | 64 | 97 | | | | | | | | | | |
| T23 | | | | 2 | | | | | | 2 | | | | | | | | | | | | | | | | | | | | |

Leisler's bat was recorded in significant numbers during the spring surveys, but was not as abundant during the summer surveys. It was broadly distributed through the survey area. The highest counts were at T11 in spring, which is an area of open farmland and drainage channels. It was also recorded in moderate to high numbers around the conifer plantations in the north-east of the survey area, particularly at T18, T19 and T20. Other sampling sites had a number of nights of moderate activity (T4, T15, T17, T23) or a single night of high activity (T2, T12) but other nights of much lower activity. Some locations had only negligible or low activity throughout the sampling period (T3, T8, T10), and the recent clearfelled site at T13 had negligible activity on all nights. There was not a clear link between habitat type and bat activity, as high bat activity was recorded in open areas, immature forestry, and forest edge.

Common pipistrelle showed some clustering of activity, with high activity at five sampling sites (T4, T8, T10, T11, T12), moderate activity at three sites (T18, T19, T20), and negligible or low activity at all other locations. Many of the highest counts were on forest edge habitat (T4, T8, T10, T19, T20), although there was also high activity at the open farmland at T11. There was negligible activity on most nights in the recently clear-felled forest, as well as in the closed-canopy mature forestry and immature forestry.

Soprano pipistrelles were highly clustered in a small number of locations, and were less abundant than the other species mentioned above. There were nights of moderate activity at T8, T10, T19 and T20, but all other areas had low or negligible activity from this species. As above, soprano pipistrelles appeared to have a preference for forest edge habitats.

#### 8.3.5.3.1 Roost Surveys

Three bat roosts were recorded in derelict buildings within the survey area, all of which supported multiple small roosts. Natterer's bats were present in all three buildings (maternity and hibernation roosts), while small numbers of brown-long-eared, common pipistrelle and soprano pipistrelles were also recorded. All roosts are located more than 250 m from the proposed turbine locations. Details of roosts are presented in **Table 8-63**. Initial surveys were carried out in 2017, and confirmatory surveys at BR2 and BR3 in 2020.

**Table 8-63 Details of bat roosts within the site boundary**

| Roost code | Notes | Characterisation | Nearest turbine |
|---|---|---|---|
| BR1 | Derelict house in forestry at Commons / Knoppoge | Natterer's (maternity, mating and hibernation), common pipistrelle (non-breeding summer and autumn roost), and possible brown-long-eared | 1.1 km from T22 |
| BR2 | Ruins of bungalow in forestry at Killeagh / Glannasack | Natterer's and brown long-eared (both are maternity, mating and hibernation) | 260 m from T19 |
| BR3 | Derelict two-storey house in farmland near Black Bog | Natterer's (maternity, mating and hibernation) and soprano pipistrelle (non-breeding summer). Brown long-eared bats recorded in 2016 but not 2017. | 300 m from T7 |

Two additional structures were also surveyed in 2017 and 2020: a collection of farm buildings (ITM grid reference 563789 592831) and a derelict former dwelling (ITM 564386 592936). No roosting bats were found at either location. There are no other potential bat roosts in the vicinity of the proposed turbine locations.

### *8.3.5.4 Bat Species Evaluation*

The survey area is used by a broad range of bat species. The most-abundant species in all cases is the common pipistrelle, which appears to favour edge habitats in conifer plantations, but is also

present in other habitat types. Soprano pipistrelles are also abundant in some places, particularly in the mixed agricultural / forestry landscape along the grid connection route. Leisler's bat is the third most-abundant species; it does not appear to have strong habitat preferences, but is occasionally recorded in moderate or high numbers. *Myotis* bats are also present in relatively high numbers around conifer plantations, mainly Natterer's bats (including several roosts), and to a lesser extent whiskered bats. Brown long-eared bats have very weak echolocation calls, so they are inevitably underestimated in bat detector surveys, but some roosting bats were found, and it is expected that this species uses the site in low to moderate numbers. This is the typical species composition of rural areas. It is noted that no lesser horseshoe bats are present, and that Nathusius' pipistrelles are present in negligible numbers.

The ecological value of the site can be categorised using Ecological Evaluation Criteria (**Table 8.8**). A number of linear habitat features (notably forest edges and internal roads) are used on a regular basis as foraging areas by a range of common bat species, and the habitat is considered to be of Local ecological value. Closed-canopy forestry and recently-clearfelled areas have much lower activity, and are considered to be of Negligible habitat value. The three bat roosts support small breeding populations of Natterer's bats (and other species), and are considered to be of Local ecological value. It is noted that all bats and their roosts receive legal protection from destruction or disturbance under the *European Communities (Birds and Natural Habitats) Regulations 2011* (as amended).

#### *8.3.5.5 Further Analysis of Bat Activity Patterns*

##### 8.3.5.5.1 Seasonal patterns of bat activity

Bat activity is strongly influenced by seasonal cycles. Bats are usually most active during summer months (between May and September), when insects are abundant, air temperatures are high, and wind speeds are low. Activity levels are lowest in winter months (between November and March), when bats enter periods of torpor / hibernation during periods of cold or unfavourable weather, and only emerge during periods of mild weather. Spring and autumn are variable periods, in which bat activity is strongly influenced by weather conditions. Therefore, the levels of bat activity recorded at a site often vary significantly over the course of a year.

A clear seasonal trend to activity was recorded during the transect surveys, with a peak of activity for most species in July, August and September, and lower counts in May, June and October. For Leisler's bat the pattern was slightly earlier in the summer, with a peak in June, moderate numbers in May, July and August, and low counts in September and October.

For static detector surveys in 2017 and 2019, the highest levels of bat activity were recorded in May, with moderate counts in July and August. Activity levels were significantly lower in September and October, with only sporadic peaks of activity at certain locations during periods of favourable weather. As noted above, the peak of Leisler's activity was much earlier in the summer, with several high counts in May 2019, but lower activity in June, July and August, and negligible activity in September and October

Overall, the results of both survey methods conform to the expected pattern of bat activity, albeit with some variation between species. Leisler's activity peaked in May and June, with lower levels in mid-summer months, and low counts in September and October. Activity of common and soprano pipistrelles was more consistent throughout the year, with a peak between May and August, and sporadic activity in September and October.

##### 8.3.5.5.2 Time of night

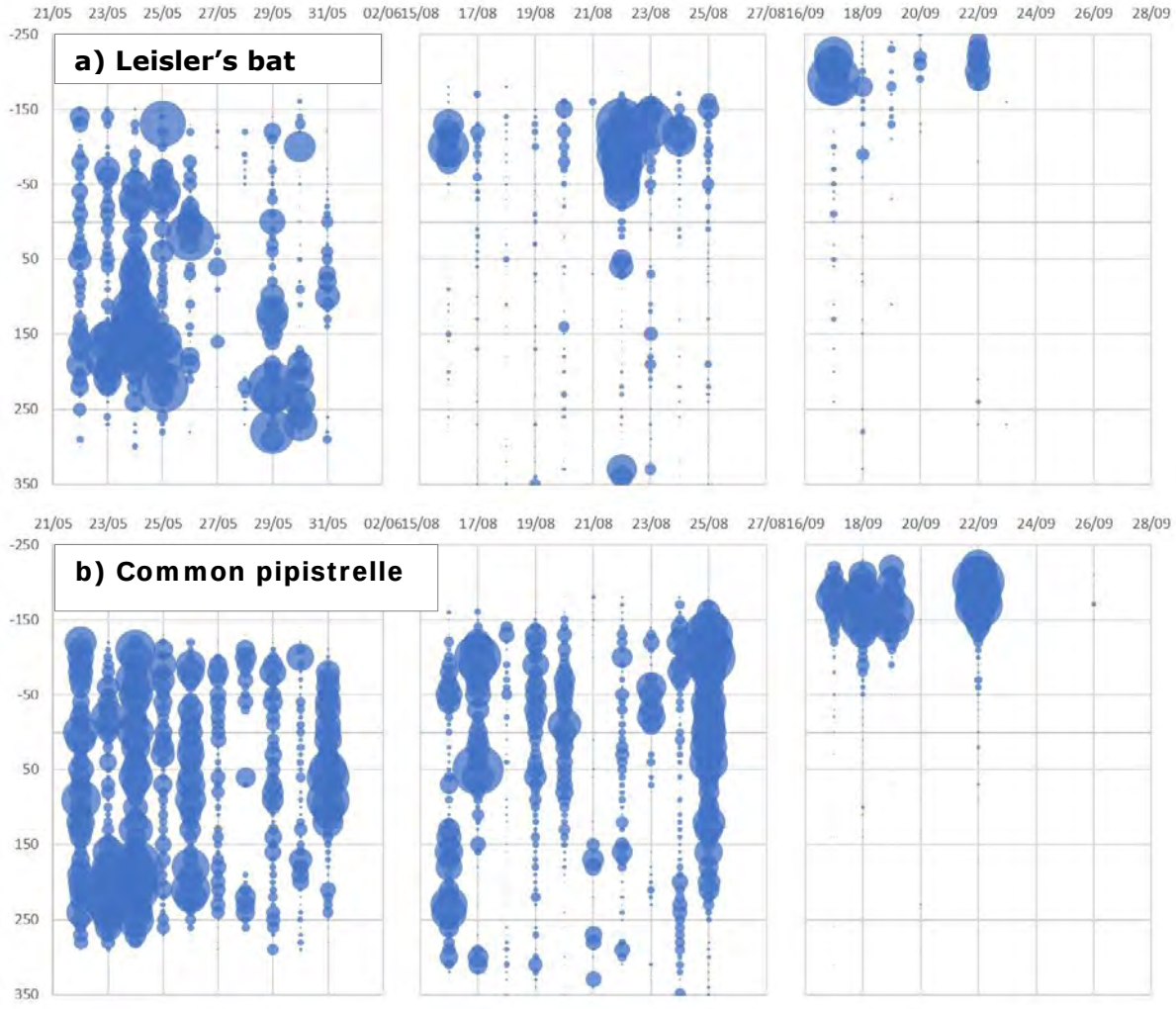
Bat activity often varies over the course of the night. The highest levels of activity often occur immediately after sunset, as bats emerge from their roosts, commute to their feeding locations, and feed intensively for 2 – 3 hours. In the middle part of the night there is sometimes a lull of activity, but there is a second, smaller peak in activity in the hours before sunrise. This activity pattern is thought to be influenced by the activity patterns of insect prey, which also peak during the sunset and sunrise periods.

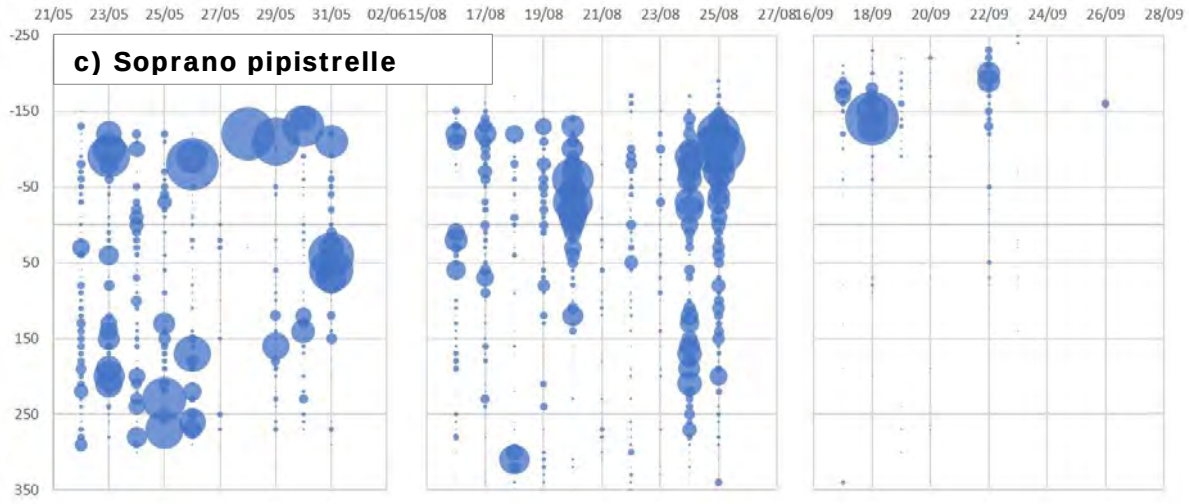
Activity for the three key species were assessed in ten-minute intervals using the 2019 dataset. The results are shown in **Table 8-64**, using circles to indicate the levels of bat activity in each

ten-minute period over the course of the night, and displaying results separately for each sampling night in each season.

The figures do not show any clear patterns in activity throughout the night, as bats were recorded at all times of the night, particularly during the peak of activity in May. Post-sunset peaks of activity were apparent for Leisler's bats in August, and for all species in September, but these patterns were not consistent. Therefore, the 2019 dataset does not appear to follow the variable pattern of bat activity that occurs at some locations (i.e. peaks after sunset and before sunrise, with a lull between). Activity levels are relatively constant throughout the night, particularly during periods of peak activity.

**Table 8-64 Patterns of bat activity during the night. The Y axis refers to minutes before and after midnight, the X axis refers to date, and the size of the circle indicates the number of bat passes recorded in ten-minute intervals.**






#### 8.3.5.5.3 Influence of weather conditions on bat activity

Bat activity is often influenced by weather conditions, particularly wind and temperature. Flight conditions for bats and their prey are often best when wind speeds are low, and insects are often most active when air temperature is high. Higher activity levels by bats also affect the likelihood of collision-related impacts; in a study of bat fatalities at operational wind farms, Mathews et al (2016) found that most nights where casualties occurred (81.5%) had low mean wind speeds (≤5 m/s measured at the ground) and maximum night-time temperatures of >10°C.

To investigate this further, potential relationships between bat activity and weather were assessed for the 2019 dataset. Wind speed and temperature data in ten-minute intervals collected from the on-site meteorological mast (measured at 35 m above ground level, which is within the blade-swept zone of modern wind turbines) were aligned with the counts of key bat species in the same ten-minute intervals, and the results were grouped into categories.

#### 8.3.5.5.4 Effect of wind speed on bat activity

A breakdown of bat activity at different wind speeds is presented in **Table 8-65** and **Chart 8-1**, expressed both as counts and percentages. The proportion of sampling periods in each wind speed band is also provided in order to characterise the range of wind speeds during the month.

The average wind speed during the sampling period was 4.7 m/s (± 1.9 SD), with a normal distribution around the mean, and the majority (68%) of sampling periods with wind speeds between 3 and 7 m/s. When the relative proportions of wind speeds are compared to the relative proportions of bat passes for each species (Table 7 and Figure 8), it is clear that bat activity was skewed towards lower wind speeds. For example, 66 – 71% of bat passes were recorded below 5 m/s, even though only 53% of wind records were below this speed. For all species 86-88% of activity was at wind speed below 6 m/s, and 98% below 7 m/s.

#### 8.3.5.5.5 Effect of temperature on bat activity

A similar assessment of the relationship between bat activity and air temperature in each year is presented in **Table 8-66** and **Chart 8-2**.

The average temperature during the sampling period was 11.4°C (± 2.1 SD), with a normal distribution around the mean, and the majority (74%) of sampling periods with temperatures between 9 and 14 ºC. The distribution of bat activity was broadly similar, with 81 – 86 % of passes when temperatures between 9 and 14 ºC). The critical limit for temperature appeared to be 9°C because 92% of Leisler's, 87% of common pipistrelle and 90% of soprano pipistrelle passes were recorded above this limit.

Overall, it appears that bats were more active on nights with warmer temperatures, and that activity decreased significantly at lower temperatures. However, it is not clear whether this is a direct causal relationship, or whether it is an indirect relationship that is influenced by other

factors, e.g. that bat activity is highest in summer months, when temperatures are coincidentally high. It is beyond the scope of this study to assess this variation in detail.

**Table 8-65 Relationships between bat activity and wind speed. The first column contains bands of wind speed in 1 m/s increments, and the second and third columns show the count and percentage of sampling periods in which the wind speed was between these values. The remaining columns show the count and percentages of passes for each species within each band, and the final column.**

| Wind | Frequency | | Leislers | | Common Pipistrelle | | Soprano Pipistrelle | |
|---|---|---|---|---|---|---|---|---|
| m/s | Count | Percent | Count | Percent | Count | Percent | Count | Percent |
| 0 - 1 | 29 | 1.6% | 239 | 2% | 664 | 3% | 124 | 3% |
| 1 - 2 | 162 | 8.8% | 2014 | 19% | 3486 | 17% | 429 | 11% |
| 2 - 3 | 184 | 10.0% | 1824 | 17% | 3837 | 18% | 504 | 13% |
| 3 - 4 | 271 | 14.7% | 1463 | 14% | 3270 | 16% | 707 | 19% |
| 4 - 5 | 330 | 17.9% | 1508 | 14% | 3606 | 17% | 723 | 19% |
| 5 - 6 | 392 | 21.3% | 2105 | 20% | 3603 | 17% | 766 | 20% |
| 6 - 7 | 258 | 14.0% | 1071 | 10% | 2124 | 10% | 458 | 12% |
| 7 - 8 | 119 | 6.5% | 193 | 2% | 381 | 2% | 39 | 1% |
| 8 - 9 | 67 | 3.6% | 18 | 0% | 29 | 0% | 16 | 0% |
| 9 - 10 | 20 | 1.1% | 5 | 0% | 33 | 0% | 19 | 1% |
| 10 -11 | 7 | 0.4% | 0 | 0% | 0 | 0% | 0 | 0% |
| 11 - 12 | 0 | 0.0% | 0 | 0% | 0 | 0% | 0 | 0% |
| | 1,839 | | 10,440 | | 21,033 | | 3,785 | |

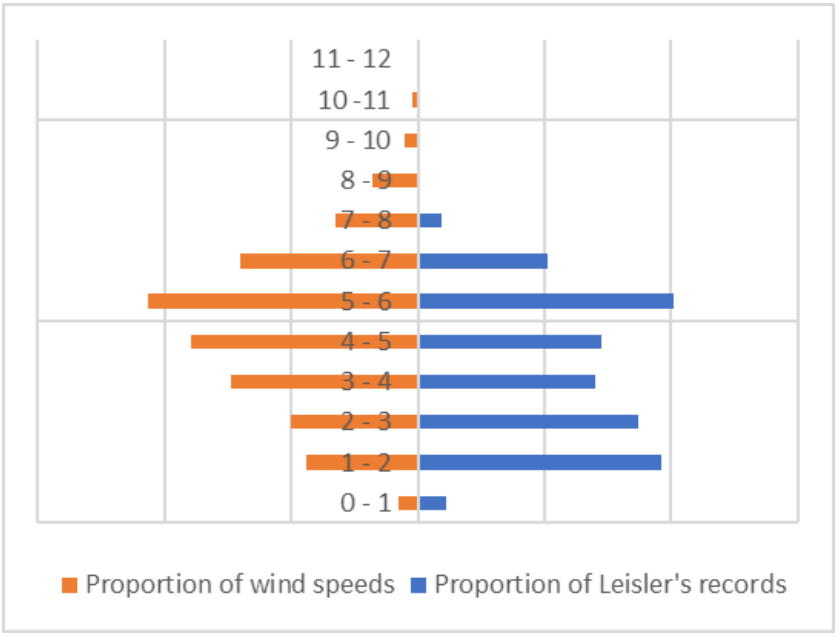



**Chart 8-1: Comparing the relative proportions of wind speeds (m/s) and Leisler's passes**

**Table 8-66 Relationships between bat activity and temperature The first column contains bands of temperature in 1ºC increments, the second and third columns show the count and percentage of sampling periods in which the temperature was between these values, and the remaining columns show the count and percentages of passes for each species within each band.**

| Temp | Frequency | | Leislers | | Common pipistrelle | | Soprano pipistrelle | |
|---|---|---|---|---|---|---|---|---|
| Celsius | Count | Percent | Count | Percent | Count | Percent | Count | Percent |
| 5 - 6 | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| 6 - 7 | 21 | 1.1% | 3 | 0.0% | 10 | 0.0% | 8 | 0.2% |
| 7 - 8 | 86 | 4.7% | 225 | 2.2% | 1038 | 4.9% | 68 | 1.8% |
| 8 - 9 | 157 | 8.5% | 578 | 5.5% | 1800 | 8.6% | 315 | 8.3% |
| 9 - 10 | 279 | 15.2% | 2668 | 25.6% | 6113 | 29.1% | 779 | 20.6% |
| 10 - 11 | 272 | 14.8% | 625 | 6.0% | 3156 | 15.0% | 579 | 15.3% |
| 11 - 12 | 236 | 12.8% | 1952 | 18.7% | 3870 | 18.4% | 767 | 20.3% |
| 12 - 13 | 328 | 17.8% | 2806 | 26.9% | 2591 | 12.3% | 620 | 16.4% |
| 13 - 14 | 255 | 13.9% | 932 | 8.9% | 1490 | 7.1% | 337 | 8.9% |
| 14 - 15 | 188 | 10.2% | 635 | 6.1% | 950 | 4.5% | 302 | 8.0% |
| 15 - 16 | 17 | 0.9% | 16 | 0.2% | 15 | 0.1% | 10 | 0.3% |
| 16 - 17 | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| | 1,839 | | 10,440 | | 21,033 | | 3,785 | |

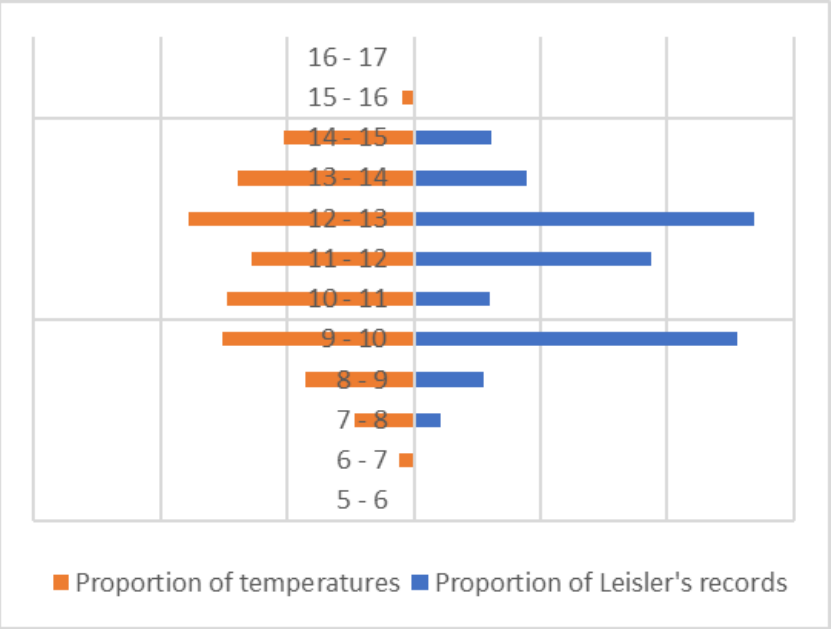



**Chart 8-2: Comparing the relative proportions of temperature (°C) and Leisler's passes**

## 8.3.6 Other Protected Fauna

### *8.3.6.1 Study Area*

#### 8.3.6.1.1 Marsh Fritillary

**Table 8-67: Study area for Marsh Fritillary and justification**

| Study Area for Aquatic Habitats & Species | Justification for the Study Area Extents |
|---|---|
| 50m area around and incorporating the CGEP construction works area and the CGEP Gird Connection route | Professional Judgement and as per Best Practice (CIEEM, 2018). |

#### 8.3.6.1.2 Amphibians and Reptiles

**Table 8-68: Study area for Amphibians and Reptiles and justification**

| Study Area for Aquatic Habitats & Species | Justification for the Study Area Extents |
|---|---|
| 50m area around and incorporating the CGEP construction works area and the CGEP Gird Connection route | Professional Judgement and as per Best Practice (CIEEM, 2018). |

### *8.3.6.2 Desktop Study*

#### 8.3.6.2.1 Marsh Fritillary

Marsh Fritillary (*Euphudras aurinia*) has a wide distribution across Ireland, but the distribution is patchy and it is still considered overlooked in some parts of its range. Colonies can be found in a variety of habitats including calcareous grassland, degraded bogs, wet heath, transition mires and fens up to 300m (Reagan *et al.,* 2010). It is the only protected butterfly species in Ireland. The population often fluctuates within its range dependant on weather, food supply and interaction with parasites. Larvae overwinter in a small web close to the ground and emerge in early spring. At a local level, populations can fluctuate highly and are subject to extremely low levels or periodic extinctions. The evidence all indicates that the Marsh Fritillary is relatively sedentary, rarely dispersing beyond 750m, although colonisation may rarely take place over longer distances of 5−20 km (Warren 1994). The distance of 2km has been previously considered as a standardised 'functional landscape' i.e. the area within which most dispersal, new colonisation and regular exchange of genetic material will occur (Fowles & Smith 2006).

Previous records exist from a number of locations proximal to the CGEP and CGEP Grid Connection Route. Notably, Hectad W69 has 357 records of marsh fritillary, these records are concentrated within four localities within the townlands of Fiddane, Tooreen, Knockacullata and Knuttery. These four clusters of records are located outside of the proposed CGEP development boundary. See **Table 8-69** for the number of records held by the National Biodiversity Data Centre for the four 10km grid squares within the which the CGEP and grid connection are located. A total of 21 Marsh Fritillary records were retrieved for W68, with the majority of these concentrated within a single locality in the townland of Coom West, approximately 2.7km west of the CGEP development boundary.

Fewer records were found for hectads W79 and W89 which cover the CGEP Grid Connection Route, with a total of 14 records for W79 and no Marsh Fritillary records for W89. There is a cluster of records from an area within Coolnkilla Townland which lies within the CGEP Grid Connection Route study area.

**Table 8-69: Desktop results of Marsh Fritillary within the proposed development 10km grid squares.**

| 10km Grid square | Record count | Date of last record |
|---|---|---|
| **W68** | 21 | 26/08/18 |
| **W69** | 357 | 10/04/19 |
| **W79** | 14 | 31/12/20 |
| **W89** | No records | No records |

#### 8.3.6.2.2 Reptiles and Amphibians

Taking into account the species distribution of amphibians and reptiles in Ireland, suitable habitat exists within the study area for Smooth Newt, Common Frog, and Common Lizard.

**Smooth Newt** (*Lissotriton vulgaris*) is the only species of tailed amphibian found in Ireland. While commonly encountered near water bodies, adult newts are actually terrestrial, only returning to water bodies to breed. They tend to prefer habitats that offer protection from desiccation, such as long grass, woodland and scrubland. Newts will over-winter in refugia such as woodpiles and rotting logs, which offer them some protection from the elements (HSI). Smooth Newt has been recorded from Co. Cork in suitable habitat (Meehan 2013). In general, it is perceived that information gaps exist in terms of the distribution of this species in Ireland. A search of existing records for this species show that it has only been recorded in one 10km grid square, W79.

**Common frog** *(Rana temporaria)* is one of only three amphibians found in Ireland. It is a widespread and abundant species occurring in a broad range of habitats throughout the country. Adults congregate to spawn in ponds and ditches in the spring. Eggs develop into tadpoles as water temperature rises and following metamorphosis young froglets emerge onto land in early summer. These young animals are particularly vulnerable to predation. They spend 2-3 years on land, feeding on terrestrial invertebrates, before returning to freshwater to breed. A life expectancy of 3-4 years would be typical. Extrapolated data primarily from the 2011 National Frog Survey (Reid *et al.,* 2013), used to inform Ireland's Article 17 under the EU Habitats Directive indicates the distribution of this species within three of the four 10km squares overlapping with the CGEP and the CGEP Grid Connection route. Records held by the National Biodiversity Data Centre show that Common Frog has been recorded within all four 10km grid squares within which the CGEP and CGEP Gird Connection route is located, with the most recent records from 2018.

**Common or Viviparous Lizard** (*Zootoca vivpera*) is Ireland's only native terrestrial reptile. The species is widely distributed on the Irish mainland and at least some of the islands. It often frequents damp habitats, as the humidity has a beneficial effect on growth rate and activity. Ideal habitats for the species are south-facing, damp tussocky grassland, scrub covered hillsides, dunes or banks, woodland tracks and it also resides in peat bogs, dry grasslands and heathlands (HSI). No records for this species within the four 10km grid squares within which the CGEP and CGEP Grid Connection Route is located were found.

See **Table 8-70** for the number of records held by the National Biodiversity Data Centre for the four 10km grid squares within the which the CGEP development and CGEP Grid Connection Route are located.

**Table 8-70: Desktop results of amphibians and reptiles within the proposed development 10km grid squares.**

| Species name | W68 | W69 | W79 | W89 |
|---|---|---|---|---|
| | Year last recorded | Year last recorded | Year last recorded | Year last recorded |
| Common Frog (*Rana temporaria*) | 2018 | 2018 | 2018 | 2018 |

| Species name | W68 | W69 | W79 | W89 |
|---|---|---|---|---|
| | Year last recorded | Year last recorded | Year last recorded | Year last recorded |
| Smooth Newt (*Lissotriton vulgaris*) | - | - | 2018 | - |
| Common Lizard *(Zootoca vivipara)* | - | - | - | - |

### *8.3.6.3 Site Survey Results*

#### 8.3.6.3.1 Marsh Fritillary

*CGEP and Grid Connection Route*

Surveys of the CGEP did not identify the presence of Marsh Fritillary within the study area. No larvae, larval foodwebs or adult butterflies were recorded. Field surveys during 2019 found that habitats within 50m of the CGEP infrastructure were found to be generally of low value to Marsh Fritillary being dominated by commercial forestry plantation, clearfelled areas, forestry tracks and scrub.

Habitat potentially suitable to Marsh Fritillary was identified at seven locations within the grid connection study area. These areas were further evaluated for their potential to support Marsh Fritillary using a field assessment to evaluate suitability. Following the field survey of potentially suitable habitat no areas of suitable Marsh Fritillary habitat were recorded within the CGEP Grid Connection Route study area. The locality in Coolnakilla townland for which previous records were identified during the desktop study was surveyed; this area was however found to be unsuitable for Marsh Fritillary, likely due to landuse change with a resultant loss of suitable habitat. It was noted that the area consisted of unsuitable improved agricultural grassland and recently planted conifer plantation at the time of survey

No Marsh Fritillary larvae, larval food webs or adult butterflies were recorded during the survey of the CGEP and grid connection route.

#### 8.3.6.3.2 Amphibians and Reptiles

*CGEP and Grid Connection Route*

**Smooth Newt**: Due to their wide distribution across Ireland, there is the possibility that Smooth Newt occurs in suitable habitat within the study area. Smooth newt are typically found in slow-moving water such as natural ponds, ditches and wetlands. Man-made habitats such as garden ponds and quarry ponds are not significant components of the newt's habitat (Meehan 2013). No Smooth Newts were recorded during surveys undertaken in 2016, 2018 and 2019. Foraging Smooth Newt can exploit a wide range of habitats but show a preference for wet grassland, woodland and scrub; thus, where these habitats occur within the CGEP and CGEP Grid Connection Route study areas, there is suitable foraging habitat for this species. Breeding Smooth Newt show preference for fish free ponds and ditches with abundant emergent vegetation. It is considered that suitable breeding habitat may occur.

**Common frog**: Due to their wide distribution across Ireland, there is the possibility that Common Frog occurs within suitable habitat (typically garden ponds, natural pools, drainage ditches and quarry ponds) throughout the CGEP and CGEP Grid Connection Route study areas. No Common Frogs were recorded during surveys undertaken on the CGEP Grid Connection route, however suitable habitat for this species was noted. Thirteen records of Common Frogs or evidence of Common Frog were recorded during surveys of the CGEP, these records include frog spawn clumps, and breeding pools with adults and spawn present; see **Figure 8.82** for the location of these records. Suitable habitat occurs at a number of locations throughout the CGEP and CGEP Grid Connection study areas, including roadside and field drains which could potentially support breeding frogs. Common frogs exploit a wide range of habitats and can breed in puddles, drains and slow-flowing sections of watercourses. Frogs forage in a range of wet habitats including wet

grassland and marsh; therefore, where these habitats occur within the study area are likely to support frogs.

**Common or Viviparous Lizard:** Due to their wide distribution across Ireland, there is the possibility that Viviparous Lizard occur within suitable habitat (woodland, marshes, heath, moors, bogs, acid grassland) within the study area. No Viviparous Lizards were recorded during surveys undertaken in 2016, 2018 and 2019. However, suitable habitat for this species was noted. Suitable habitat is present within the study area including heath and heath mosaic habitats where they are expected to occur.

*Turbine Delivery Route*

No Marsh Fritillary larvae or adults were identified during surveys of the proposed Turbine Delivery Route. Several Devil's Bit Scabious plants were noted at a single node location; however, these were not supporting any Marsh Fritillary larvae

#### *8.3.6.4 Other Species Evaluation*

##### 8.3.6.4.1 Marsh Fritillary

Marsh Fritillary is the only butterfly species resident in Ireland that is listed in Annex II of the EU Habitats Directive 92/43/EEC. While no populations were recorded during surveys of the CGEP and CGEP Grid Connection Route. Habitat within the site is very limited being predominantly forestry. The known population/habitat extent recorded from the wider area is evaluated as of County Importance.

##### 8.3.6.4.2 Amphibians and Reptiles

All amphibian and reptile species are protected under the Wildlife Act (1976, amended 2000). The Common Frog is also listed on the Annex V of the Habitats Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC), meaning that the removal of this species from the wild is restricted by European law.

All amphibians and reptiles present are evaluated as of Local Importance (Higher Value).

### 8.3.7 Fisheries and Aquatic Ecology

#### *8.3.7.1 Study Area*

| Study Area | Justification for the Study Area Extent |
|---|---|
| Watercourse Crossing Locations and Waterbody Sub-catchments within the zone of influence of the CGEP development and the CGEP Grid Connection Route. | As per Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Scheme, NRA, (2008), and CIEEM 2018. |

#### *8.3.7.2 Desktop Study*

Existing fisheries data for the wider River Bride catchment was reviewed. This included the rivers Bride, Blackwater and Clyda and selected tributaries. Fisheries data is generally lacking for the upper Bride and Clyda catchments, as well as the smaller tributaries in the catchment (including

those surveyed). However, the Bride is known to support brown and sea trout (*Salmo trutta*), Atlantic salmon (*Salmo salar*), European eel (*Anguilla anguilla*) and Stone loach (*Barbatula barbatula*), as well as *Lampetra* spp. ammocoetes a short distance downstream of Castlelyons, approx. 5km downstream of the lowermost survey site (13) (Kelly *et al*., 2009, 2012; O' Gorman *et al*., 2015).

Salmon, brown trout and sea trout fishing are all popular on the (lower) River Bride (O'Reilly, 2009). Additionally, surveys conducted as part of the National European eel monitoring programme on the River Bride sub-catchment found that eels occupied a very uniform distribution throughout the Bride catchment (IFI, 2015).

The Munster Blackwater, to which the Bride joins near Youghal, is a recognised salmonid watercourse, supporting runs of Atlantic salmon (McGinnity *et al*., 2003). The river (and several major tributaries including the rivers Bride and Clyda) is designated as the Blackwater River SAC (code: 2170) with Atlantic salmon, brook lamprey, river lamprey, sea lamprey and Twaite shad (*Alosa fallax*) listed as conservation objectives for the site (NPWS, 2012). The Blackwater also supports brown trout, sea trout, European eel, gudgeon (*Gobio gobio*), minnow (*Phoxinus phoxinus*), Three-spined stickleback (*Gasterosteus aculeatus*) and stone loach, as well as the non-native cyprinids roach (*Rutilus rutilus*) and dace (*Leusiscus leusiscus*) (Kelly *et al*., 2010, 2012; Caffrey *et al*., 2007).

There is a lack of fisheries information for the Clyda River, to which the Monaparson Riverflows, but, as a tributary of the Blackwater, is known locally to support Atlantic salmon, brown trout, European eel, roach and dace (pers. obs).

All of the riverine sites surveyed flow over Devonian sandstone and sandstone till when reviewing their situation on the Geological Survey of Ireland database[37]. Watercourses typically represented more upland, eroding channels bordered by improved agricultural grasslands and afforested Sitka and Lodgepole pine plantations in the upper catchment.

#### *8.3.7.3 Fisheries Survey Results*

The results of electrofishing surveys are presented in **Appendix 8-B**. See **Figure 8.99** for the locations of electrofishing sample points. All sites outlined are within the drainage catchment of the CGEP and GCR.

##### 8.3.7.3.1 Site A1 – Unnamed stream, Knutter Bridge

No fish were recorded during electro-fishing at site A1. The stream was dry at the time of survey (July 2020) and was not capable of supporting resident fish. The stream may be utilised by brown trout and European eel during periods of higher flow (e.g. autumn, winter) although its fisheries value was considered very low given likely seasonality.

##### 8.3.7.3.2 Site A2 - unnamed stream, St. Johns Well, Tooreen North

No fish were recorded during electro-fishing at site A2. The site (i.e. at source, St. John's Well) was not considered of fisheries value due to its very small size, shallow depth and situation in the uppermost reaches of a catchment. The upstream catchment is extremely short, emanating from a small spring <50m upstream of the survey area.

##### 8.3.7.3.3 Site A3 – Tooreen North Stream, Tooreen North

No fish were recorded during electro-fishing at site A3. The site was not considered of fisheries value due to its very small size and situation in the uppermost reaches of a catchment with water shallow depth and very limited holding pool habitat. The stream may be utilised by migratory European eel during periods of higher flow although its overall fisheries value was considered low given likely seasonality.

[37] www.gsi.ie accessed 25th October 2017

#### 8.3.7.3.4 Site A4 – Slievedotia, Dalys Cross

No fish were recorded during electro-fishing at site A4. The stream was semi-dry at the time of survey (July 2020) and was not capable of supporting resident fish. The stream may be utilised by migratory European eel during periods of higher flow (e.g. autumn, winter) although its overall fisheries value was considered low given likely seasonality and overall modified nature

#### 8.3.7.3.5 Site A5 – Unnamed stream, Lissard

No fish were recorded during electro-fishing at site A5. The stream was 100% dry at the time of survey (July 2020) and was not capable of supporting resident fish (no fisheries value). Given downstream connectivity to the Monparson River, the stream may be migratory European eel during periods of higher flow (e.g. autumn, winter) although its overall fisheries value was considered low given likely seasonality

#### 8.3.7.3.6 Site A6 – Monparson River, Lissard

Three fish species were recorded from the Monparson River at site A6 (**Chart 8-3**). Brown trout (n=47) followed by Atlantic salmon (n=27) dominated the site, with moderate number of Lampetra sp. ammocoetes recorded from small marginal silt patches in the vicinity of the bridge structure. Both juvenile and adult trout were recorded, with two size classes of Atlantic salmon present.

Despite historical straightening (good recovery), salmonid habitat scored as 'excellent' overall according to Life Cycle Unit scores. The site was evidently an excellent nursery for both brown trout and Atlantic salmon and offered some good quality holding and spawning habitat. The quality of the latter was reduced somewhat given compaction and sedimentation of substrata, locally. Lamprey spawning and nursery habitat were both considered of good quality, with localised small-medium gravel patches between cobble and small boulder in addition to marginal pockets of silt/sand (some up to 10cm in depth). Although none were recorded, European eel habitat was considered good given the presence of deeper pool areas and ample refugia.

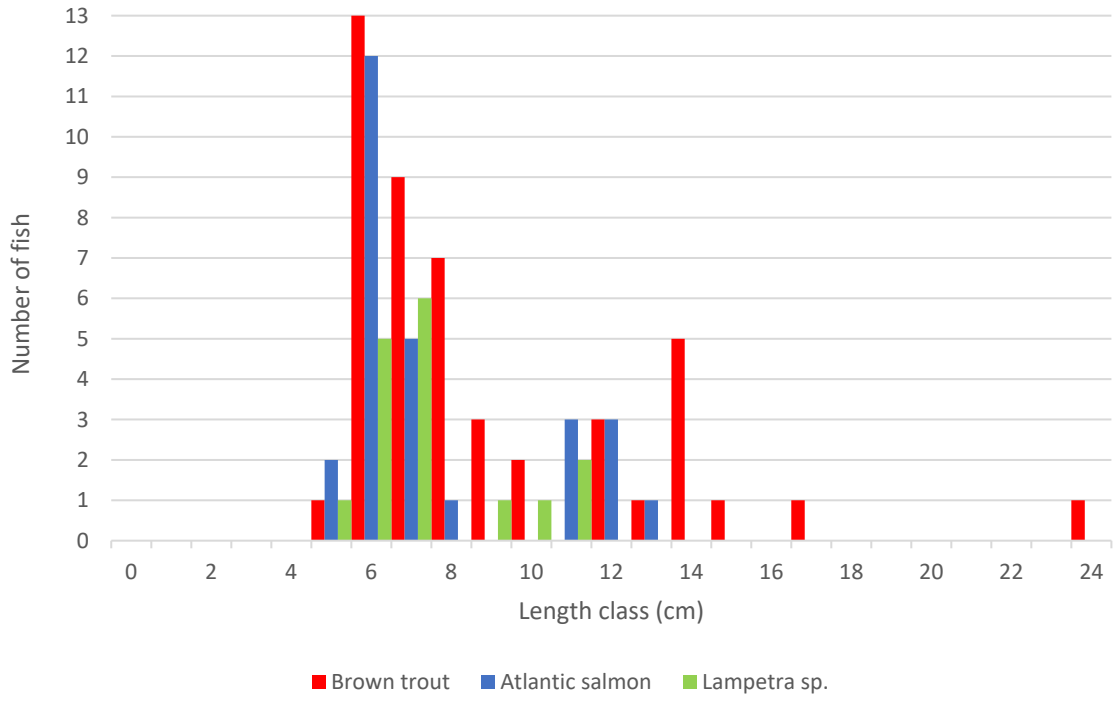



**Chart 8-3: Fish stock length distribution recorded via electro-fishing at site A6 on the Monparson River, Lissard in July 2020.**

#### 8.3.7.3.7 Site B1 – Toor River, Mullenaboree

No fish were recorded during electro-fishing at site B1. The stream had been extensively deepened and straightened and retained very little natural character, with (upstream of bridge) heavy macrophyte and (downstream) riparian cover present, in addition to shallow water (<0.1m). Given improved fisheries habitat downstream, the site may be utilised by brown trout and European eel during periods of higher flow (e.g. autumn, winter) although its overall fisheries value was considered low at this location.

#### 8.3.7.3.8 Site B2 – Coom Stream, Bottlehill

No fish were recorded during electro-fishing at site B2 but only 70m2 was effectively fished due to the overgrown nature of the channel. The site was considered to have poor fisheries value given the shallow, upland nature of the stream at this site, with no suitability for lamprey or salmonids. Given improved fisheries habitat downstream, the site may be utilised by European eel during periods of higher flow (e.g. autumn, winter) although its overall fisheries value was considered low at this location.

#### 8.3.7.3.9 Site B3 – Coom River, Coom

Atlantic salmon (*n*=43) and brown trout (*n*=36) were the only two fish species recorded from site B3 on the Coom River (**Chart 8-4**). Both juvenile and (small) adult trout were recorded, with two size classes of Atlantic salmon present. With the exception of European eel, the same species assemblage was recorded during a 2017 survey of this site (Triturus, 2017).

The river was considered an excellent salmonid nursery with good holding and spawning habitat present. Atlantic salmon density was the highest recorded across all survey sites (0.225 fish per $m^2$). However, the site's spawning potential for salmonids was impacted by siltation with partial bedding of the substrata. Holding habitat was limited to a large pool downstream of the weir below the bridge. The site was of too high energy for lamprey despite the presence of some limited potential spawning substrata marginally. The site was considered of low value as an eel nursery due to the sites location high in the catchment and evident absence of the species during electro-fishing.

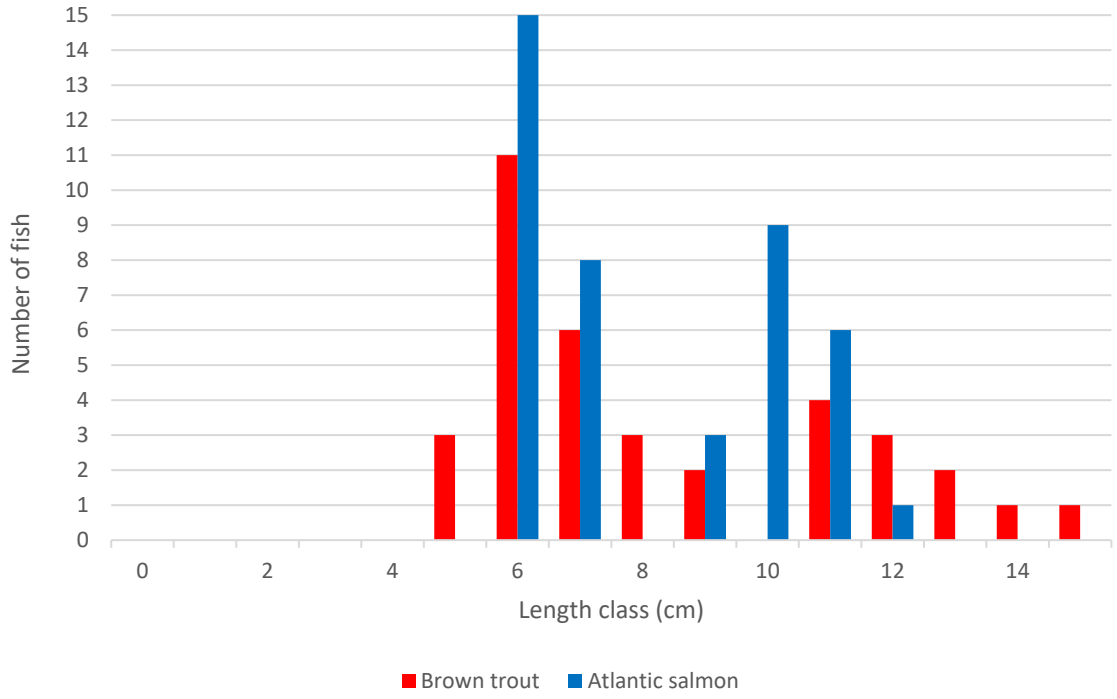



**Chart 8-4: Fish stock length distribution recorded via electro-fishing at site B3 on the Coom River, Coom, July 2020.**

#### 8.3.7.3.10 Site B4 – Toor River, Raheen

Two fish species were recorded from site B4. Brown trout dominated (n=36) with a small number of Atlantic salmon parr (n=3) also captured (**Chart 8-5**). Both juvenile and adult trout were present, with two size classes of Atlantic salmon recorded. With the exception of European eel, the same species assemblage was recorded during a 2017 survey of this site (Triturus, 2017).
The river was considered a good salmonid nursery with good holding and spawning habitat present. However, the site's spawning potential for salmonids was impacted by siltation with partial bedding of the substrata and light to moderate siltation pressures. The site was of too high energy for lamprey despite the presence of some limited potential spawning substrata marginally. Soft sediment areas were scarce and, where present, were typically compacted and composed predominantly of sand, thus providing poor larval lamprey nursery habitat. The site was considered of low value as an eel nursery and foraging habitat.

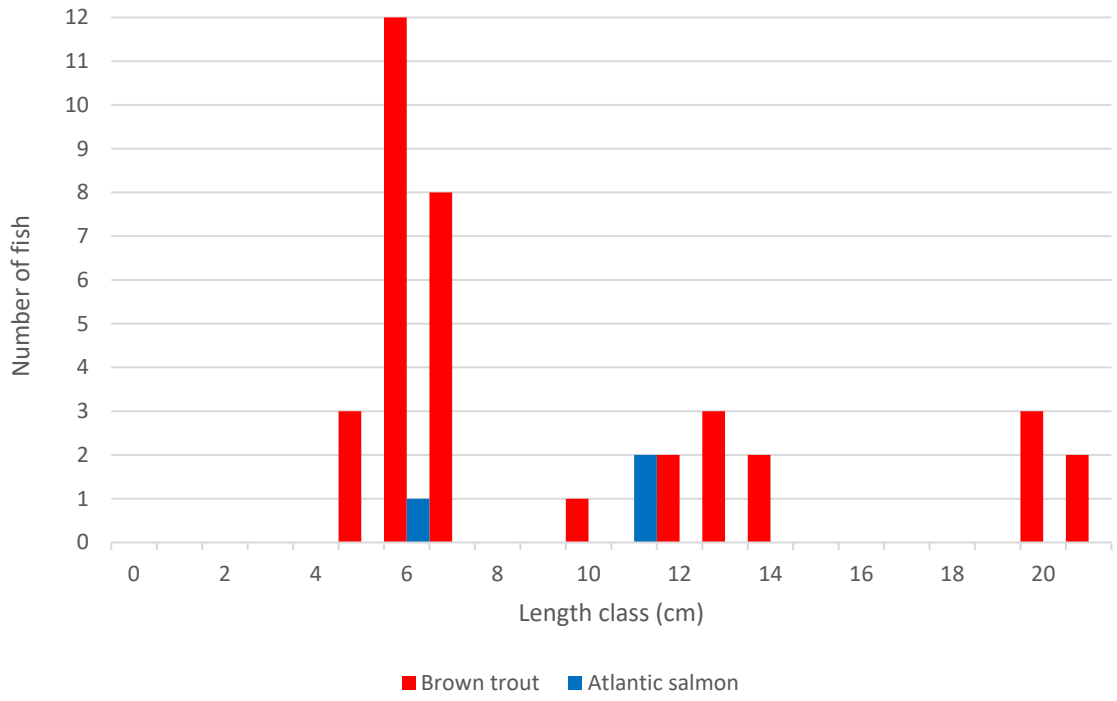



**Chart 8-5: Fish stock length distribution recorded via electro-fishing at site B4 on the Toor River, Raheen, July 2020.**

#### 8.3.7.3.11 Site B5 – Lyravarrig Stream, Commons

Brown trout and European eel were the only two fish species recorded from site B5 on the Lyravarrig Stream (**Chart 8-6**), a tributary of the upper River Bride. A low number of juvenile brown trout (n=7) and maturing European eel were present.
The historically straightened and deepened stream suffered from heavy siltation with the majority of the substrata covered in silt. Overall, the stream was considered a lower value nursery and spawning area for brown trout, with moderate quality nursery, spawning and holding habitat present . It was also a lower value nursery for European eel. The stream appeared to be of moderate value for lamprey given frequent soft sediment areas but none were recorded during the survey.

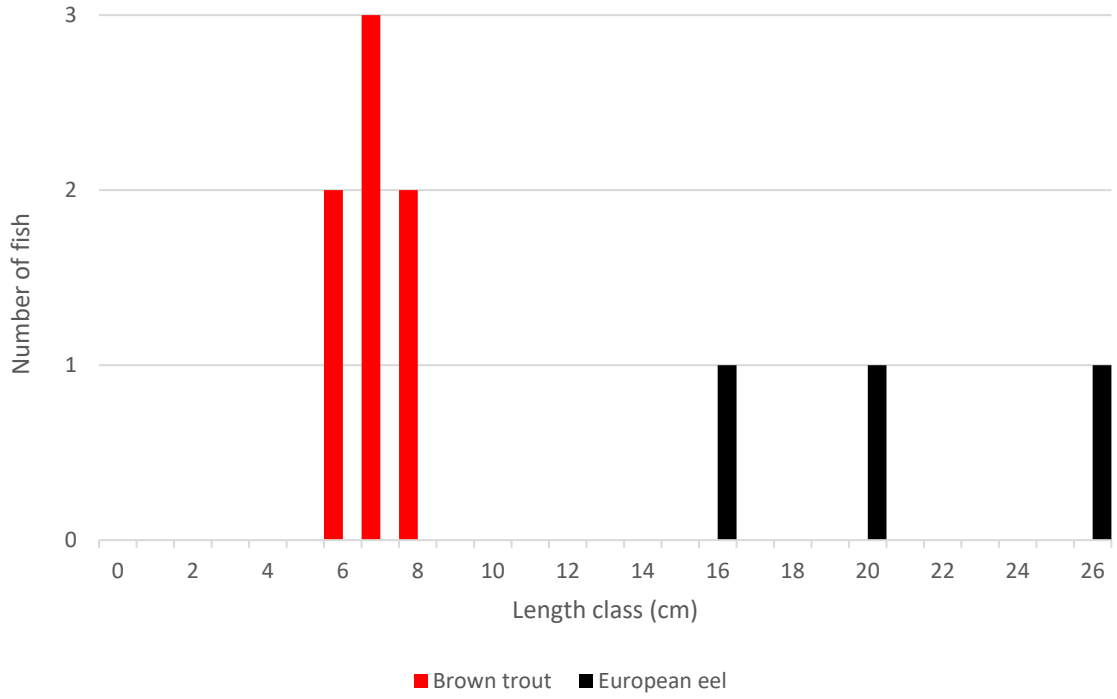



**Chart 8-6: Fish stock length distribution recorded via electro-fishing at site B5 on the Lyravarrig Stream, Commons in July 2020.**

#### 8.3.7.3.12 Site B6 – Seefin Stream, Commons

A single European eel was the only fish recorded from site B6 on the Seefin Stream. The channel suffered from very low flows at the time of survey, with localised semi-stagnant pools. Thus, salmonid habitat was not present. The site had no inherent fisheries value given small size and low flows although, given downstream connectivity with the River Bride, may support brown trout and greater densities of European eel during higher flow periods (e.g. winter).

#### Site B7 – River Bride, Commons

Brown trout were the dominant species recorded from site B7 on the River Bride (n=37), with a single European eel also captured (**Chart 8-7**). Relatively high numbers of juvenile trout were present in addition to a range of adult size classes.
The site was evidently a very good salmonid nursery with good quality spawning and holding habitat (on meanders) present also. However, the overall value was diminished due to siltation and evident enrichment (excessive filamentous algae present). Whilst some localised lamprey spawning habitat (smaller gravel fractions) was present, the site was generally unsuitable for larval lamprey given its higher energy nature and none were recorded. European eel habitat was considered moderate as localised pool was present with some suitable instream refugia.

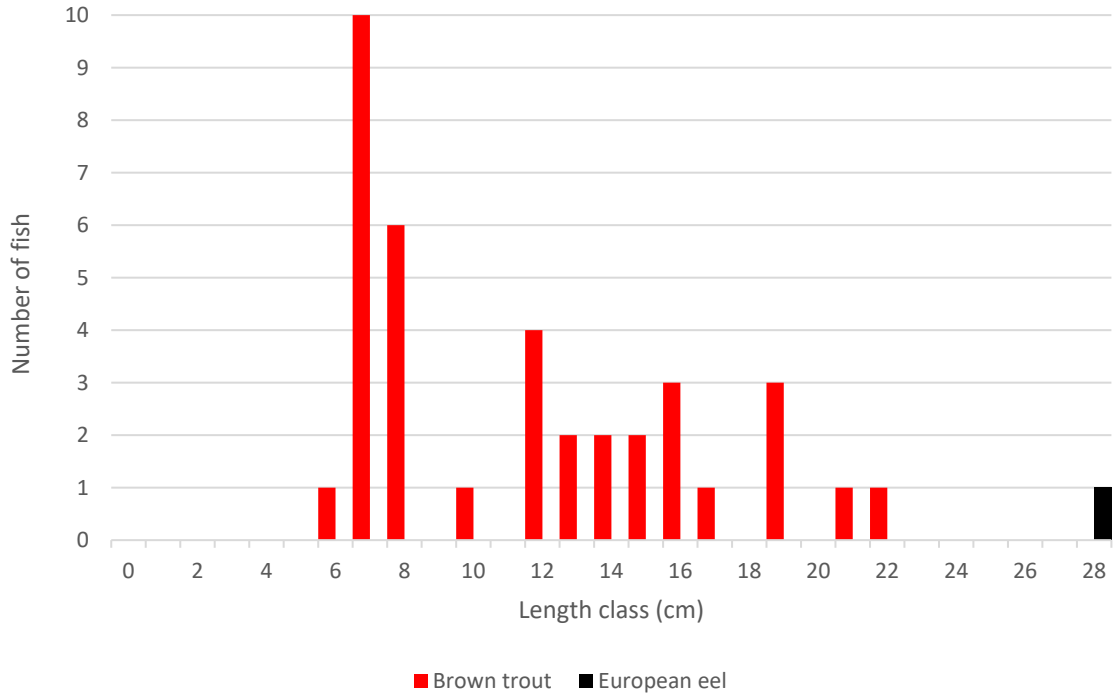



**Chart 8-7: Fish stock length distribution recorded via electro-fishing at site B7 on the River Bride, Commons in July 2020.**

Site B8 – Lyravarrig Stream, Mullenaboree

Brown trout were the dominant species recorded from site B8 on the Lyravarrig Stream (n=38), with a single European eel also captured (**Chart 8-7**). Relatively high numbers of juvenile trout were present (majority ≤7.6cm FL) with only two small adults recorded.
The site was evidently a good salmonid nursery although it was impacted by siltation pressures. The spawning habitat was considered of moderate quality (siltation) with a paucity of deeper holding areas for adults. The site was generally unsuitable for lamprey given its higher energy nature and lack of suitable sediment accumulations and none were recorded. European eel habitat was moderate, at best, given the lack of deeper pool habitat and overall shallow nature of the stream.

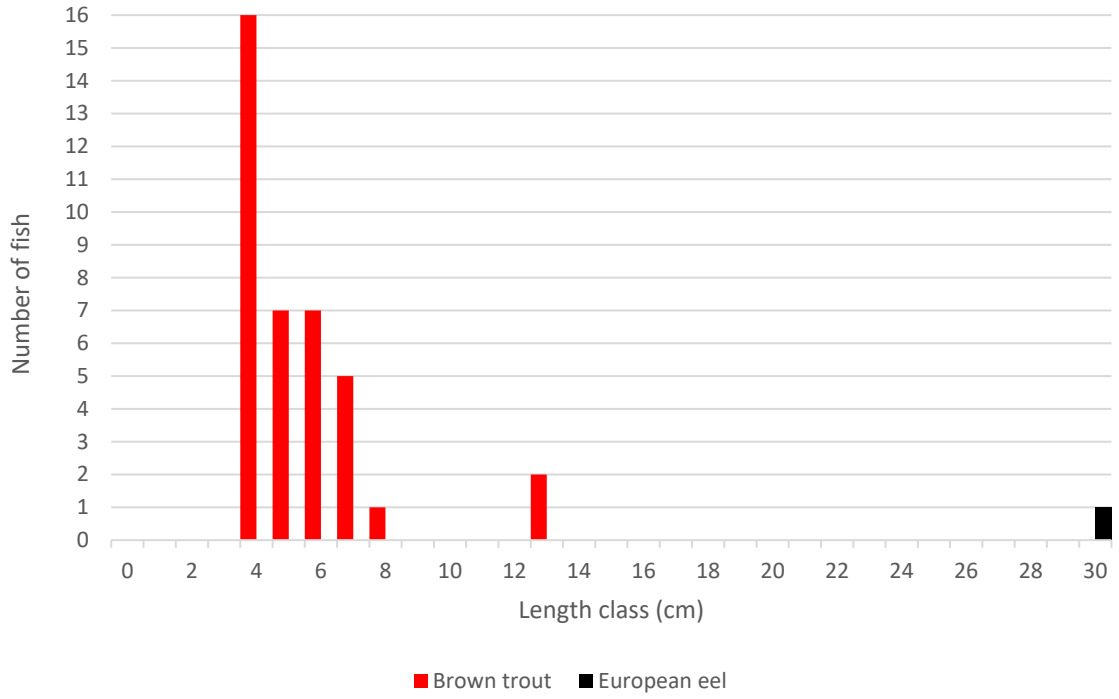



**Chart 8-8: Fish stock length distribution recorded via electro-fishing at site B8 on Lyravarrig Stream, Mullenaboree in July 2020.**

Site B9 – Field Chimney Stream, Chimneyfield

A total of two fish species were recorded from site B9 on the Field Chimney Stream. Brown trout dominated (n=15) with low numbers (n=5) of Atlantic salmon parr also captured (**Chart 8-9**). All fish recorded were juveniles.
The site was evidently a good salmonid nursery although it was impacted by siltation pressures. Salmonid spawning and holding habitat were both considered of moderate value. The site was of too high energy to support lamprey and none were recorded. Despite some moderate suitability as a nursery/foraging area, no European eel were recorded.

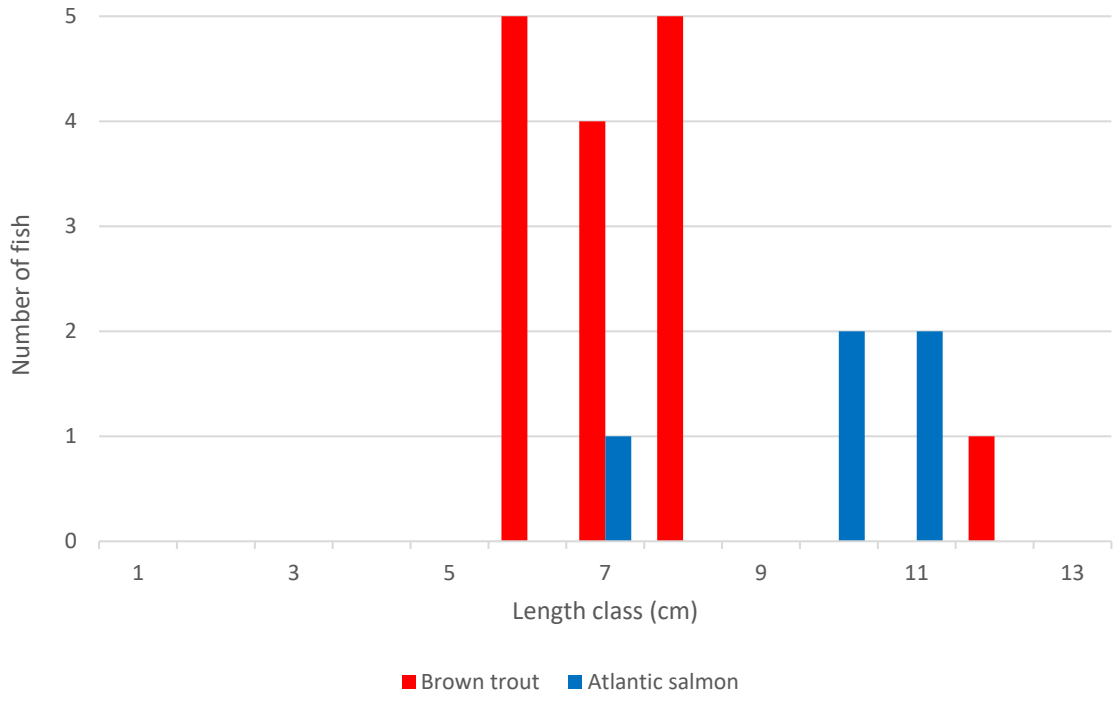


**Chart 8-9: Fish stock length distribution recorded via electro-fishing at site B9 on Field Chimney Stream, Chimneyfield, July 2020.**

Site B10 – Inchinanagh River, Inchinanagh

A total of three fish species were recorded from site B10 on the Inchinanagh River (**Chart 8-10**). Brown trout predominated (n=50), with a particularly high abundance of juveniles recorded in addition to low numbers of small adults. Brown trout density was the highest recorded across all survey sites (0.385 fish per m2). A low number of Atlantic salmon parr (two size classes) and adult European eel were also present.
The river was evidently a good salmonid nursery with some good spawning habitat but had only moderate holding habitat with limited deeper pools . The small river site was of too high energy for larval lamprey, despite some physical spawning habitat suitability. The site was considered a good eel nursery/foraging area with ample boulder habitat present throughout.

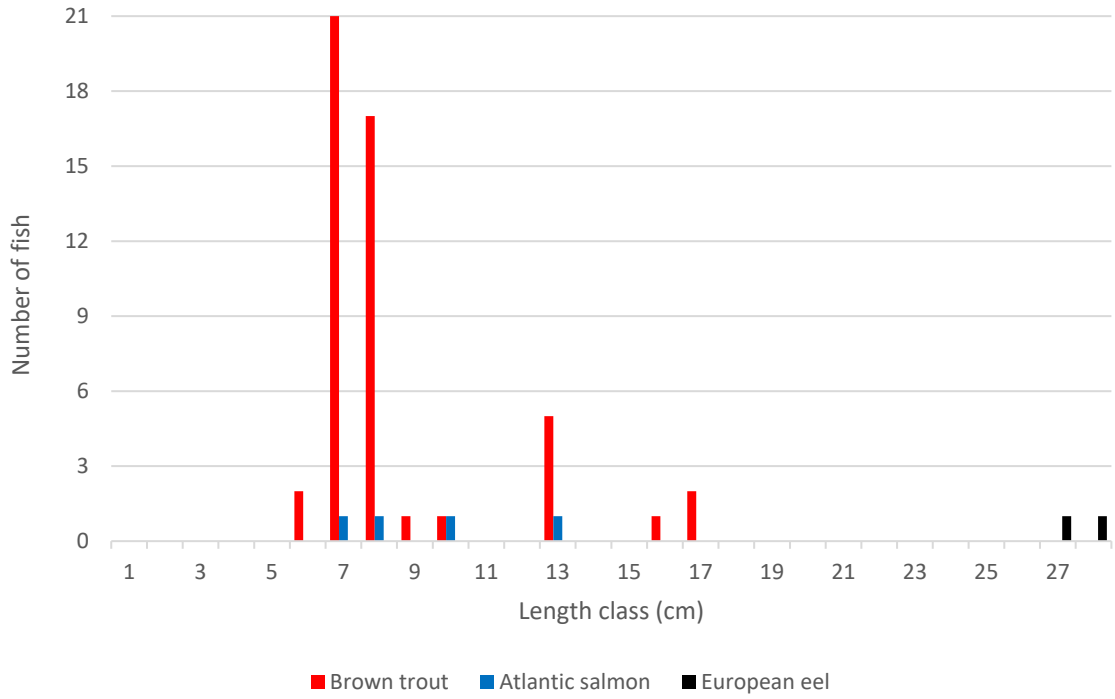



**Chart 8-10: Fish stock length distribution recorded via electro-fishing at site B10 on the Inchinanagh River, Inchinanagh, July 2020.**

Site B11 – River Bride, Bride Bridge

Brown trout and Atlantic salmon were the only two species recorded from site B10 on the River Bride (**Chart 8-11**). Brown trout dominated (n=35), with a healthy range of juvenile and adult size classes present. Moderate numbers of Atlantic salmon parr (n=16) were also recorded (two size classes). The same species assemblage was also recorded during a 2017 survey of this site (Triturus, 2017) although abundances of Atlantic salmon were notably higher in 2020.
The upland, cascading site offered excellent holding habitat for adult salmonids, in addition to being an evidently good nursery. Spawning was of good quality (frequent well-sorted coarse-medium gravels) although typically more suited to Atlantic salmon. Whilst localised spawning substrata for lamprey were present, larval lamprey habitat was not present given the higher energy nature of the site. Although no European eel were recorded during the survey, the site did offer some good suitability for the species, especially in deeper pool areas.

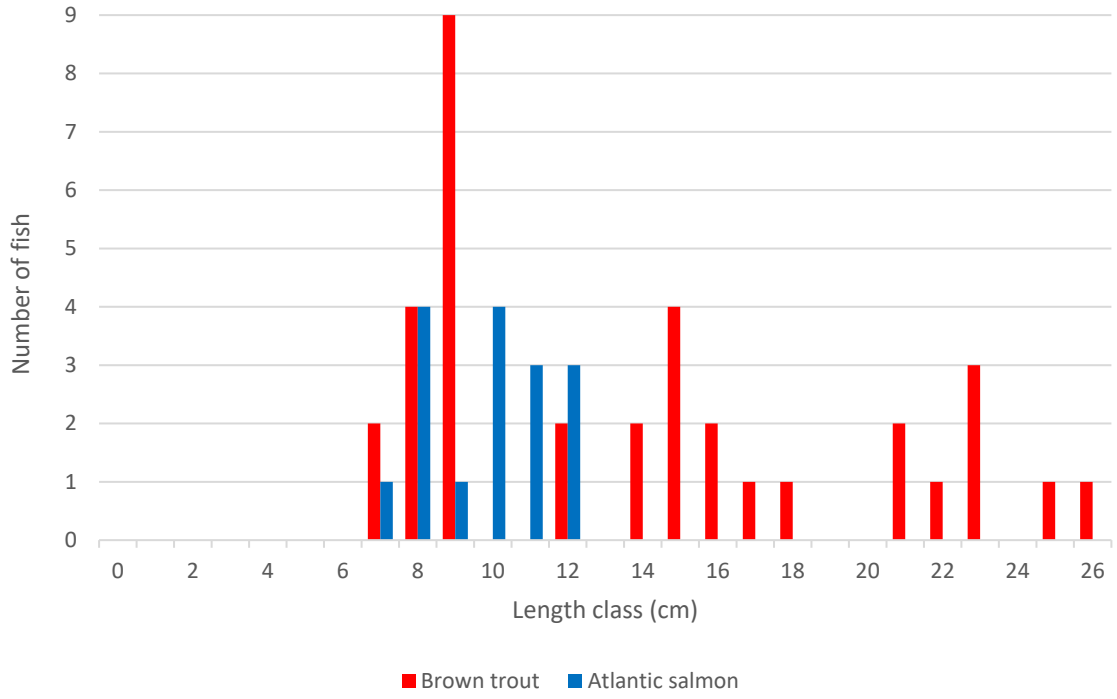



**Chart 8-11: Fish stock length distribution recorded via electro-fishing at site B11 on the River Bride at Bride Bridge, July 2020.**

Site B12 – unnamed stream, Knockdoorty

No fish were recorded during electro-fishing at site B12. The shallow, upland nature of the small channel with heavily bedded substrata (moderate siltation) reduced its viability for salmonids albeit populations would be present further downstream in higher order reaches. Lamprey habitat was absent. The stream may be utilised seasonally by migratory European eel during periods of higher flow (e.g. autumn, winter) although the site's overall fisheries value was considered low

Site B13 – unnamed stream, Power's Bridge

European eel (2) was the only species recorded from site B13, with two juveniles captured via electro-fishing. Overall, the shallow nature of the small stream channel, with heavily bedded substrata, reduced its viability for salmonids. However, populations were present further downstream as the channel deepened and widened. The upland site was not suitable for lamprey. A small European eel population was present, exemplifying its value as a nursery and likely utilisation as a seasonal migratory pathway for the species.

Site B14 – Bunnaglanna Stream, Moneygorm

No fish were recorded during electro-fishing at site B14. The shallow, upland nature of the small channel with heavily bedded substrata (heavy siltation) reduced its viability for salmonids albeit populations were present further downstream in higher order reaches. Lamprey habitat was absent. The stream may be utilised seasonally by migratory European eel during periods of higher flow (e.g. autumn, winter) although the site's overall fisheries value was considered low.

Site B15 – River Bride, Old Bridge

Atlantic salmon and brown trout were the only two species recorded from site B15 on the River Bride (**Chart 8-12**). Both species were recorded in similar numbers (n=22, n=21 respectively). A healthy range of juvenile and adult trout size classes were present along with two distinct Atlantic salmon size classes. With the exception of European eel, the same species assemblage

was also recorded during a 2017 survey of this site (Triturus, 2017) although abundances of juvenile Atlantic salmon and brown trout were notably higher in 2020.
The site was evidently an excellent salmonid nursery (Table 3.2) and also exhibited good spawning habitat locally, as reflected by the stock demographic captured during the survey. The best nursery areas were in the faster riffle area near the bridge. Holding habitat was also good moving upstream where pool habitat existed below large instream boulders. However, the River Bride was of too high energy at site B15 to support lamprey species. Some suitability existed as an eel nursery in the boulder and cobble areas although none were recorded during the survey.

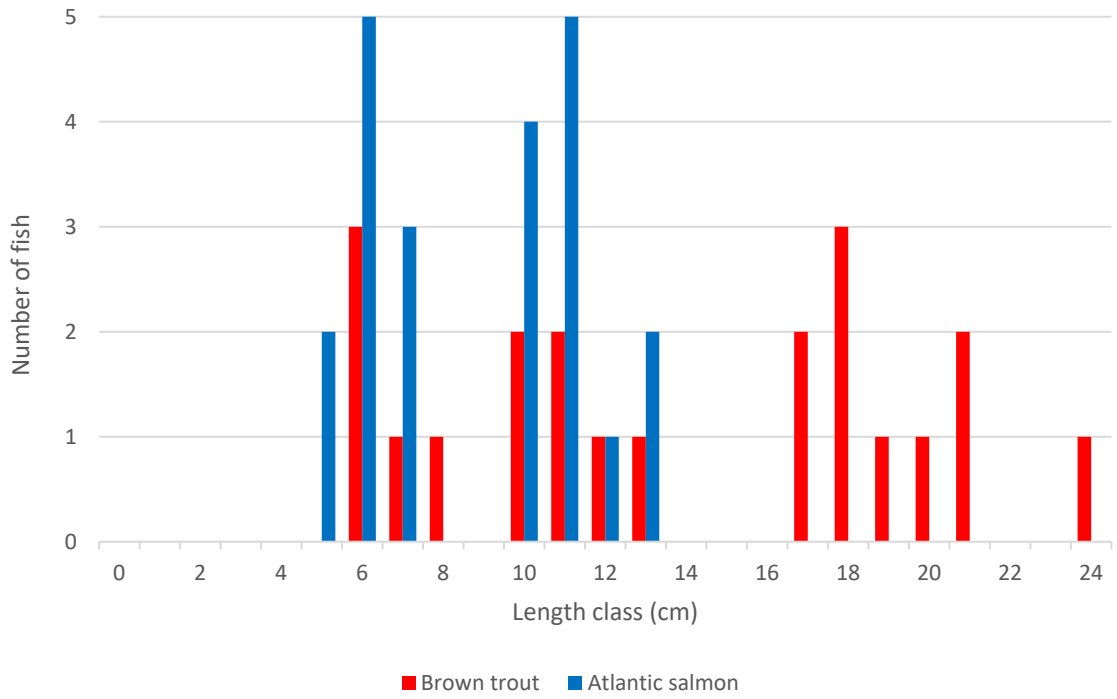



**Chart 8-12: Fish stock length distribution recorded via electro-fishing at site B15 on the River Bride at Old Bridge, July 2020.**

Site C1 – Slumberhill Stream, Knockacullata

No fish were recorded from site C1 on the Slumberhill Stream. The historically straightened and deepened site was of poor fisheries value given the very shallow and likely seasonal nature of the stream at this location. Given downstream connectivity, the stream may be of some value to migratory European eel during higher flow periods (e.g. autumn, winter).

Site C2 – Ross Stream, Knockacullata

Three fish species were recorded from site C2 on the upper reaches of the Ross Stream (**Chart 8-13**), with low numbers of brown trout and European eel present. A single three-spined stickleback was also captured.
The heavily silted stream site was considered a lower value nursery and spawning area for brown trout, with poor quality spawning and holding habitat present. It was also a lower value nursery and foraging area for European eel. Lamprey habitat was considered sub-optimal due to the position of the survey area high up in catchment. Despite the presence of silt areas for lamprey ammocoete burial, the sediment was more mobile in nature and its presence is due to constant siltation pressure from bank erosion and cattle fords.

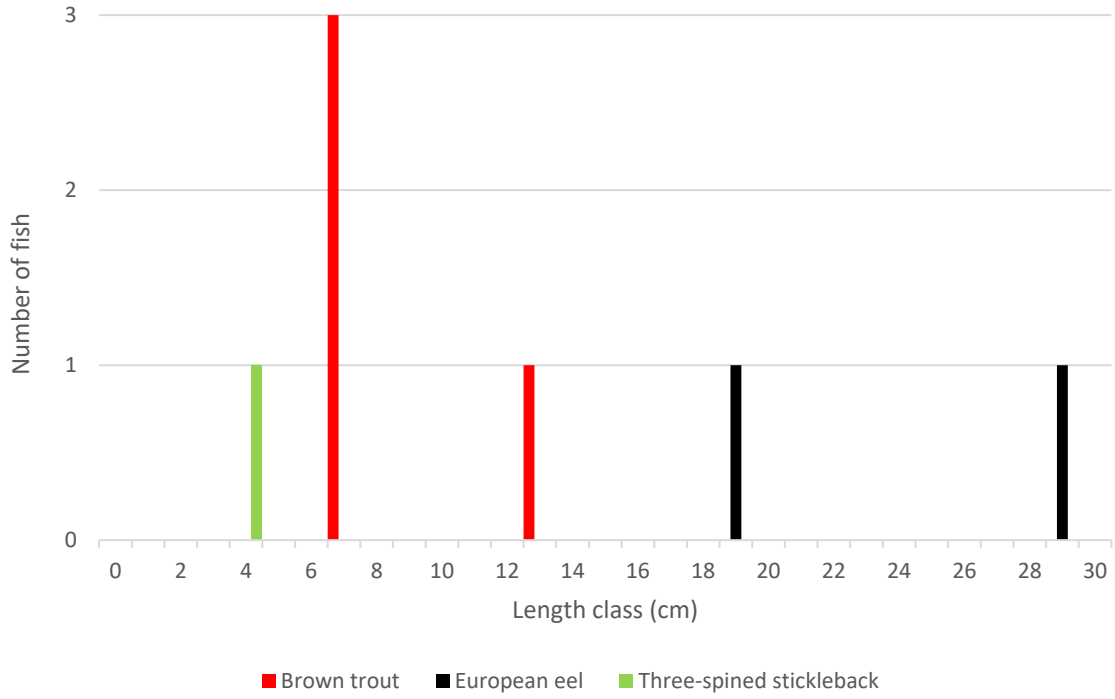



**Chart 8-13: Fish stock length distribution recorded via electro-fishing at site C2 on Ross Stream, Knockacullata in July 2020.**

Site D1 – Shanowen Trib 1, Ballynahina

No fish were recorded from site D1 on the Shanowen Trib 1 Stream via electro-fishing. The very shallow (≤0.05m), heavily modified lowland stream featured moderate siltation with bedded substrata and was not considered of fisheries value at the time of survey, although, given downstream connectivity, it may be utilised seasonally by migratory European eel.

Site D2 – Farran North River, Farran North

A total of five fish species were recorded from site D2 on the Farran North Stream. Larval lamprey (Lampetra sp.) were the most abundant (n=65) followed by brown trout (n=10) (**Chart 8-14**). The majority of lamprey ammocoetes were recorded from targeted 1m2 quadrats in suitable soft sediment areas (some were captured incidentally). The density of lamprey ammocoetes was the highest recorded across all survey sites (16.25 larvae per m2 of targeted 1m2 quadrat). Both juvenile and adult trout were captured. Low numbers of Atlantic salmon parr, European eel and three-spined stickleback were also recorded. A 2017 electro-fishing survey of this site reported only brown trout and Lampetra sp. ammocoetes (Triturus, 2017).
The heavily modified site D2 suffered from heavy (locally, very heavy) siltation. As such, it was considered a lower value salmonid nursery area, with better spawning habitat noted upstream of the survey area. Holding habitat for adult salmonids was largely absent. However, the site was considered an excellent nursery area for lamprey (likely brook lamprey), with moderate spawning substrata. The site was also a good eel nursery but had a paucity of stone refugia. Most eel emanated from soft sediment as with lamprey and the species can avail of softer sediment as nursery habitat in the absence of stone refugia. A storm drain at the meander appeared to be contributing to the majority of the habitat degradation.

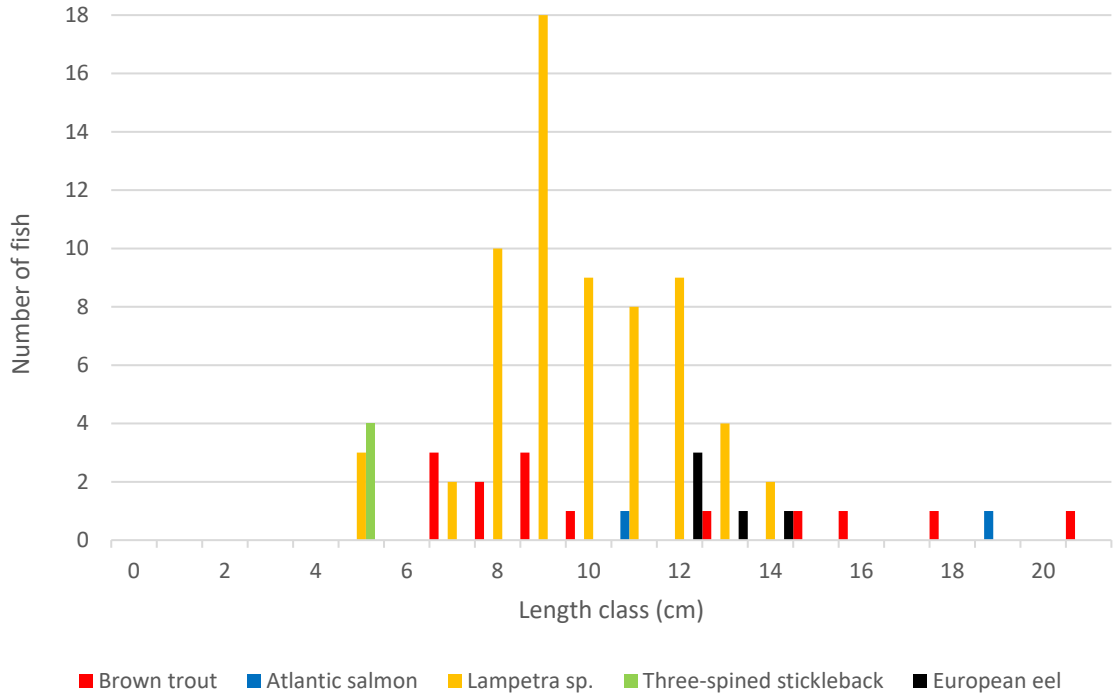



**Chart 8-14: Fish stock length distribution recorded via electro-fishing at site D2 on the Farran North River, Farran North in July 2020.**

A summary of fish species recorded and densities is provided below in **Table 8-71** with images of species recorded provided in **Plate 8-1**.

**Table 8-71 Fish species densities per m² recorded at sites in the vicinity of Coom Green Energy Park via electro-fishing in July 2020. Lamprey numbers are presented per 1m² targeted quadrat unless otherwise stated.**

| Fish density (number fish per m2) | | | | |
|---|---|---|---|---|
| **Site** | **Brown trout** | **Atlantic salmon** | **Lampetra sp.** | **European eel** |
| A1 | 0 | 0 | 0 | 0 |
| A2 | 0 | 0 | 0 | 0 |
| A3 | 0 | 0 | 0 | 0 |
| A4 | 0 | 0 | 0 | 0 |
| A5 | | | | |
| A6 | 0.108 | 0.192 | 5 per 1m2 quadrat | 0 |
| B1 | 0 | 0 | 0 | 0 |
| B2 | 0 | 0 | 0 | 0 |
| B3 | 0.180 | 0.225 | 0 | 0 |
| B4 | 0.240 | 0.020 | 0 | 0 |
| B5 | 0.080 | 0 | 0 | 0.040 |
| B6 | 0 | 0 | 0 | 0.020 |
| B7 | 0.185 | 0 | 0 | 0.005 |
| B8 | 0.253 | 0 | 0 | 0.013 |
| B9 | 0.133 | 0.042 | 0 | 0 |
| B10 | 0.385 | 0.031 | 0 | 0.015 |
| B11 | 0.095 | 0.080 | 0 | 0 |
| B12 | 0 | 0 | 0 | 0 |
| B13 | 0 | 0 | 0 | 0 |
| B14 | 0 | 0 | 0 | 0 |
| B15 | 0.088 | 0.092 | 0 | 0 |
| C1 | 0 | 0 | 0 | 0 |
| C2 | 0.040 | 0 | 0 | 0.020 |
| D1 | 0 | 0 | 0 | 0 |
| D2 | 0.091 | 0.009 | 16.25 per 1m2 quadrat | 0.045 |

**Plate 8-1: Plates representing the fish species diversity recorded during electro fishing surveys of watercourses in the catchment of the proposed windfarm development at Bottlehill, Co. Cork.**

| | | |
|---|---|---|
|  |  |  |
| Brown trout juveniles (*Salmo trutta*) captured from the Monaparson River (site 11) | Two large adult brown trout captured from the Toor River (site 5) | Brook/River lamprey ammocoetes recorded from Farran North stream (site 13) |
|  |  | |
| Juvenile Atlantic salmon (*Salmo salar*) parr captured from the Toor River (site 5) | Brook/ River lamprey transformer (*Lampetra* spp.) at Farran North stream (site 13) | |

### *8.3.7.4 Fisheries and Aquatic Habitat Results*

#### 8.3.7.4.1 Salmonid habitat

Salmonid habitat ranged from poor to excellent value across the survey sites (**Table 8-72**). Of the *n*=25 sites, four sites in total offered excellent quality salmonid habitat according to life Cycle Unit scores. These were sites A6 (Monparson River), B3 (Coom River) and B11 and B15 (River Bride).

Sites B4, B7, B9, B10 and D2 offered good quality salmonid habitat, with these sites often featuring moderate-heavy siltation, thus reducing overall scores. Sites B5, B8, C1, C2 and D1 scored as moderate quality salmonid habitat. Nine sites in total (sites A2, A3, A4, B1, B2, B6, B12, B13 and B14) offered little or no value for salmonids and scored as 'poor' in terms of salmonid habitat. Sites A1 (unnamed stream, Knuttery Bridge) and A5 (unnamed stream, Lissard) were 100% dry at the time of survey and thus a Life Cycle Unit score was not applicable (no fisheries habitat present).

**Table 8-72: Life Cycle Unit scores for sites surveyed in the vicinity of the proposed Coom Green Energy Park, July 2020.**

| Site | Salmonid habitat value | Spawning | Nursery | Pool (holding) | Total score |
|---|---|---|---|---|---|
| A1 | n/a – channel 100% dry | | | | |
| A2 | Poor | 4 | 4 | 4 | **12** |
| A3 | Poor | 4 | 4 | 4 | **12** |
| A4 | Poor | 4 | 4 | 4 | **12** |
| A5 | n/a – channel 100% dry | | | | |
| A6 | Excellent | 2 | 1 | 2 | **5** |
| B1 | Poor | 4 | 4 | 4 | **12** |
| B2 | Poor | 4 | 4 | 4 | **12** |
| B3 | Excellent | 2 | 1 | 2 | **5** |
| B4 | Good | 2 | 2 | 2 | **6** |
| B5 | Moderate | 3 | 3 | 4 | **10** |
| B6 | Poor | 4 | 4 | 4 | **12** |
| B7 | Good | 2 | 2 | 2 | **6** |
| B8 | Moderate | 3 | 2 | 4 | **9** |
| B9 | Good | 3 | 2 | 3 | **8** |
| B10 | Good | 2 | 2 | 3 | **7** |

| Site | Salmonid habitat value | Spawning | Nursery | Pool (holding) | Total score |
|---|---|---|---|---|---|
| B11 | Excellent | 2 | 2 | 1 | **5** |
| B12 | Poor | 4 | 4 | 4 | **12** |
| B13 | Poor | 4 | 4 | 4 | **12** |
| B14 | Poor | 4 | 4 | 4 | **12** |
| B15 | Excellent | 2 | 1 | 2 | **5** |
| C1 | Moderate | 3 | 4 | 4 | **11** |
| C2 | Moderate | 4 | 3 | 4 | **11** |
| D1 | Moderate | 4 | 4 | 4 | **12** |
| D2 | Good | 3 | 2 | 2 | **7** |

#### 8.3.7.4.2 Lamprey habitat

Lamprey habitat was typically of poor to moderate quality across the majority of the survey area (21 or 91% of 23 sites) based on Lamprey Habitat Quality Index (LHQI) scores (**Table 8-73**). Eleven sites offered poor lamprey habitat whilst ten sites offered moderate quality lamprey habitat. However, sites B7 (River Bride) and B10 (Inchinanagh River) (both achieved 'moderate' scores) provided some good quality spawning substrata by way of finer gravel fractions.

Only sites A6 (Monparson River) and D2 (Farran North Stream) provided overall good quality lamprey habitat. Sites A1 and A5 were 100% dry at the time of survey and was therefore not assessable via LHQI scores (no fisheries habitat present).

**Table 8-73: Lamprey Habitat Quality Index (LHQI) scores for sites surveyed in the vicinity of the proposed Coom Green Energy Park, July 2020.**

| Site | Lamprey habitat value | Spawning | Nursery | Total score |
|---|---|---|---|---|
| A1 | n/a – channel 100% dry | | | |
| A2 | Poor | 4 | 4 | **8** |
| A3 | Poor | 4 | 4 | **8** |
| A4 | Poor | 4 | 4 | **8** |
| A5 | n/a – channel 100% dry | | | |
| A6 | Good | 2 | 2 | **4** |
| B1 | Poor | 4 | 4 | **8** |
| B2 | Poor | 4 | 4 | **8** |

| Site | Lamprey habitat value | Spawning | Nursery | Total score |
|---|---|---|---|---|
| B3 | Moderate | 3 | 4 | **7** |
| B4 | Moderate | 4 | 3 | **7** |
| B5 | Moderate | 3 | 3 | **6** |
| B6 | Poor | 4 | 4 | **8** |
| B7 | Moderate | 2 | 4 | **6** |
| B8 | Poor | 4 | 4 | **8** |
| B9 | Moderate | 3 | 4 | **7** |
| B10 | Moderate | 2 | 4 | **6** |
| B11 | Moderate | 3 | 4 | **7** |
| B12 | Poor | 4 | 4 | **8** |
| B13 | Poor | 4 | 4 | **8** |
| B14 | Poor | 4 | 4 | **8** |
| B15 | Moderate | 3 | 4 | **7** |
| C1 | Moderate | 3 | 4 | **7** |
| C2 | Moderate | 4 | 3 | **7** |
| D1 | Poor | 4 | 4 | **8** |
| D2 | Good | 2 | 1 | **3** |

### European Eel habitat

European eel were recorded from a total of seven sites (i.e. B5, B6, B7, B8, B10, B13 and C2). Eel habitat ranged from poor to moderate across the majority of survey sites, with only a few larger sites providing better quality eel habitat (e.g. Monparson River, River Bride, Inchinanagh River).

#### 8.3.7.4.3 Invasive alien species

**Riparian plants**

Himalayan balsam (*Impatiens glandulifera*) was the only invasive plant species recorded during this survey, which was widespread and abundant along both banks of channel at site 13 (Farran North stream) and also present in smaller, scattered patches at site 9 (Bunnaglanna River). It was not recorded at any other sites. Should balsam continue to spread unmanaged, its growth may further contribute to siltation rates through bank de-stabilisation under low vegetative growth, high water, winter periods (Hendry & Cragg-Hine, 2003; Kelly *et al*., 2008; Greenwood *et al*., 2014).

**Fish**

In an Irish freshwater context, roach (*Rutilus rutilus*), dace (*Leuciscus leuciscus*) and Common carp (*Cyprinus carpio*) are listed on the 3rd Schedule of S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) and are thus subject to restrictions under articles 49 and 50 as invasive species. However, none of these species were recorded during the catchment-wide electro-fishing survey of the River Bride catchment in the vicinity of the proposed windfarm development at Bottlehill.

Both roach and dace have long been present in the (Munster) River Blackwater (Caffrey *et al*., 2007), to which the River Bride flows and, therefore, populations may exist in the lower reaches of the Bride itself as well as its lower tributaries but surveys have, to date, failed to verify if the species are present in the upper Bride catchment. Both fish species, particularly dace, are considered an invasive threat in Ireland given their propensity to compete for food and spawning resources with salmonids.

#### 8.3.7.5 Freshwater Pearl Mussel Survey

The study area for the proposed windfarm project and its associated components drains to tributaries of the River Blackwater (Munster). The majority of the study area is drained by the upper reaches of the River Bride and its headwater tributaries, for which there are no historical records of FPM.

Stage 1 FPM surveys, following the NPWS standard survey methods (Anon, 2004) were completed at 7 no. watercourses identified within the study area and receiving catchments downstream in 2017 and 2018. Follow up surveys were conducted in 2020 and there were no significant changes noted (**Figure 8-100**). No records of this species were identified and generally, instream habitat for this species was evaluated as unsuitable or sub-optimal. The results of the survey completed are presented in **Table 8-74**.

**Table 8-74 Summary findings of the Freshwater pearl mussel survey within the study area, 2017-2018**

| Site Ref. No. | Name EPA | Downstream connecting river | River water body code | Field survey notes |
|---|---|---|---|---|
| FPM A | Lisheen Cross | Munster Blackwater | IE_SW_18B022100 | No FPM recorded - unsuitable. Small watercourse 2-2.5m width, mobile substrate. Suitable salmonid nursery habitat. |
| FPM B | North Lackendarragh | Munster Blackwater | IE_SW_18B022100 | No FPM recorded - unsuitable. High gradient with cascades and riffle, Substrate too unstable. |
| FPM B1 | South Creggolympry | Munster Blackwater | IE_SW_18B022100 | No FPM recorded - unsuitable. Substrate too unstable. |
| FPM C | Shanowennadrimina Stream | River Bride | IE_SW_18B050400 | No FPM recorded. Substrate and geomorphology suitable for FPM; however, siltation high, with ag. inputs evident. Good salmonid & lamprey habitat. |
| FPM D | River Bride | Munster Blackwater | IE_SW_18B050320 | No FPM recorded. Substrate and geomorphology suitable for FPM. Good salmonid spawning and rearing habitat. |
| FPM E | River Bride | Munster Blackwater | IE_SW_18B050050 | No FPM recorded. Substrate and geomorphology sub-optimal for FPM, higher gradient and unstable substrate. Good salmonid spawning and rearing habitat. |
| FPM F | Ross [Killavullen] | Munster Blackwater | IE_SW_18R020500 | No FPM recorded. Substrate and geomorphology sub-optimal for FPM, higher gradient and unstable substrate. Good salmonid spawning and rearing habitat. |

No live freshwater pearl mussels were found at any of the sites surveyed in 2020 (**Figure 8-100**) or in previous surveys outside known populations which are located an extensive distance downstream of CGEP. No empty shells were found. There is no indication of the current presence of freshwater pearl mussels in the River Bride, the River Martin or the Clyda River. There are no freshwater pearl mussels records farther downstream of the stretches surveyed in the Rivers Bride and Martin. Freshwater pearl mussels are known to occur in the Munster Blackwater River, downstream of the Clyda River confluence.

#### *8.3.7.6 Aquatic Macroinvertebrate Community Survey*

Q-samples were collected and analysed from n=12 riverine sites in the footprint of the proposed Coom Green Energy Park development and associated cable route. A total of n=46 species across n=33 families were recorded in the kick samples. A summary of results is presented in **Appendix 8-B**.
Following the methodology of Toner et al. (2005), the Environmental Protection Agency (EPA) group invertebrates into classes whereby pollution intolerant species are denoted class A, and species with greater pollution tolerance fall into successive classes (B through E, respectively). As such, the presence or absence of these groups and their relative abundance facilitates an assessment of biological river health. Good status (Q4) unpolluted water quality is achieved according to the EPA if at least one Group A taxon is present in, at least, fair numbers (5-10% total sample composition). Group B taxa may be common or absent and Baetis rhodani (large dark olive mayfly) is often dominant. Other Group C taxa are never excessive and group D / E taxa are present in small numbers or absent (Toner et. al., 2005). Our results are discussed in this context in order to interpret potential changes in the macroinvertebrate community composition.
Of the 12 Q sampling sites seven (A2, A6, B4, B7, B8, D1 & D2) had Q3 poor status water quality. These sites typically had low numbers of EPA group B taxa and a dominance of EPA group C taxa. Four sites (site A3, B3, B10 & B13) had Q3-4 water quality. These sites had low numbers of EPA group A taxa and from only a single taxonomic group only (i.e. clean water stonefly or mayfly species).
A single site, B15 on the River Bride at Old Bridge, achieved 'good status (Q4) water quality as required under the Water Framework Directive. The presence of moderate numbers of clean-water EPA group A (Plecoptera) stoneflies and good numbers of class B stoneflies (Plecoptera) was indicative of cleaner water.

#### *8.3.7.7 Fisheries and Aquatic Ecology Evaluation*

##### 8.3.7.7.1 Salmonid Habitat Evaluation

Across n=25 sites, Atlantic salmon were recorded from a total of eight sites (i.e. sites A6, B3, B4, B9, B10, B11, B15 and D2), with brown trout present at a total of twelve sites (i.e. A6, B3, B4, B5, B7, B8, B9, B10, B11, B15, C2 and D2). Atlantic salmon density was highest at site B3 (Coom River), with brown trout density highest at site B10 (Inchinanagh River) (**Table 8-72**).
Salmonid habitat ranged from poor to excellent value across the survey sites according to Life Cycle Unit scores (Table 3.2). Sites A6 (Monparson River), B3 (Coom River), B11 and B15 (River Bride) and D2 (Farran North Stream) offered excellent quality salmonid habitat. Typically, these high scores were a result of the presence of excellent quality nursery habitat for brown trout and or Atlantic salmon. Sites B4, B7, B9 and B10 offered good quality salmonid habitat, with these sites often featuring moderate siltation, thus reducing overall scores.
Sites B5, B8, C1, C2, D1 and D2 scored as moderate quality salmonid habitat, with overall scores reduced given siltation pressures in addition to a lack of deeper holding habitat (i.e. shallow watercourses).
Ten sites (sites A1, A2, A3, A4, B1, B2, B6, B12, B13 and B14) offered little or no value for salmonids and scored as 'poor' in terms of salmonid habitat. Site A5 (unnamed stream, Lissard) was 100% dry at the time of survey and thus a Life Cycle Unit score was not applicable (no fisheries habitat present; Table 3.2).
In general, smaller and or more upland sites received higher (worse) scores given their lack or even absence of suitable spawning substrata and nursery habitat resulting from higher gradients, higher-energy flows and spate natures. Stream gradient is known to be one of the principal determinants of juvenile salmonid production, with medium gradients most optimal in terms of successful recruitment and population persistence (Wood & Budy, 2009; O'Grady, 2006; Amiro, 1993). Furthermore, as would be expected in catchments exposed to pressures including afforestation and agriculture, survey sites on larger watercourses typically offered better quality salmonid habitat and supported higher densities of salmonids (e.g. River Bride).
Biological water quality was typically of less than good status (i.e. ≤Q3-4) across the survey sites, with only sites B15 on the River Bride meeting Water Framework Directive (i.e. ≥Q4) and Surface Water Regulations (S.I. No. 77/2019) standards (i.e. EQR high/good ≥0.85). The abundance of salmonids (especially Atlantic salmon as opposed to brown trout) is more stable at better quality sites (≥Q4), with salmon populations tending to oscillate due to fry abundance 'pulses' at moderate quality sites (i.e. Q3-4) (Kelly et al., 2007; Champ et al., 2009).

##### 8.3.7.7.2 Lamprey Habitat Evaluation

Lamprey habitat was typically of poor to moderate quality across the majority of the survey area (21 or 91% of 23 sites) based on Lamprey Habitat Quality Index (LHQI) scores (**Table 8-73**). Twelve sites offered poor lamprey habitat given the absence of suitable larval habitat (e.g. in higher flow sites) and or little to no suitable spawning substrata. Many of the survey sites were located on upland eroding watercourses and naturally such sites do not encourage the deposition of fine, organic rich sediment required by larval lamprey (Goodwin et al., 2008; Aronsuu & Virkkala, 2014).
Ten sites offered moderate quality lamprey habitat with scores invariably reduced given a paucity or lack of suitable soft sediment areas for ammocoetes. However, sites B7 (River Bride) and B10 (Inchinanagh River) (both of which achieved 'moderate' overall scores) provided some good quality spawning substrata by way of finer gravel fractions.
Only sites A6 (Monparson River) and D2 (Farran North Stream) provided overall good quality lamprey habitat. Site A6 offered a combination of good quality spawning and nursery habitat, whilst site D2 featured some good spawning substrata in addition to excellent quality larval habitat. Site D2 provided the best lamprey habitat of any survey site.

#### 8.3.7.7.3 European Eel Habitat Evaluation

On both a global and Irish scale European eel is listed as 'critically endangered' (Pike et al., 2020; King et al., 2011). European eel were recorded from a total of seven sites (i.e. B5, B6, B7, B8, B10, B13 and C2), typically in low abundances. Eel habitat ranged from poor to moderate across the majority of survey sites, with only a few larger sites providing better (good) quality eel habitat (e.g. Monparson River, River Bride, Inchinanagh River). The highest eel density was recorded at site D2 on the Farran North Stream (0.045 fish per m2; Table 3.1). In general, the majority of sites featured a paucity of suitable refugia, deeper pool areas and or were too shallow/high energy to be considered of good value to eel. Nonetheless, even smaller channels with poor or little overall fisheries value (e.g. B5, B6, C2 etc.) offered value as potential European eel migratory pathways given their downstream connectivity to larger channels. (e.g. adult migration seawards, usually from September/October onwards).

#### 8.3.7.7.4 Freshwater Pearl Mussel Evaluation

The Freshwater pearl mussel (FPM) is an Internationally important species, listed on Annex II of the EC Habitats Directive. A population of this species exists within the River Blackwater (Munster) main channel and although previously designated as a qualifying interest of the River Blackwater (Cork/Waterford) SAC it has been recently de-designated in accordance with Statutory Instruments S.I. 355/2018 European Union Environmental Objectives (Freshwater Pearl Mussel) (Amendment) Regulations 2018. The potential for FPM to occur within the study area was evaluated based on hydromorphological conditions of the catchments and their tributaries draining the windfarm site and associated Project components. The high gradient, high energy nature of the minor watercourses within the study area means they are generally unsuitable for FPM due to mobile substrate and spate flow conditions.

There are no records of this species from the wider study area, other than within the River Blackwater (Munster) main channel. The designated *Margaritifera* Sensitive Area for the Blackwater (Munster) includes the Blackwater River and its tributaries to the north of the proposed development; however, the River Bride sub-catchment is not included.

Standards FPM Stage 1 surveys were undertaken throughout the study area including the following watercourses: River Bride, Shanowennadrimina, Ross (Killavullen), Lisheen Cross, South Creggolympry and North Lackendarragh. No records of this species were recorded during the field survey, and habitat was generally evaluated to be unsuitable, based on hydrogeomorphology. The FPM population in the wider zone of influence is therefore defined as the extant population within the River Blackwater main channel and the indirect pathways for effects via the Project elements draining to the Blackwater.

#### 8.3.7.7.5 White-clawed crayfish

No white-clawed crayfish were recorded from the n=25 riverine survey sites. Furthermore, no crayfish remains were identified in mustelid spraint, where encountered, in the vicinity of the survey sites. There were no historical or contemporary records for the species within the survey area, although crayfish are known from the wider River Blackwater SAC (002170) site (i.e. Blackwater main channel).

#### 8.3.7.7.6 Summary Aquatic Ecology Evaluation

An evaluation of each aquatic survey site was based on the results of the aquatic surveys. A total of eleven aquatic survey sites (A6, B3, B4, B5, B6, B7, B8, B9, B13, C2, D2) were considered of **local importance (higher value)** given the presence of moderate to good salmonid, lamprey and or European eel habitat.

A further eleven sites (A1, A2, A3, A4, A5, B1, B2, B12, B14, C1 and D1) were considered of local importance (lower value) due to their small size, low fisheries value and absence of good status Q4 water quality.

A total of three sites (B10 (Inchinanagh River) and B11 & B15 (River Bride)) were considered **of International importance** given they form part of the Blackwater River SAC (002170).

As summary of each site aquatic ecology and fishery evaluations is presented in **Table 8-75** below

## Table 8-75: Summary of Fisheries and Aquatic Ecology Evaluation

| Species Name | Conservation Status | Rationale | Important Ecological Feature |
|---|---|---|---|
| Salmonids (Atlantic salmon, Brown trout) | Atlantic salmon: Annex II, Annex V, listed as QI for the River Blackwater (Cork/Waterford SAC); Wildlife Act; Salmonid Water Regulations; Fisheries Act (2006 amdended)<br>Internationally Important<br><br>Brown trout: Wildlife Act; Salmonid Water Regulations; Fisheries Act (2006 amdended)<br>Local importance, higher value | The watercourses within the study area were found to support good populations of both Atlantic salmon and Brown trout. Aquatic habitats supporting the diverse life-stages for these species were found to be in good condition. Salmonid populations and aquatic habitats are hydrologically connected to the proposed Project. | Yes, scoped is as this receptor is located within the zone of influence of the Project. |
| Lamprey species | Annex II, Annex V, Fisheries Act (2006 amdended)<br>Internationally Important | No records of sea lamprey were recorded within the study area; however, juvenile (ammocoetes) of river/brook lamprey were identified in the lower-gradient reaches of the Farran north stream. The location of these records, in the Bride catchment suggests these were Brook lamprey (*Lampetra planeri*). The aquatic habitats supporting lamprey species are hydrologically connected to the proposed Project. | Yes, scoped is as this receptor is located within the zone of influence of the Project. |
| European eel | IUCN Critically Endangered; CITES Annex II; Fisheries Act (2006 amdended)<br>Internationally important | This species has been recorded from watercourses throughout the study area. Watercourses that are within, or hydrologically connected to the Project comprise suitable habitat for this species and thus this species is scoped in for further | Yes, scoped is as this receptor is located within the zone of influence of the Project. |
| Freshwater Pearl Mussel | Internationally important<br>Annex II; IUCN Critically Endangered<br>Internationally important | This species does not occur within the watercourses directly affected by the proposed Project; nor has it been recorded from downstream reaches of the tributaries and minor catchments draining the zone of influence. The FPM population in the River Blackwater main channel is hydrologically connected to the proposed Project, and is thus scoped in for further assessment. | Yes, scoped is as this receptor is located within the zone of influence of the Project within the River Blackwater main channel. |

| Species Name | Conservation Status | Rationale | Important Ecological Feature |
|---|---|---|---|
| Aquatic macroinvertebrate community | Local importance, higher value | The aquatic macroinvertebrate community provides an important food source for salmonid fish, as well as comprising an indicator of aquatic ecosystem health. Within the zone of influence of the Project the aquatic macroinvertebrate community was found to be highly diverse, representative of 'high' and 'good' indicative biological water quality status. The aquatic habitats supporting the macroinvertebrate community are hydrologically connected to the proposed Project. | Yes, scoped is as this receptor is located within the zone of influence of the Project. |
| White-Clawed Crayfish | Annex II, Annex V, listed as QI for the River Blackwater (Cork/Waterford SAC) Internationally important | None recorded in any surveys. Rivers in the study area outside of the distant main channel River Blackwater are generally unsuitable for this species which prefers lowland hard waters. | No. Given none recorded and extensive distance to populations of this species and negligible risks at this project scale to a species which is relatively tolerant of pollutants, this species can be scoped out. |

## 8.4 DO NOTHING SCENARIO

If the proposed development does not proceed, the 'do nothing' scenario is that the existing environment and key receptors identified in **Section 8.3** are likely to remain as described.

# 8.5 POTENTIAL IMPACTS ON BIODIVERSITY

## 8.5.1 Mitigation by Avoidance and Design

The following measures were undertaken to reduce impacts on designated sites, flora and fauna through avoidance and design:

- The hard-standing area of the wind farm has been kept to the minimum necessary, including all site clearance works to minimise land take of habitats and flora.
- Subject to technical constraints turbines have been situated as close together as possible to minimize the development footprint.
- Larger turbines have also been utilised to minimise the total rotor envelope of the proposed development.
- Site design and layout deliberately avoided Natura 2000 sites, NHA's, pNHA's in addition to other nature conservation designations. The placement of turbines in deciduous woodland and semi natural bog and heath habitats has been avoided. Internal road design has avoided hedgerow removal wherever possible. This in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt & Langston, 2006).
- All cabling for the project is to be placed underground; this significantly reduces collision risk to birds over the lifetime of the wind farm and is in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt & Langston, 2006).
- The grid connection route has been selected to utilise public roads thereby minimising landtake of potentially sensitive habitats.
- Construction of the cable along the grid route will be directionally drilled at all stream crossings hence avoiding direct impacts to stream and riparian habitats, and associated fisheries.
- Care has been taken to ensure that sufficient buffers are in place between wind farm infrastructure and hydrological features such as rivers, lakes and streams. Access roads were the exception to the rule in that river crossings had to take place however, wherever possible, existing stream and river crossings have been utilised.
- Turbine and infrastructure layout has been modified as part of an iterative process to reduce impacts on ecological resources identified during the impact assessment process.
- Turbines have been located predominantly in mature (post thicket) plantation forestry with extensive buffers of mature forestry. Mature forestry is of low value for foraging hen harrier, an important ecological feature in this area.
- All Turbines and associated hardstands are located at least 0.5km from hen harrier nest sites identified yearly since 2003 in the vicinity of the site, refer to **Table 8.39** and **Confidential Annex.** The closest recent (two) nest site (2019) are located c.a. 1km from turbines.
- The design of the proposed cable route and High Voltage grid connection was also carried out with cognisance to ecological features. Cables are to be placed underneath public roads where possible to avoid impact to roadside hedgerows.
- Vegetation clearance and tree management associated with the construction including site clearance works will be undertaken outside the main bird breeding season.

## 8.5.2 Potential Construction Phase Impacts

### *8.5.2.1 Designated Nature Conservation Sites*

#### 8.5.2.1.1 Potential Direct Impacts

**European Designated Sites**

*CGEP*

As there are no European Sites located within the CGEP development boundary, no potential for direct impacts will occur during the construction phase of the proposed development. The nearest European site, Blackwater River (Cork/Waterford) SAC (Site Code 002170) to the CGEP, is located approximately 0.6km south of the CGEP development boundary thus precluding any direct impacts during the construction stage. The Blackwater Callows SPA (Site Code 004094) is the next nearest European site at 11.7km east of the CGEP at its nearest point; no direct construction stage impacts are predicted by virtue of the separation distance.

*Grid Connection Route*

The GCEP Grid Connection Route is not located within any European Sites. As with the CGEP, there are two designated sites within 15km of the proposed grid route; Blackwater River SAC and Blackwater Callows SPA, which are located 1.3km and 4.2km from the grid route respectively. Given the absence of overlap between the proposed CGEP grid connection development and these sites, no potential direct effects are expected in respect of European Sites.

*Turbine Delivery Route*

Considering none of the upgrade works for the CGEP Turbine Delivery Route are located within European Sites, no direct construction stage impacts are predicted. The nearest European Sites to a TDR node is the Blackwater River (Cork/Waterford) SAC, which is located 10m from the location of proposed works at Node 2.3., refer to Appendix 8-C.

**National Sites**

*CGEP and CGEP Grid Connection Route*

There are a total of 17 Proposed Natural Heritage Areas (pNHA's) within 15km of the CGEP and CGEP Grid Connection Route the nearest pNHA is Bride/Bunaglanna Valley pNHA (Site Code 000074) which is located 1.25km south of the CGEP development boundary at its nearest point. There are no Natural Heritage Areas (NHAs) within 15km of the GCEP or GCR. Given that no National designated sites occur within the development boundary or on the grid connection route, no direct construction stage effects are predicted.

*Turbine Delivery Route*

No NHAs, and 27 pNHA's are located within 10km of the CGEP Turbine Delivery Route Study Area. Although two nodes are located within 50m of pNHA's, no works are proposed within any pNHA's, therefore there will be no direct impacts during the construction stage of the TDR.

#### 8.5.2.1.2 Potential Indirect Impacts

**European Designated Sites**

*CGEP and CGEP Grid Connection Route*

There are two European Sites within 15km of the proposed CGEP, Blackwater River (Cork/Waterford) SAC (Site Code 002170) to the CGEP, is located 0.6km south of the CGEP development boundary, and Blackwater Callows SPA (Site Code 004094) 11.7km east of the CGEP at its nearest point. Blackwater Estuary SPA (Site Code 004028), which is located approximately 28km from the proposed CGEP, is hydrologically connected to the CGEP being located at the mouth of the River Blackwater.

Although the proposed CGEP Project is not located within the boundary of the Blackwater River (Cork/Waterford) SAC, its construction phase could potentially affect hydrologically connected aquatic habitats and species of this European site resulting in significant effects to the species, their habitats and food sources. The construction phase of the proposed CGEP could also spread IAPS to European sites. Movement of soils and machinery and surface water runoff can potentially transport vegetative material (e.g. spores, fragments, seeds) to the SAC, causing invasive species to become established and reproduce there. This will potentially cause a degradation of the receiving habitats and, indirectly, cause significant effects to the SCIs of the SAC. Hydrocarbons spills and the release of cement-based materials at the proposed CEGP Development, given the hydrological connectivity with the SAC, has the potential to give rise to significant effects to the SAC Qis. Mobile QIs (e.g. otter) have the potential to be affected by the works of the proposed CGEP development. Direct deaths and habitat disturbance (e.g. holts) could represent significant effects to these Qis. The potential negative indirect impacts on the River Blackwater SAC identified here are considered

likely to occur in the absence of mitigation due to the identified downstream connectivity and proximity of the SAC to the proposed CGEP Project. The works have the potential to result in short-term **significant negative effects.**

Although the proposed CGEP project is not located within the boundary of the Blackwater Callows SPA, its construction phase could potentially affect hydrologically connected riverine habitats that support the European site's SCIs which consist of a range of wildfowl species **(Appendix 8 - E)**, through a potential decrease of river water quality. This potential decrease could result in an indirect disturbance throughout the food chain and, ultimately, cause significant effects to the SCIs. The construction phase of the proposed CGEP could also spread invasive species to European sites. Movement of soils and machinery and surface water runoff can potentially transport vegetative material (e.g. spores, fragments, seeds) to the SPA, causing invasive species to become established and reproduce there. This could potentially cause a degradation of the receiving habitats and, indirectly, cause significant effects to the SCIs of the SPA. Accidental discharges of hydrocarbons and cement-based materials at the proposed CEGP Development, given the hydrological connectivity with the SPA, have the potential to give rise to impacts to the SPA SCIs. Notwithstanding the negative quality of the potential indirect impacts identified, taking into account the separation distance of the proposed development from Blackwater Callows SPA, any impacts are expected to be **short term negative effects of imperceptible significance.**

Cork Harbour SPA and Great Island SAC are hydrologically connected via the River Martin and River Lee. This connectivity is associated with a very small portion of the overall development (works near the proposed south western site entrance). These European sites are > 20km downstream. Given the nature and scale of proposed works and distance to these sites **no measurable effects are likely**.

*Turbine Delivery Route*

The following potential construction stage impacts are identified for the CGEP Turbine Delivery Route:

- Potential for sediment inputs arising from node upgrade works to result in the alteration or degradation of water quality within Cork Harbour SPA (004030), Great Island Channel SAC (001058), Blackwater River (Cork/Waterford) SAC (002170) and/or Blackwater Callows SPA (004094)

- Potential for asphalt runoff (Node 2.1 only) to have toxic effects on aquatic life within the Blackwater River (Cork/Waterford) SAC (002170)

- Potential for the spread of non-native invasive plant species to Cork Harbour SPA (004030), Great Island Channel SAC (001058), Blackwater River (Cork/Waterford) SAC (002170), Lower River Suir SAC (002137) and/or Blackwater Callows SPA (004094).

While a limited amount of sediment arising from ground disturbance, wall demolition and washout of fines from aggregate may be transported towards Cork Harbour SPA (004030), Great Island Channel SAC (001058), Blackwater River (Cork/Waterford) SAC (002170) and/or Blackwater Callows SPA (004094), these would not have the potential to result in significant effects, due to negligible quantity in the case of Blackwater River (Cork/Waterford) SAC (002170), and in the case of Cork Harbour SPA (004030), Great Island Channel SAC (001058) and Blackwater Callows SPA (004094) a lack of potential for conservation interests to be impacted in this regard.

While the potential for input of toxic substances such as polycyclic aromatic hydrocarbons (PAHs) arising from surface runoff from asphalt used to ramp the traffic island at Node 2.1 into the Blackwater River (Cork/Waterford) SAC (002170) exists, the quantities which could be transported are negligible due to the small amount of asphalt required (73m$^2$).

Most case studies (e.g. Mahler et. *al*, 2015; Scoggins et. *al,* 2007) demonstrating toxic effects of coal-tar on aquatic life relate to the use of concentrated coal-tar based pavement sealants which contain high levels of PAHs; asphalt "concrete" which would be used at Node 2.1 contains c. 5 % petroleum based binder material, with the remainder being made up of aggregates, in comparison to pavement sealants which are concentrated. As such, the impacts are considered to be negligible in terms of sediment input or toxicity..

Considering the above, in the absence of mitigation the potential indirect impacts resulting from the proposed TDR upgrade works are considered to have an **imperceptible impact** of brief duration and of negative quality.

**National Sites**

*CGEP and CGEP Grid Connection Route*

Of the 23 pNHA's located within 15km of the proposed CGEP and CGEP Grid Connection Route, 9 of these sites have downstream connectivity with the proposed CGEP Development via tributaries of the River Bride. See **Table 8-76** below. Given that these pNHA's are located downstream of the proposed works, there is a potential for indirect impacts to occur during the construction stage of the proposed development. Construction works have the potential to result in the release of deleterious materials including hydrocarbons, cement and potentially the release of silt laden water due to site clearance and excavation works. There is also the potential for the spread of invasive species via downstream connectivity from the site of the proposed development during construction works. In the absence of mitigation, and based on sensitivities at these sites, construction stage activities have the potential to result in **short-term slight effects**.

**Table 8-76 Impact Pathways identified for pNHA sites within 15km of the proposed CGEP and CGEP Grid Connection Route.**

| Site Code | Site Name | Nearest distance to CGEP and CGEP Grid Connection Route | Impact Pathway to National Site Identified |
|---|---|---|---|
| 000079 | Bride/Bunaglanna Valley | 1.25 | Downstream hydrological connectivity |
| 001797 | Blackwater Valley (The Beech Wood) | 2.30 | Downstream hydrological connectivity |
| 001796 | Blackwater Valley (Cregg) | 3.04 | Downstream hydrological connectivity |
| 000073 | Blackwater River Callows | 3.38 | Downstream hydrological connectivity |
| 001795 | Blackwater Valley (Killathy Wood) | 3.50 | Downstream hydrological connectivity |
| 001080 | Blackwater Valley (Killavullen) | 4.59 | Downstream hydrological connectivity |
| 001794 | Blackwater Valley (Kilcummer) | 4.67 | Downstream hydrological connectivity |
| 002097 | Convamore, Ballyhooly (Near Fermoy) | 4.77 | Downstream hydrological connectivity |
| 001793 | Blackwater Valley (Ballincurrig Wood) | 4.83 | Downstream hydrological connectivity |

*Turbine Delivery Route*

No NHA's, and 27 pNHA's were recorded within 10 km of the TDR route. See **Appendix 8 -F** for a full list of pNHA's and a description of each site. The closest designated site to the turbine delivery route is Blackwater Valley (The Beech Wood) pNHA, which is located 0.01km from the closest element of infrastructure.

The proposed development is not within the boundary of any designated conservation area. The site has limited potential to be indirectly hydrologically connected to the following:

- Blackwater River Callows pNHA
- Blackwater Valley (The Beech Wood) pNHA
- Blackwater Valley (Cregg)
- Blackwater Valley (Killathy Wood)
- Blackwater Valley (Ballincurrig Wood)

Therefore, construction stage impacts on National Sites are evaluated as brief in duration and of **imperceptible significance**.

### *8.5.2.2 . Habitats and Flora*

#### 8.5.2.2.1 Identification of impact/pathways evaluated and excluded

In this Section, the likely direct and indirect effects of the CGEP Wind Farm, which includes Grid Connection, Turbine Delivery Route, and Replant lands are identified and evaluated.

Following scoping, field studies and a review of the project design, a conceptual site model exercise was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) – Habitats and Flora. As a result of the exercise, some impacts were included and some were excluded; these are presented in **Table** 8-77 **8-77** below.

**Table 8-77: Identification of impacts included and excluded based on project design**

| Impacts Included<br>**(Evaluated in the Impact Evaluation Sections)** | Impacts Excluded<br>**(Justification for exclusion provided here)** |
|---|---|
| **During Construction** | |
| Reduction in Terrestrial Habitats<br>*Pathway Rationale*<br>Temporary and permanent habitat loss will occur as a result of the proposed construction activities and wind farm infrastructure | Direct loss of Flora Protection Order species<br>*Exclusion Rationale*<br>No FPO species were recorded within the development boundary |
| Hedgerow and Treeline Severance<br>*Pathway Rationale*<br>206m of hedgerow/ linear scrub will be permanently removed | |
| Habitat degradation<br>*Pathway Rationale*<br>The potential for indirect effects on habitats resulting from construction stage impacts including permanent and temporary habitat loss is included in the impact evaluation.<br>Construction works have the potential to result in adverse impacts to local groundwater or surface-water bodies which may support terrestrial habitats. | |
| Introduction or spread of invasive species<br>*Pathway Rationale*<br>Infestations of High and Medium Impact Invasive species occur within both the CGEP Grid Connection and Wind Farm study area. Construction activities have the potential to introduce new infestations to the development site and/or spread existing infestations. | |

#### 8.5.2.2.2 Potential Direct Impacts

*CGEP*

**Reduction in Terrestrial Habitats**

No habitats consistent with Habitats listed under Annex 1 of the Habitats Directive (NPWS 2013) are likely to be directly impacted by the proposed development. Land take for the CGEP wind farm development relates to works including construction of site access roads, turbine hardstands, electrical substations, temporary site compounds, borrow pits and underground cables. In addition, there will be a reduction in existing habitats due to proposed clearfelling works required for the installation of site infrastructure. Reduction in terrestrial habitats will comprise both a temporary and permanent land-use change, which will involve a small scale permanent loss of habitats which have some local importance from a Biodiversity perspective.

Permanent land take associated with the CGEP Wind Farm relates to the construction of new access roads, upgrading of existing site access roads, turbine hardstandings, borrow pits, temporary site compounds, and substation construction; the total of which amounts to approximately 38.6ha. Felling operations required in lands outside permanent infrastructure (roads and turbine bases) are considered temporary impacts. No forestry will be replanted in these areas though low growing semi natural vegetation of biodiversity value e.g. scrub and grassland will be allowed regrow. Ongoing management of this vegetation will include felling of taller trees and leaving material in situ as dead wood which means these areas will develop local biodiversity value. No pesticides / herbicides will be used for this ongoing management.

All habitats described and evaluated herein are those evaluated as of Local Importance (Higher Value) and above i.e. habitats identified as important ecological features. It is noted that no habitats evaluated as being of County, National, or International Importance are affected by permanent land use change.

Permanent habitat loss for CGEP Wind Farm will comprise 38.6 ha, limited to fifteen non-linear habitat types (including habitat mosaics). Of these habitat types, six are evaluated as being of Local Importance (Higher Value) with a combined area of 2.3ha. The habitats evaluated as being of Local Importance (Higher Value) are; Scrub (WS1), Wet Grassland/ Dry Heath (GS4/HH1), Wet Grassland (GS4), Mixed Broadleaved Woodland (WD1) and Dry heath/ scrub mosaic (HH3/WS1). The remaining 36.3ha of permanent landtake will consist of habitat types evaluated as being of Local Importance (Lower Value) the majority of which comprises Conifer plantation (WD4), Clearfelled conifer plantation (WS5), and Improved agricultural grassland (GS4).

A total of 1.63ha of Scrub (WS1) will be permanently removed at various locations throughout the wind farm site. A total area of 0.11ha Dry heath/ scrub mosaic (HH3/WS1) will be removed permanently as a result of the construction of new access roads and the construction of hardstands for turbines T4 and T17. There will be a permanent loss of 0.344ha of Wet Grassland (GS4) and 0.2HA of deciduous woodland (WD1). The remaining habitat type evaluated as being of Local Importance (Higher Value) comprise 0.01 HA of Wet Heath/ Scrub mosaic (HH3/WS1).

The permanent loss of linear habitat important ecological features is limited to 206m of Hedgerow (WL1) and linear scrub (WS1 in forestry fire breaks) will be required. Hedgerows/ linear scrub are evaluated as being of Local Importance (Higher Value). No loss of treelines, high nature value trees or other linear habitat features of ecological importance will be permanently lost as a result of the construction of the wind farm.

Considering the permanent duration of land-take, and the loss of habitats evaluated as being of Local Importance (Higher Value), the impact quality is evaluated as permanent negative at a local scale. Notwithstanding the permanent duration of the impacts and the loss of habitats of Local Importance (Higher Value) the significance of effects to important ecological feature habitats, during the construction stage is evaluated as not significant, given the small scale of areas permanently impacted. It is noted also that clearance of mature conifers within a buffer zone out to 92m around each turbine will create a low scrub (WS1) or wet grassland (GS4) type habitat, within approximately 30.4HA in total. Habitats permanently impacted of Local Importance (Higher Value) on the CGEP and Grid Route are summarised in **Table 8-79**. Mitigation is proposed to reduce impacts to habitats.

*CGEP Grid Connection Route*

**Reduction in Terrestrial Habitats (construction stage)**

All land-take required for the installation of the underground cable will be temporary in nature and for the most part will be located within the existing public road. Within the windfarm site, the proposed cable route will follow internal site access roads and will therefore not involve any additional permanent habitat change.

The only location where the cable does not follow an existing road or forestry track is a section 355m long within Knoppoge townland. At this location the cable passes through conifer plantation (WD4) of which 0.21ha will be felled to facilitate the proposed underground cable.

Trenching and laying of cable within the public road will not involve permanent land take and no linear habitats of Local Importance (Higher Value) i.e treelines and hedgerows will be removed during the construction stage. Streams (FW1) that require crossings for the cable route will be conducted via directional drilling which will avoid direct impacts to instream and riparian areas.

Habitats permanently impacted of Local Importance (Higher Value) occur within CGEP site only (not GCR) and are summarised in **Table 8-78**. Based on the relatively small scale loss of habitats of Local Importance (Higher value) the impacts on terrestrial habitats is evaluated as **slight**, given small scale permanent habitat loss of WS1 and WD1 in particular.

**Table 8-78 Loss of Important Habitat Features due to CGEP construction stage permanent impacts.**

| Fossitt Code | Area in Hectares to be lost (ha) | Important Ecological Feature / Evaluation |
|---|---|---|
| WS1 Scrub | 1.635 | Yes/ Local Importance (Higher Value) |
| GS4/HH1 Wet Grassland/ Dry Heath | 0.11 | Yes/ Local Importance (Higher Value) |
| GS4 Wet Grassland | 0.344 | Yes/ Local Importance (Higher Value) |
| WD1 Mixed Broadleaved Woodland | 0.2 | Yes/ Local Importance (Higher Value) |
| HH4/WS1 Wet Heath/Scrub | 0.005 | Local importance (Higher Value) |

*Turbine Delivery Route*

**Reduction in Terrestrial Habitats**

Reduction in terrestrial habitat along the proposed TDR (Turbine Delivery Route) will occur at 13 locations in order to facilitate the delivery on turbine components to site. This reduction of habitat will occur due to land-take associated with road widening, lowering of section of stone wall and earth banks. It is envisaged that trimming of trees and shrubs will be required at many locations.

Of the habitats potentially impacted by the TDR, eight locations with proposed upgrade works support habitats evaluated as being of Local Importance (Higher Value), comprising of three habitat types (mosaics); Dry Siliceous heath/Dry meadows and grassy verges (HH1/GS2), Mixed broadleaved woodland (WD1), Scrub /Dry meadows and grassy verges (WS1/GS2).

Dry Siliceous heath/Dry meadows and grassy verges (HH1/GS2) evaluated as Local Importance (Higher Value) occurs at three locations where land-take is required for road widening. As this habitat type is widespread and common in the study area, and the area to be impacted is proportionally minimal, the impact is envisaged as **short term and slight**.

Mixed broadleaved woodland (WD1) of Local Importance (Higher Value) occurs at five locations where road upgrade works are required. Of these five locations, there shall be not works require within broadleaved woodland at two of these locations and two require trimming to allow oversail and/or load bearing during delivery. At another location tree felling on a bend may potentially be required (node 2.10). Assuming that trimming will be required at two locations, the impact is evaluated as short-term and slight, notwithstanding

the very limited extent of trimming required. As the final location supporting WD1 of Local Importance (Higher Value) will undergo minimal trimming / felling only, to allow for oversail, the impact will be medium-term and imperceptible..

The final habitat type of Local Importance (Higher Value) occurring within the TDR footprint is an area of Scrub / Dry meadows and grassy verges (WS1/GS2) mosaic, which will be subject to land take for road widening and tree trimming. Due however to the very limited extent of habitat affected and the abundance of this habitat in the study area, the impact is envisaged as being **short-term and slight**.

#### 8.5.2.2.3 Potential Indirect Impacts

*CGEP*

**Habitat Degradation**

Groundwater and surface-water dependant habitats including peatlands, fen and other wetland habitats are sensitive to indirect impacts resulting from changes in groundwater regimen. Therefore, construction works proposed in the vicinity of sensitive habitats may have indirect effects on water regimen resulting in habitat degradation. An area of Upland blanket bog PB2 located in Coom townland (Red Bog) which was mapped during habitat surveys of the wider study area, occurs approximately 1.3km east of the nearest work location. Given the separation distance from the works and the absence of downstream hydrological connectivity no construction stage degradation of this Upland blanket bog habitat is expected.

One area of non Annex 1 (Habitat Directive) Cutover bog (PB4) occurs in the wider survey area, located 135m north of Turbine T11 in the townland of Knuttery. This area of bog, some of which has been converted to conifer plantation is heavily degraded and has been subject to extensive peat harvesting and drainage. Given the already poor habitat condition of this bog and the separation distance from works, no significant impacts to this habitat are expected.

**Introduction or spread of invasive species**

Construction activities have the potential to introduce new infestations to the development site and/or spread existing infestations.

Two infestations of a Medium Impact invasive species, Pheasant Berry *(Leycesteria formosa)* were recorded within the CGEP development boundary. Both infestations are adjacent to the existing paved access road to the Bottlehill landfill facility and are located approximately 485m apart. Pheasant Berry is considered an invasive species as it can exclude native vegetation by forming a dense evergreen thicket (Booy et al,. 2015). As these infestations are located adjacent to a site road there is potential for spread of this species through interaction with construction activities and traffic. If left unmanaged there is also a potential for these infestations to expand beyond their current extent, or to spread via natural means, i.e through the establishment of new infestations via seed dispersal, with resultant negative impacts on local biodiversity.

No infestations of High Impact invasive species including those listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (as amended) were recorded within the development boundary of the wind farm study area. Therefore, the potential for negative impact resulting from High Impact invasive species is limited to the potential introduction to the development site of these invasive species via either human vectors or natural dispersion.

It is considered therefore that any unmitigated impacts through the spread or introduction of High Impact Invasives could be **significant**.

**CGEP Grid Connection Route**

**Habitat Degradation**

The construction works required for the installation of the underground cable will be temporary in nature, and for the most part confined to the existing public road corridor. Therefore, potential impacts on terrestrial habitats are limited to indirect habitat degradation in areas adjacent to the construction works

Due to the absence of groundwater sensitive habitats e.g. peatlands, wet heath, or other terrestrial habitats sensitive to changes in groundwater regime within the grid connection study area, no negative impacts through secondary habitat degradation are expected during the construction stage of the development. Construction stage activities associated with trenching and laying of cable will be of short duration and reversible.

The impact magnitude of habitat degradation during the construction stage of the CGEP Grid Connection relates to potential temporary degradation of terrestrial habitats. Overall this impact magnitude for habitat degradation within the CGEP Grid Connection study area is evaluated as negligible due to the limited extent of the works, which are of temporary duration. Considering the temporary duration of the works and the absence of habitats of Local Importance (Higher Value) or above, the impact of construction stage degradation of terrestrial habitats is evaluated as **not significant.**

**Introduction or spread of invasive species**

Three Japanese knotweed infestations were recorded during habitat assessments on the CGEP Grid Connection, two of which occur within the CGEP Grid Connection study area at roadside locations in the townland of Cullenagh adjacent to the golf course of Fermoy Golf Club. Japanese Knotweed is a High Impact invasive species listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (as amended). The two Knotweed infestations occurring within the study area are located within 7m of the proposed works and are therefore liable to being spread by grid connection construction works. Due to a maximum root spread of 7m from the above-ground stems, trenching works within this area have the potential to break roots and spread viable fragments to other work locations.

Himalayan balsam (*Impatiens glandulifera*), a high impact Third Schedule invasive plant species is widespread and abundant along both banks of a watercourse channel at Farran North within the grid connection study area.

Cotoneasteer *(Cotoneaster sp.),* which is listed as a 'Medium impact' non-native invasive plant species (Kelly *et al.,* 2013a, O' Flynn *et al.*, 2014), was recorded at two locations within the grid connection study area. Montbretia *(Crocosmia x crocosmiflora),* was also recorded at two locations, one of which occurs within the grid connection study area. While not listed as a "Medium Impact" invasive species, Montbretia is considered an invasive species in Ireland.

Given the presence of invasive species, including the presence of two high impact invasive species within the zone of influence of grid connection construction works, there is a potential for dispersal of existing invasive species infestations to other parts of the CGEP Grid connection study area and the wider landscape through construction and construction related activities. Taking in to account the likelihood of the impact, and the negative effects invasive species have on habitats and native flora, the impact quality is evaluated as negative. Infestations of Japanese Knotweed can be difficult to eradicate and dispersion occurs easily along roads leading to long term impacts on affected habitats. Considering the above, without mitigation the potential impact of invasive species within the grid connection study area is considered to be **significant**.

**<u>Turbine Delivery Route</u>**

**Habitat Degradation**

Tree trimming and temporary load bearing is identified on habitats of local importance at Nodes 1.3, 1.4, 1.6, 2.2, 2.3 (hedgerow bank lowered), 2.4, 2.5 (lowering hedge bank), 2.7 (lowering old stone wall), 2.8 (felling area mixed broadleaved woodland), 2.9 (felling area of broadleaved woodland), 2.10 (felling area of mixed broadleaved woodland), 2.11 (lowering hedgerow), 2.12 (scrub trimming), 2.13 (scrub trimming), Junction 1 (load bearing on hedgerow), Junction 2 (hedgerow trimming) and offsite turning and transfer area (plantation woodland cutting and scrub clearance).

As the impact on these habitats associated with load bearing and oversail will be temporary in duration and of limited extent, the overall impact significance is evaluated as **not significant**.

**Introduction or spread of invasive species**

Invasive plant species were recorded at six locations along the TDR including nodes 1.3, 1.4, 2.0, 2.2, 2.3 and 2.4. Japanese knotweed *(Fallopia japonica)* a High Impact invasive species listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats)

Regulations 2011 (S.I. No. 477/2011) was the only high impact invasive recorded at Node 1.4. This Knotweed infestation however is located >7m outside of the footprint of the proposed upgrade works and is therefore unlikely to be spread by proposed TDR upgrade activities though mitigation is required to ensure it does not get disturbed.

The Medium impact invasive species Traveller's-joy (*Clematis vitalba)* and Himalayan honeysuckle (*Leycesteria Formosa)* were recorded at two and one locations respectively. Cherry laurel *(Prunus laurocerasus)* was recorded at one location but does not occur within the footprint of the proposed works. Winter heliotrope *(Petasites fragrans)* occurs at three locations, all within the footprint of the proposed works.

The presence of these invasive species within the works location presents a potential negative impact to habitats and flora through the spread of existing infestations to other work locations and areas along the turbine delivery route. Therefore, the impact of invasive species is evaluated as a **significant negative** impact if no mitigation is carried out.

### *8.5.2.3 Avifauna*

#### 8.5.2.3.1 Identification of impact/pathways evaluated and excluded

In this Section, the likely direct and indirect effects of the proposed CGEP, Grid Connection Route and Turbine Delivery Route are identified.

Following scoping, field studies and a review of the project design, a conceptual site model exercise was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) – Avifauna. As a result of the exercise, some impacts were included and some were excluded. **Table 8-79** lists the potential impacts during construction phase of the CGEP and GCR included for further evaluation. Rationale for exclusion is also stated. **Table 8-80** lists the potential impacts of the construction phase of the TDR and Replant Lands, respectively, included and excluded for further evaluation.

**Table 8-79: List of Impacts included and excluded from the Impact Evaluation for the CGEP and GCR Construction Phase.**

| Impacts Included<br>(Evaluated in the Impact Evaluation Table sections) | Impacts Excluded<br>(Justification at the end of the Impact Evaluation Table sections) |
|---|---|
| *Construction Phase* | |
| **General Birds** – Secondary habitat degradation through water quality degradation.<br>*Pathway Rationale*<br>Kingfisher, Grey Wagtail and Dipper and their nests can be affected by the instream works on existing culvers and other watercourse crossings. Construction works on the riparian zone have the potential to disturb/destroy nests and/or impact habitats used by these species. | **General Birds** – Direct Mortality<br>*Exclusion Rationale*<br>Direct Mortality of all tree-nesting or ground nesting species with the potential to undergo physical contact during felling or vegetation clearance including whilst in situ in nests (includes Goshawk, Sparrowhawk, Kestrel, Merlin, Long-eared Owl, Skylark, Meadow Pipit, Woodcock etc). However, project design measures will avoid direct effects on birds as all clear felling of trees or scrub/ground clearance occurs outside of the nesting season (March – August). |
| **General Birds:** Disturbance/Displacement<br>*Pathway Rationale*<br>Noise, visual intrusion, clearfelling, vegetation clearance and movement of soil from operating machinery, construction/ trenching works near and at watercourses. | **General Birds** – Secondary habitat degradation through water quality degradation.<br>*Exclusion Rationale*<br>Other than Kingfisher, Grey Wagtail and Dipper (evaluated separately), secondary effects along this pathway can reasonably be excluded, as little or no records were made of these or any other riparian or water dependant species. |
| **General Birds:** Loss of Habitat<br>*Pathway Rationale*<br>Removal of vegetation including trees and movement of soil during construction works. | **Barn Owl -** Direct Mortality<br>*Exclusion Rationale*<br>Construction works will be conducted predominantly during daylight hours. Barn Owls do not nest in conifer trees and there are limited suitable broadleaf trees present within felling areas. Separation distance to identified roosting locations precludes the likelihood of this pathway. Furthermore, vehicle speed within the construction works boundary will be limited and thus the likelihood for direct mortality is low. |
| **Goshawk:** Disturbance/Displacement<br>*Pathway Rationale*<br>Noise, visual intrusion, clearfelling, vegetation clearance and movement of soil from operating machinery. | **Barn Owl –** Disturbance & Displacement<br>*Exclusion Rationale*<br>Construction works will be conducted predominantly during daylight hours only, the confirm roosting location is outside of the construction works boundary, thus disturbance and displacement effects are not likely. Any disturbance of daytime roosting birds is of brief to momentary duration and likely to be reversible, likely significant effects can reasonably be excluded. |

| Impacts Included<br>(Evaluated in the Impact Evaluation Table sections) | Impacts Excluded<br>(Justification at the end of the Impact Evaluation Table sections) |
|---|---|
| **Goshawk:** Loss of Habitat<br>*Pathway Rationale*<br>Removal of trees during construction works will directly reduce the availability of habitat for this species. | **Barn Owl –** Habitat Loss<br>*Exclusion Rationale*<br>Due to the extent of the suitable habitat available and limited scale of land use change of suitable foraging habitat within the study area (most land take is conifer woodland), loss of habitat will have negligible effects on barn owl. |
| **Skylark and Meadow Pipit:** Loss of Habitat<br>*Pathway Rationale*<br>During the construction of the CGEP development a total estimated area of 0.45ha of suitable foraging/nesting habitat will be lost permanently. This habitat loss comprises wet grassland and wet grassland/heath mosaic. | **Whooper Swan**<br>*Exclusion Rationale*<br>This species was not recorded utilising habitat within the site boundary. The development footprint is dominated by conifer planation, which does not provide suitable habitat for the species. There is no potential for the proposed works to have negative impacts on this species.<br>A survey of wetlands in the hinterland of the study area, particularly along the River Blackwater to the north of the site, was also undertaken in winter.<br>There is no evidence to suggest that the development site lies on a commuting or migratory route for the species. No potential for effect exists. |
| **Skylark and Meadow Pipit**: Disturbance/Displacement<br>*Pathway Rationale*<br>Suitable foraging and nesting habitat occurs within the zone of influence of the proposed CGEP and CGEP Grid Connection Route. | **Woodcock**<br>*Exclusion Rationale*<br>Only one record of woodcock was recorded during the survey. There is no evidence to suggest that the site is of significance to this species. |
| **Kestrel:** Loss of Habitat<br>*Pathway Rationale*<br>During the construction of the CGEP development a total area of 0.45ha of suitable foraging habitat will be lost permanently. This habitat loss comprises wet grassland and wet grassland/heath mosaic. As the proposed development involves clearfelling of forestry plantation there will be a loss of suitable nesting habitat. | **Kingfisher, Grey Wagtail & Dipper -direct Mortality**<br>*Exclusion Rationale*<br>No observations of Kingfisher were recorded within the construction works boundary or upstream of the M8 along the River Bride. Along the River Bride in the Bird Atlas 2007-11 (Balmer *et al.*, 2013). Only four observations of Grey Wagtail were recorded during surveys. Only one record of an old Dipper nest 4.5 km downstream of the windfarm. |

| Impacts Included<br>(Evaluated in the Impact Evaluation Table sections) | Impacts Excluded<br>(Justification at the end of the Impact Evaluation Table sections) |
|---|---|
| **Kestrel:** Disturbance/Displacement<br>*Pathway Rationale*<br>Due to occurrence of suitable nesting and foraging habitat within the zone of influence of the CGEP and CGEP grid connection route this impact is included. | **Eurasian Curlew**<br>*Exclusion Rationale*<br>No Curlew were recorded during any of the bird survey fieldwork undertaken in the Wing Farm or Grid Connection Study Areas, including VP surveys. Suitable habitat for this species is limited across the site. There is no potential for the proposed works to have negative impacts on this species. |
| **Kingfisher, Grey Wagtail & Dipper- secondary effects through habitat degradation**<br>*Inclusion Rationale*<br>No observations of Kingfisher were recorded within the construction works boundary or upstream of the M8 along the River Bride along the River Bride, in the Bird Atlas 2007-11 (Balmer *et al.*, 2013). Only four observations of Grey Wagtail were recorded during surveys. Only one record of an old Dipper nest 4.5 km downstream of the windfarm. On a precautionary basis, this potential impact was included for further assessment due to hydrological connectivity. | **Short-eared Owl**<br>*Exclusion Rationale*<br>No Short-eared Owls were observed during any of the field survey undertaken on the wind farm or grid connection study areas. There is no potential for the proposed works to have negative impacts on this species and further assessment can reasonably be excluded. |
| | **Peregrine:** *Disturbance Displacement*<br>*Exclusion Rationale*<br>Peregrine are sensitive to disturbance when nesting. No suitable habitat for nesting exists within the study area or surrounding lands (within 2km). Thus disturbance/displacement effects are considered to be insignificant. |
| **Hen Harrier** – Habitat Loss -Direct<br>*Pathway Rationale*<br>Removal of ground vegetation & trees, clear felling, turbine and infrastructure construction, and movement of soil during construction works. | **Hen Harrier** – Direct Mortality at Winter Roosts<br>*Exclusion Rationale*<br>Direct Mortality of Hen Harrier with the potential to undergo physical contact during felling or vegetation clearance including whilst in situ in Roost locations. However, no works occur in sufficient proximity to identified roosts for mortality to be reasonably foreseeable. Construction works will be conducted during daylight hours only. |

| Impacts Included<br>(Evaluated in the Impact Evaluation Table sections) | Impacts Excluded<br>(Justification at the end of the Impact Evaluation Table sections) |
|---|---|
| **Hen Harrier:** Disturbance/Displacement -Indirect<br>*Pathway Rationale*<br>Noise, visual intrusion (clear felling, vegetation clearance and movement of soil from operating machinery, construction/ trenching works. | **Hen Harrier** – Secondary habitat degradation through water quality degradation.<br>*Exclusion Rationale*<br>Whilst Hen Harrier may forage on wetland habitats such as bog or wet grassland, outside of direct habitat loss, there is little likelihood of secondary habitat degradation of sufficient magnitude to alter the carrying capacity of these habitats for Hen Harrier prey items. Likely significant effects can reasonably be excluded. |
| **Hen Harrier:** Direct Mortality at Nest Locations - Direct<br>*Pathway Rationale*<br>Removal of vegetation including trees, clear felling and movement of soil during construction works. | **Hen Harrier -** Reductions in Prey Item density from direct mortality<br>*Exclusion Rationale*<br>Construction works will be conducted predominantly during daylight hours only, with ground-based vegetation clearance outside the bird nesting season (March-August). Any inadvertent mortality of small mammals or birds is considered of negligible magnitude & unlikely to result in likely significant cross-factor effects on Hen Harrier, through a reduction in prey item density. |
| | **Merlin**: Loss of Habitat<br>*Exclusion Rationale*<br>Although winter foraging habitat is present within the study area, it is not considered significant based on availability of alternative habitat in the vicinity. Furthermore, the population is largely formed of wintering birds from elsewhere in Europe, Iceland, etc.<br>There will be some loss of potential nesting habitat (e.g. conifers), however, no breeding was recorded within the study area. Therefore, further impacts can be reasonably excluded. |
| | **Merlin:** Disturbance/Displacement<br>*Exclusion Rationale*<br>Although winter foraging habitat is present within the study area, it is not considered significant and construction works and activities are not considered sufficiently extensive to cause impacts that could disturb locally occurring Merlin and cause their displacement. |

| Impacts Included<br>(Evaluated in the Impact Evaluation Table sections) | Impacts Excluded<br>(Justification at the end of the Impact Evaluation Table sections) |
|---|---|
| | **Buzzard**: Disturbance/Displacement<br>*Exclusion Rationale*<br>Due to the suitability of habitats within the vicinity of the wind farm, effects are considered to be insignificant. As no vegetation removal will take place within the breeding season, effects due to disturbance/displacement are considered insignificant and are therefore excluded. |
| | **Peregrine:** Habitat Loss<br>*Exclusion Rationale*<br>Limited records suggest low usage by foraging birds and no breeding birds have been observed. For breeding birds, the distance to nearest known nests, most foraging within 2kmof nests. |
| | **Golden Plover:** Habitat Loss/ Disturbance/Displacement<br>*Exclusion Rationale*<br>Besides the limited loss of suitable foraging (e.g. improved grassland), no breeding Golden Plover have been identified within the study area. Furthermore, the study area is outside the currently known Irish breeding range. |
| | **Snipe:** Loss of Habitat<br>*Exclusion Rationale*<br>The habitats affected by the Construction of the CGEP and GCR are not generally favoured by Snipe. The impact of the construction works on Snipe usable habitat is insignificant. |
| | **Snipe:** Disturbance/Displacement<br>*Exclusion Rationale*<br>As the habitats affected by the Construction of the CGEP and GCR are not favoured by Snipe, it is unlikely the construction works will disturb or cause its displacement. As a result it is concluded that the construction works will have an insignificant effect on Snipe disturbance or displacement. |

**Table 8-80 List of Impacts included and excluded from the Impact Evaluation of TDR of the Construction Phase**

| Impacts Included<br>(Evaluated in the Impact Evaluation Table sections) | Impacts Excluded<br>(Justification at the end of the Impact Evaluation Table sections) |
|---|---|
| **During Construction** | |
| **General Birds**: Disturbance/Displacement<br>*Pathway Rationale*<br>Vegetations and clear felling is required to facilitate the TDR. | **General Birds** – Direct Mortality<br>*Exclusion Rationale*<br>Project design measure will avoid direct effects on birds as all clear felling of trees or scrub/ground clearance occurs outside of the nesting season (March – August). |
| **General Birds**: Habitat Loss<br>*Pathway Rationale*<br>Vegetation clearance including trees to facilitate the TDR. | **Hen Harrier** – Habitat Loss -Direct<br>*Exclusion Rationale*<br>Removal of vegetation including trees and compaction of natural habitats adjacent to roadways, at Node locations within 2km of nesting attempts is considered not to be significant given limited scale and given works will be outside breeding season. |
| | **Hen Harrier** – Direct Mortality at Winter Roosts<br>*Exclusion Rationale*<br>Direct Mortality of Hen Harrier with the potential to undergo physical contact during felling or vegetation clearance including whilst in situ in Roost locations. However, no works at Nodes occur in sufficient proximity to identified roosts for mortality to be reasonably foreseeable. Construction works will be conducted during daylight hours only. |
| | **Hen Harrier -** Disturbance/Displacement - Indirect<br>*Exclusion Rationale*<br>Noise, visual intrusion, vegetation clearance and movement of soil from works at Nodes in close proximity (2km) of nests is considered not to be significant given limited scale and given works will be outside breeding season. |
| | **Hen Harrier** – Secondary habitat degradation through water quality degradation.<br>*Exclusion Rationale*<br>Whilst Hen Harrier may forage on wetland habitats such as bog or wet grassland, outside of direct habitat loss, there is little likelihood of secondary habitat degradation of sufficient magnitude at TDR Nodes to alter the carrying capacity of these habitats for Hen Harrier prey items. Likely significant effects can reasonably be excluded. |

| Impacts Included<br>(Evaluated in the Impact Evaluation Table sections) | Impacts Excluded<br>(Justification at the end of the Impact Evaluation Table sections) |
|---|---|
| | **Hen Harrier -** Reductions in Prey Item density from Direct Mortality<br>*Exclusion Rationale*<br>Construction works will be conducted during daylight hours only, with ground-based vegetation clearance outside the bird nesting season (March-August). Any inadvertent mortality of small mammals or birds at TDR Node locations is considered of negligible magnitude & unlikely to result in likely significant cross-factor effects on Hen Harrier, through a reduction in prey item density. |
| | **Hen Harrier: Direct Mortality at Nest Locations**<br>*Exclusion Rationale*<br>Removal of vegetation including trees, vegetation clearance, placement of hard core and movement of soil during Node location works is considered unlikely to result in direct mortality. Harriers are considered highly unlikely to be nesting in such close proximity to roads as is the case at Node locations. Likely significant effects can reasonably be excluded. |

#### 8.5.2.3.2 Potential Direct Impacts

*CGEP and GCR*

No direct effects are likely during construction due to project design measures which will avoid direct effects (direct mortality, disturbance and displacement) on birds as all clear felling of trees or scrub/ground clearance occurs outside of the nesting season (March – August).

*Turbine Delivery Route*

No direct are likely effects during construction due to project design measures. All felling and clearing of vegetation will be carried out outside of the nesting season for birds.

#### 8.5.2.3.3 Potential Indirect Impacts

*CGEP and GCR*

*General Birds*

The pathways for indirect impacts on general bird species during construction have been identified as follows; habitat loss, disturbance and displacement, and secondary habitat degradation through a deterioration in water quality. The magnitude of suitable habitat loss relates to the area taken up by the development during construction, which includes permanent landtake from site infrastructure such as roads, turbine hard stands and permanent site facilities; this amounts to 38.44HA of permanent habitat loss, the majority of which is commercial forestry plantation (29.67Ha). Given the proposed 30-year lifetime of the CGEP development the impact resulting from habitat loss at construction stage for general birds is expected to be one of long-term duration. Taking into account the magnitude of habitat loss, and the extent of available habitat in the surrounding area and wider landscape, the impact significance is evaluated as **not significant.** The conversion of an additional 30.4 HA of mature forest around all turbines to low scrub / rank grassland will also potentially benefit some passerine species that prefer more open habitats e.g. stonechat, Lesser redpoll, dunnock etc. Open habitats are also preferred over mature forestry by foraging hen harrier and Kestrel.

With a proposed construction duration of 18-24 months, indirect disturbance and displacement effects on general birds are considered to be of short-term duration and of limited extent. The potential disturbance during the breeding season will be minimised as vegetation clearance and felling will be limited to the winter months. The impact magnitude due to disturbance during the construction is evaluated as low due to the extent of available habitat for general birds in the wider landscape. Due to the short-term duration and low magnitude of effects predicted, the impact magnitude of construction stage disturbance to birds is considered **not significant.**

Potential Impacts on river water quality and effects on birds during the Construction Phase are considered unlikely and **not significant**.

*Hen Harrier*

*Disturbance & Displacement*

Hen Harrier are identified as an important ecological feature with a high sensitivity rating at the CGEP site and wider study area. The proposed CGEP windfarm site has been subject to intensive breeding hen harrier survey to inform baseline usage, flight activity at turbines and breeding activity in the study area, including the site. Monthly vantage points survey effort was conducted over 4 years between 2016 and 2019 following best practise methods, SNH (2017). Breeding hen harrier surveys were also conducted during 2020. Additional surveys were also conducted and considered in this assessment around the Bottlehill landfill area (2005 – 2015). All previously used hen harrier nest sites recorded, as outlined in **Table 8.41,** are located at least 500M from proposed turbine construction areas. In more recent years (since 2016) nesting activity has been at least 800m from proposed turbines and since 2019 at least 1km. Given a distance of at least 500m from known breeding areas displacement and disturbance are unlikely. With the maturing forestry on the site the location of the development has become less attractive for nesting hen harriers in more recent years.

However, considering the high sensitivity of breeding hen harrier, potential for future usage (with forest clearance) of the site and distances to known nest sites; disturbance and displacement during the nesting period may still possibly occur. Risks of disturbance are considered low and of **medium** significance, in the absence of mitigation.

*Habitat Loss*

Permanent habitat loss associated with project infrastructure will remove an estimated 38.4ha of existing habitats. Of this area currently approximately 9.8HA is suitable hen harrier habitat (wet grassland, cleared forestry, pre thicket forestry and some scrub and heath remnants). 6.5ha of the total habitat loss will never be suitable hen harrier habitat (existing roads and improved farmland), while a further 22.1 HA (mature forestry) may become utilised in the future depending on forestry management cycles. Based on this a worst-case scenario of permanent hen harrier forage habitat loss is 31.95ha.
In addition to this permanent impact a further zone out to 92m around each turbine will be permanently cleared of mature plantation (post thicket) woodland during construction phase, as bat mitigation. This area extends to 30.4ha in total and would be expected to provide an possible alternative forage habitat, for hen harrier. The removal of mature forest (a poor forage habitat for hen harrier) will result in an open grassland/ scrub type habitat (suitable hen harrier forage habitat). In this regard this 30.4ha area will provide some potential replacement/ alternative forage habitat to other hen harrier forage habitat loss e.g. wet grassland habitats and pre thicket forestry favoured by hen harrier for foraging albeit with the presence of the turbines may be unattractive for hen harrier. This preferred forage habitat currently (2020) accounts for < 10HA.
In this regard if Hen harrier utilise the newly cleared areas then there would be a minimal forage habitat loss (31.95HA – 30.4HA) equal to a worst-case scenario = 1.55HA forage habitat loss.
However, given only c.a. 10HA is currently potential forage habitat on the site, there is a potential for net forage habitat gain for the next number of years at least, (30.4HA – 10HA) equal to an additional 20.4HA, provided hen harrier utilise this area given its closeness to wind turbines. It is noted that the 30.4HA close to turbines is unlikely to be preferred as forage habitat for hen harriers, given available research indicates displacement of foraging and flight behaviour close to wind turbines as reported in the literature (100m for foraging and 250m for flight - (Mike Madders & Whitfield, 2006; Pearce-Higgins et al., 2009; Whitfield & Madders, 2006). However, hen harrier will make some use of these areas, as they have been recorded using similar cleared areas at existing operational windfarms in forestry locations, (author observations). These "cleared" areas will have increased prey species in particular small mammals (voles and mice) compared to mature forestry.

In summary a worst case scenario is that forage habitat loss is minimal (-1.55ha) in the context of existing available habitat and potential alternative habitat, and also given the areas of habitat loss are well removed from known hen harrier nest areas and key sensitive locations i.e. 500m buffer around nest sites. A best-case scenario is that there will be additional forage habitat availability (20.4ha) albeit it may not be regularly used due to closeness of wind turbines, refer to indirect operation impacts to hen harrier (**Section 8.5.3.3.2**)..

It is important to also consider core forage habitat loss/ alteration for adult female hen harrier in particular within 2km around active nest sites. Hen Harrier habitat suitability and habitat change estimates are provided in **Table 8.81**.

**Table 8-81 Foraging habitat Suitability within 2km of nesting attempts A-M and estimate of habitat change.**

| Nest | Year | Suitable Habitat (ha) | Unsuitable Habitat (ha) | % of 2km core range suitable | Nest within 2km of turbines |
|---|---|---|---|---|---|
| Nest A | 2019 | 235 | 1021 | 18.7 | Yes |
| Nest B | 2019 | 490 | 766 | 39.0 | Yes |
| Nest C | 2018 | 267 | 989 | 21.3 | Yes |
| Nest D | 2017 | 226 | 1030 | 18.0 | No |
| Nest E | 2016 | 252 | 1004 | 20.1 | Yes |
| Nest F | 2015 | 287 | 969 | 22.9 | Yes |
| Nest G | 2015 | 268 | 988 | 21.3 | Yes |
| Nest H | 2015 | 238 | 1018 | 18.9 | Yes |
| Nest I | 2014 | 191 | 1065 | 15.2 | Yes |
| Nest J | 2014 | 245 | 1011 | 19.5 | Yes |
| Nest K | 2014 | 244 | 1012 | 19.4 | Yes |
| Nest L | 2014 | 419 | 837 | 33.4 | No |

| | | | | | |
|---|---|---|---|---|---|
| Nest M | 2014 | 365 | 891 | 29.1 | No |

Two km is considered the core foraging habitat range for female adult hen harrier (SNH, 2018, Irwin *et al.* ,2012) during the breeding season and hence this 2km is considered the realistic zone of influence of the development. In this regard 10 (of 13) nest sites in Table 8.72 are within 2km of turbines. Of these the highest recent counts of hen harrier nest sites (2019) is two territories. Given a worst case scenario estimate of forage habitat loss = 1.5HA for the total windfarm site, and assuming this 1.5HA is relevant to these 10 (including two 2019 nest sites); the maximum and worst case permanent hen harrier forage habitat loss (assuming mature forest has potential forage habitat at some stage) for each nest site ranges between 0.3% and 0.8%. If mature forest loss (22HA currently) is not considered as a forage habitat, then all nest sites would potentially gain forage habitat overall given a potential 30.4HA increase due to the new cleared forest buffer zones around each turbine. This assumes the open areas around the turbines will have some forage habitat value. It is important to note that the most sensitive 500m buffer around all recorded nest sites will not have turbines located, and all recent nest sites (2018 and 2019) are at least 800m from turbines.

Based on the extent of small scale hen harrier forage habitat loss (< 10HA of wet grassland etc), creation of 30.4HA alternative forage habitat due to permanent forest removal, maintenance of a minimum 500m buffer around each identified nest site, loss of <1% forage habitat/ nest site (worst case scenario)and the availability of other suitable forage habitats which will remain within the site boundary and environs; effects of habitat loss on Hen harrier (**high sensitivity**) are considered to be a of **medium** significance during the construction phase, in the complete absence of mitigation (including works within the bird breeding season).

*Goshawk*

*Disturbance & Displacement*

Goshawk are identified as an important ecological feature with a high sensitivity rating. Goshawk nesting is rare in Ireland and Goshawk may have nested in the vicinity of the wind farm survey area in 2017 and 2019. Thus, disturbance and displacement during the nesting period may occur and are considered to be a **medium** magnitude of impact. Given this species **high** sensitivity significance of effects could be short term **high**, in the absence of mitigation (including indirect disturbance associated with works within the bird breeding season).

*Habitat Loss*

Due to the extent of habitat loss and the availability of habitats which will remain within the site boundary, effects of habitat loss on Goshawk are considered to be a **low** magnitude of impact. Given this species **high** sensitivity significance of effects could be short term **Low**, in the absence of mitigation.

*Golden Plover*

*Direct Habitat Loss & Displacement*

The development footprint is dominated by conifer plantation, which does not provide suitable foraging, loafing or roosting habitat for the species. There is no potential for loss of significant habitat for this species given that flocks were only recorded on four occasions during wind farm VP surveys: flock size ranged from 9 – 40 individuals. Five bouts of Golden Plover activity were observed during VP watches on the grid connection; flock size ranged from 40 – 60 individuals.

No breeding or roosting sites were recorded within the study area and there is no evidence to suggest the windfarm site is of significance to wintering populations. Disturbance during construction is unlikely to discourage flight activity or foraging in the vicinity of the Proposed Development particularly given the low levels of activity recorded. Significant displacement effects are not anticipated. The magnitude of the effect is assessed as **negligible** with a **very low** significance.

Kestrel

*Disturbance/Displacement*

Suitable foraging and nesting habitats are present within the construction works boundary. Construction works will require the use of machinery and the removal of vegetation including trees. These works have the potential of causing negative effects on nesting birds and could cause nest failure. The effects of disturbance/displacement of foraging birds will be **medium** as alternative foraging habitat is available in

surrounding lands. Due to most of the habitat being relatively unsuitable for foraging kestrel within the proposed construction works and a slight risk of nest disturbance there will be **medium** impacts on Kestrel in the absence of mitigation. The receptor sensitivity and effect magnitude described above result in effects of **very low significance**.

*Habitat loss*

Clear-felling of conifer plantation will result in relatively small-scale loss of possible nesting habitat. Loss of suitable open foraging habitat will amount to c.a. 2.3 ha due to construction works associated with the proposed CGEP and GCR. This potential impact is considered to result in a **very low** significance to the local Kestrel population.

Merlin

*Disturbance Displacement*

Merlin are sensitive to disturbance when nesting. No breeding Merlin were recorded on the site and wider study area. Potential breeding impacts to possible breeding habitat – forestry edge, are limited and disturbance is considered very unlikely. Risk of disturbance and displacement to Merlin are considered to be **negligible**.

*Loss of Habitat*

Merlin typically nest on the ground in open areas of heather-covered bogs, although they will also nest in trees at the edge of such habitats. There will be no loss of suitable heather-covered bogs or net loss of suitable nesting trees during the construction of the windfarm. In upland areas, Merlin forage over moorland/heath, no suitable foraging habitat will be impacted by the proposed windfarm. Risk of loss of suitable habitat including foraging area for Merlin are considered to be **negligible**.

Peregrine

*Loss of Habitat/ Displacement*

No nesting habitats within the study area were identified. Due to the limited extent of foraging habitats within the vicinity of the CGEP there will be no significant loss of habitat for peregrine, and risk of loss of suitable habitat including foraging area are considered to be **negligible.**

Meadow Pipit & Skylark

*Loss of Habitat/ Disturbance/Displacement*

Meadow pipits use bogs, uplands, pasture and scrub. Skylark breed in cultivated areas, un-grazed grasslands and upland heaths. In the winter Skylark use stubble fields and grassland. Of these habitats scrub (WS1) and improved grassland (GA1) habitat is present within the study area, improved grassland has limited potential for nesting meadow pipit as it is dependent on the amount of vegetation coverage. A total of c.a. 2HA of suitable breeding habitat (scrub and wet grassland) will be permanently removed at various locations throughout the wind farm site. In the absence of mitigation during the construction phase localised impacts are considered to be **Low** given the relatively low numbers of these common passerine bird species at risk of temporary disturbance.

*Grid Connection and Turbine Delivery Route*

Construction and other works for the grid connection route and TDR will be carried out one sections at a time, thus works will be brief at these sections, reducing the impact of disturbance and displacement events. The majority of the construction works will take place in roadside verges, where habitats have a level of baseline disturbance due to the proximity to roads. Construction of substations, on the other hand, are located within conifer plantation and would not cause disturbance and displacement effects on Meadow Pipit and Skylark. Thus, significant effects are not anticipated. Potential brief **not significant** effects are anticipated.

The TDR works may lead to localised disturbance of breeding birds if vegetation clearance is conducted during the main breeding season (i.e. March to August). In the absence of mitigation during the construction phase localised impacts are considered to be **low** given a relatively low number of common passerine bird species

would be at risk of temporary disturbance. The significance of this is **very low** albeit mitigation is required to minimise disturbance risks in particular to breeding birds.

#### *8.5.2.4 Terrestrial Mammals (excluding bats)*

##### 8.5.2.4.1 Identification of impact/pathways evaluated and excluded

In this Section, the likely direct and indirect effects of the CGEP project, which includes Grid Connection and Turbine Delivery Route are identified and evaluated.

Following scoping, field studies and a review of the project design, a conceptual site model exercise was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) – Terrestrial Mammals (excluding bats). As a result of the exercise, some impacts were included and some were excluded. **Table 8-82** to **Table 8-83** below, list the impacts included and excluded for impact evaluation for each project element (Wind Farm and Grid Connection, Turbine Delivery Route and Replant Lands). Rationale for exclusion is also stated in the tables.

**Table 8-82: List of all Impacts included and excluded from the Impact Evaluation for the CGEP and CGEP Grid Connection Route.**

| Impacts Included (Evaluated in the Impact Evaluation Table sections) | Impacts Excluded |
|---|---|
| **During Construction** | |
| Otter: Disturbance/Displacement<br>*Pathway Rationale*<br>Noise, visual intrusion and movement of soil from operating machinery, construction/ trenching works near and at watercourses. | Irish Hare, Hedgehog, Irish stoat, Fallow Deer: Habitat Loss<br>*Exclusion Rationale*<br>In relation to the wind farm and grid connection route, permanent habitat loss is considered negligible in the context of available habitat for these species overall. |
| Mortality of Otter<br>*Pathway Rationale*<br>Potential mortality due to vehicular collision is considered unlikely as works will only be conducted predominantly during daylight hours, and due to vehicular speed restrictions within the development site. Potential mortality during vegetation clearance and felling is included for further evaluation however. | Otter – Loss of Habitat<br>*Exclusion Rationale*<br>Removal of vegetation and movement of soil from operating machinery, construction/ trenching works near and at watercourses. Impacts are unlikely as works are limited to smaller drains/ watercourses on the site where no evidence of otter was noted. |
| Mortality of Deer, Irish Hare, Irish Stoat, Hedgehog<br>*Pathway Rationale*<br>Potential mortality due to vehicular collision is considered unlikely as works will only be conducted predominantly during daylight hours, and due to vehicular speed restrictions within the development site. Potential mortality during vegetation clearance and felling is included for further evaluation however. | |
| Otter – Secondary habitat degradation<br>*Pathway Rationale.*<br>Operating Machinery, construction/ trenching works near and at watercourses causing water degradation from fuels and silt laden run-off. | |
| Badger: Habitat Loss<br>*Pathway Rationale*<br>Movement of soil, vegetation removal including clear felling and conversion of habitats into hardstanding or other unsuitable habitat. | |
| Badger: Disturbance/Displacement<br>*Pathway Rationale* | |

| | |
|---|---|
| Noise, visual intrusion and movement of soil from operating machinery, construction/ trenching works. | |
| Badger: Mortality<br>*Pathway Rationale*<br>Direct impact with operating Machinery, construction/ trenching works and accidental collision with vehicles. | |
| Red Squirrel: Habitat Loss<br>*Pathway Rationale*<br>Movement of soil, vegetation removal including clear felling and conversion of habitats into hardstanding/ other unsuitable habitat. | |
| Red Squirrel: Disturbance/Displacement<br>Pathway Rationale<br>Noise, visual intrusion by operating machinery, construction/ trenching works. | |
| Red squirrel: Mortality<br>Direct impact with operating Machinery, construction/ trenching works and accidental collision with vehicles. | |
| Pine Marten: Habitat Loss<br>*Pathway Rationale*<br>Movement of soil, vegetation removal including clear felling and conversion of habitats into hardstanding. | |
| Pine Marten: Mortality<br>*Pathway Rationale*<br>Direct impact with operating Machinery, construction/ trenching works and accidental collision with vehicles. | |
| Pine Marten: Disturbance/Displacement<br>Noise, visual intrusion by operating machinery, construction/ trenching works. | |

**Table 8-83 List of all Impacts included and excluded from the Impact Evaluation of TDR**

| Impacts Included<br>**(Evaluated in the Impact Evaluation Table sections)** | Impacts Excluded<br>**(Justification at the end of the Impact Evaluation Table sections)** |
|---|---|
| During Construction | |
| Badger, Pine Marten and Red Squirrel – Habitat Loss<br>*Pathway Rationale*<br>Suitable foraging and resting habitat will be cleared to facilitate the TDR. | Secondary Mortality of Terrestrial Mammals<br>*Exclusion Rationale*<br>Sources of mortality are restricted to accidental collision with vehicles. Turbine delivery will take place where practicable during daylight hours And will be at very low speeds (<20km/hour) avoiding significant mortality risk. |
| Badger, Pine Marten and Red Squirrel: Disturbance/Displacement<br>*Pathway Rationale*<br>Vegetations and clear felling is required to facilitate the TDR. | Otter – Habitat Loss<br>*Exclusion Rationale*<br>The habitats that will be impacted by vegetation clearance/felling are not suitable for Otter. |
| Badger, Pine Marten and Red Squirrel: Habitat Loss<br>*Pathway Rationale*<br>Proposed removal of three and scrub cover with could cause disturbance to Badger, Pine Marten and Red Squirrel. | Otter – Disturbance/Displacement<br>*Exclusion Rationale*<br>No evidence of Otter was recorded within the habitats to be impacted by the proposed works. A watercourse is present at Node 2.12, the watercourse passes under the road of the TDR. No evidence of Otter was recorded 150 metres upstream or down-stream of the Node location. Furthermore, the work proposed at this located is trimming the limbs of a European/hybrid Larch, this will have no impact on Otter. |
| | Hedgehog, Irish Stoat and Hare - Habitat Loss<br>*Exclusion Rationale*<br>Due to the nature of the proposed works and small amount of proposed habitat change the effects are considered neutral. |

#### 8.5.2.4.2 Potential Direct Impacts

*CGEP*

**Potential Direct impacts on Badger**

There is potential for direct impacts to Badger via mortality during construction stage within CGEP construction works area. Due to the suitability of habitats on site for Badger, the proximity of an outlier sett 60 metres from the construction works boundary, mortality may occur due to excavations of nearby soils with machinery. There is also potential for direct Badger mortality via collision with moving vehicles. Thus, there is potential for **negative / adverse effects** if not avoided or mitigated for. It is considered probable that any unmitigated impacts on Badger will have short term **slight** effects and are unlikely.

**Potential Direct impacts on Red Squirrel**

There is potential for direct impacts to Red Squirrel via mortality during construction stage within the CGEP construction works area. Due to the location of squirrel drays within the CGEP study area, mortality may occur due to felling of trees. Potential for localised mortailties may result if not avoided or mitigated for. The Irish population of Red Squirrel is currently in recovery and has a conservation status of Least Concern. While this impact could temporarily reduce the local population, it is considered that any unmitigated direct impacts on Red Squirrel will have **slight** effects of short-term duration.

**Potential Direct impacts on Pine Marten**

There is potential for direct impacts to Pine Marten via mortality during construction stage within CGEP construction works boundary. No Pine Marten resting places or evidence was recorded during surveys, however due to the high suitability of habitats on site, based on a precautionary principal Pine Marten are considered for potential impacts. There is potential for **negative / adverse effects** on Pine Marten if not avoided or mitigated for. The Irish population of Pine Marten is considered to be increasing and is therefore classified as being of least concern. It is considered that any unmitigated impacts on Pine Marten will have **slight** effects of short-term duration.

*Grid Connection*

**Potential Direct impacts on Badger, Red squirrel and Pine Marten**

There is potential for direct Badger, Red Squirrel and Pine Marten mortality via collision with moving vehicles during the CGEP grid connection construction. Direct effects via destruction of occupied resting places is considered unlikely as there are no records of resting places for Red Squirrel, Pine Marten or Badger within the roadside verge. Furthermore, there is limited suitable habitat within the footprint of the grid connection route. However, there is potential for direct impacts to Pine Marten, Badger and Red Squirrel via mortality during construction stage of substations related to the grid connection. No evidence of resting or breeding places of these species was recorded during mammal surveys within the footprint of the proposed substations however due to the high suitability of habitats within the substation footprint, based on a precautionary principal these species (Pine Marten, Badger, Red Squirrel) are considered for potential impacts. There is potential for **negative / adverse effects** on these species if not avoided or mitigated. Given however the temporary nature of the works, and as the works will be largely confined to existing roads and tracks the impact significance is evaluated as **slight** with a short-term duration.

*Turbine Delivery Route*

**Potential Direct impacts on Badger, Red squirrel and Pine Marten**

No mammal resting places were recorded during surveys of the TDR. Thus, it is unlikely that mammals will be directly impacted by the proposed works. Accounting for the passage of time from the initial ecological surveys to the proposed works there is potential for mammals to create resting/breeding places within suitable habitats. Given however the temporary nature of the works, and as the works will be largely confined to existing roads and tracks the impact significance is evaluated as **slight** with a short-term duration.

#### 8.5.2.4.3 Potential Indirect Impacts

*CGEP*

**Potential indirect impacts on Otter**

*Otter: disturbance/displacement:*

There is potential for indirect disturbance effects, associated with construction works at and near watercourses within the CGEP study area. The watercourses within the CGEP study comprise of minor 1st and 2nd order watercourses with seasonal increases and decreases in waterflow. These watercourses are unlikely to sustain routine otter activity, particularly breeding activity. However, they may be utilised by otter for commuting and refuge during times of flooding in the downstream catchment. Considering the relatively low suitability of the watercourses in the vicinity of the site for otter, potential disturbance effects resulting from the CGEP construction stage are expected to be **slight** and of short-term duration.

*Otter: secondary habitat degradation:*

There is potential for secondary habitat degradation in relation to otter habitat through water quality effects due to fuel/sediment laden run-off impacting habitat quality and prey availably for otter. Thus, **significant** effects at a local scale could arise due to construction works near and at watercourse crossings in the absence of mitigation measures for the protection of water quality during construction and monitoring of potential breeding sites that may establish before the project is constructed.

**Potential indirect impacts on Badger**

*Badger: Disturbance/Displacement:*

Badger activity was recorded within and around the construction works boundary. See **Figure 8.73** for all records of badger activity within the study area. No Badger setts were recorded within the construction works boundary, however a single outlier sett was recorded outside of the construction works boundary. Disturbance and displacement through the movement of machinery and other construction works would be short-term in duration. Considering all construction works will be carried out predominantly during daylight hours this significantly reduces the potential for disturbance/displacement impacts as Badger are nocturnal. The significance of effects are considered to be **imperceptible** at a local scale.

*Badger: Habitat Loss*

Suitable foraging habitats consisting of grassland, woodland and hedgerows were recorded within the CGEP and CGEP Grid Route study areas. Permanent land use change associated with the construction of the CGEP (access roads, turbine hardstanding, borrow pits and substations) will result in the loss of suitable foraging and resting habitat consisting of improved grassland (GA1), as well as woodland and scrub habitat (WD1, WD4, WS4/WS1, WS1).
In relation to the CGEP, permanent habitat loss resulting from land take associated with the CGEP is considered slight in the context of background trends, and available habitat within the construction works boundary and wider environs. Based on the presence of Badger activity recorded within the study area and the substantial extent of suitable alternative habitat, it is considered probable that any unmitigated impacts on Badger via habitat loss will have **slight,** short-term effects at a local scale.

**Potential indirect impacts on Red Squirrel**

Red Squirrel: Disturbance/Displacement

Red squirrel activity, including the presence of squirrel dreys were recorded within and around the CGEP construction works boundary. It is considered probable therefore that any unmitigated impacts e.g. site clearance works on Red Squirrel would have **moderate negative** effects of short-term duration at a local scale.

*Red Squirrel: Habitat Loss*

Suitable habitats, consisting of woodland and hedgerows were recorded within the proposed wind farm construction boundary. Permanent land use change associated with the construction of the CGEP (access roads, turbine hardstanding, borrow pits and substations) results in the loss of suitable foraging and resting habitat consisting of woodland and hedgerow habitat (WD1, WD4, WS2, WD4/WS1). Total permanent land use change of suitable habitat is estimated at 23.9ha. In relation to the CGEP, permanent loss of habitat for red squirrel is considered to be long-term and **moderate** at a local scale.

**Potential indirect impacts on Pine Marten**

Pine Marten: Disturbance/Displacement

Suitable Pine Marten habitat is widespread within the CGEP and CGEP GCR study area, including within the construction works boundary. Suitable habitats consisting of conifer plantation and broadleaved woodland were recorded within the proposed wind farm construction boundary. Although suitable habitat is present, no evidence of Pine Marten was recorded during survey. Due to the presence of suitable foraging and breeding habitat within the study area, it is considered probable that any unmitigated impacts on Pine Marten would have **moderate negative** effects at a local scale.

Pine Marten: Habitat Loss

No Pine Marten evidence was recorded within the wind farm boundary. However, there are suitable habitat within the construction boundary thus Pine Marten are considered to occur within the construction boundary Permanent land use change associated with the construction of the Wind Farm (access roads, turbine hardstanding, Borrow Pits and substations results in the loss of suitable foraging and resting habitats. Total permanent land use changes of suitable woodland (WD1, WD4, WS2, WD4/WS1) is 29.67HA.
In relation to the wind farm, permanent habitat loss is considered to have **moderate negative** effects at a local scale.

*Grid Connection Route*

**Potential indirect impacts on Otter**

*Otter: disturbance/displacement*

No Otter holts or resting places have been recorded within the CGEP Grid Connection Route study area. However, these is suitable Otter forage and commuting habitat within the study area at all watercourse crossings crossed by the grid route. Considering the suitability of the watercourses for otter and lack of evidence noted in surveys, potential disturbance effects resulting from the CGEP Grid Connection construction stage are not expected and if they arise will be temporary and of **moderate** significance.

*Otter: Loss of habitat*

As works will avoid impacts to riparian and instream areas potential for loss of habitat, including habitat fragmentation, associated with construction works at and near watercourses are considered **Not Significant**.

*Otter: secondary habitat degradation*

There is potential for secondary habitat degradation in relation to otter habitat through water degradation due to fuel/sediment laden run-off impacting habitat and prey availably for otter. Thus, **significant** short-term effects could occur due to construction of works near and at watercourse crossings, in the absence of mitigation measures for the protection of water quality.

**Potential indirect impacts on Badger**

*Badger: Disturbance/ Displacement*

No signs of badger activity or badger setts were recorded within the construction works boundary of the grid connection route or substations. Disturbance from construction works may occur during clear felling within the substation footprints. Disturbance and displacement effects through the movement of machinery and other construction works would be short-term in duration and considered unlikely. It is considered that potential impacts on Badger will have **imperceptible** effects of a short-term duration.

*Badger: Habitat Loss*

Suitable habitats, consisting of grassland, woodland and hedgerows were recorded within the grid connection route, however no evidence of Badger activity was recorded along the route. As the proposed CGEP grid connection route will be located within the existing roads and forestry tracks, the extent of suitable habitat lost through permanent land use change will be of negligible extent. It is considered that any impacts on Badger via habitat loss will have **imperceptible** effects due the scale of habitat loss and availability of suitable habitat within the wider environs.

**Potential indirect impacts on Red Squirrel**

*Red Squirrel: Disturbance/Displacement*

A single Red Squirrel was recorded within the grid connection route study area. Suitable foraging habitats, consisting of woodland and hedgerows were recorded within the grid connection and substations construction works boundary. Disturbance from construction works may occur during clear felling within the substation footprints and construction works through noise and visual intrusion. It is considered probable that impacts on Red Squirrel will have **moderate** and short-term effects as there is some suitable habitat for breeding and foraging red squirrel present along the Grid connection Route that will be disturbed.

*Red Squirrel: Habitat Loss*

Suitable foraging habitats, consisting of woodland and hedgerows were recorded within the grid connection and substations construction works boundary As the proposed CGEP grid connection route will be located within the existing roads and forestry tracks, the extent of suitable habitat lost through permanent land use change will be of negligible extent. Based on presence of Red Squirrel activity recorded within the study area and the extent of suitable habitat permanent habitat loss is considered **imperceptible** at a local scale.

**Potential indirect impacts on Pine Marten**

*Pine Marten: Habitat Loss*

No Pine Marten evidence was recorded with the Grid Connection Route study area. However, there are suitable habitats were recorded, thus Pine Marten are considered to be present. As the proposed CGEP grid connection route will be located within the existing roads and forestry tracks, the extent of suitable habitat lost through permanent land use change will be of negligible extent. Seeing as there will be no significant change to the habitats within and surrounding the proposed Grid Connection Route, it is concluded that no significant change to baseline conditions will occur. Therefore, the significance of the effects are considered to be **imperceptible.**

Pine Marten: Disturbance/Displacement

Due to the widespread availability of suitable habitat in the lands surrounding the Grid Connection Route study area, and due to the temporary duration of potential disturbance and displacement effects, it is anticipated that impacts on Pine Marten will be **imperceptible**.

*TDR*
Indirect potential impacts on Badger/Pine Marten and Red Squirrel are considered **imperceptible** as the works are brief in duration, and of very limited extent.

#### *8.5.2.5 Bats*

##### 8.5.2.5.1 Potential Impacts

*CGEP*

*Foraging and commuting bats*

Site clearance works will involve the removal of conifers and other woody vegetation in a radius of 92m around each turbine, and in a narrow linear strip along new access tracks. This will significantly change the habitat in many areas, particularly those in closed-canopy woodland. This may decrease the suitability of the habitats for bats in some areas (e.g. by creating open space where there was previously a habitat edge), and may increase habitat suitability in other areas (e.g. by creating edge habitats where they did not previously exist). However, the overall availability of edge habitat in the area will not change significantly, it is expected that bats will adapt relatively quickly to the changes in their habitat. The construction of the grid connection will not require significant vegetation removal. Therefore, habitat loss during site clearance works will not cause any significant adverse effects on foraging or commuting bats.

*Bat Roosts*

None of the buildings that contain bat roosts will be modified during construction works. All are located more than 250 m from proposed turbine locations, so there is no risk of indirect impacts via noise or vibration. The main commuting routes to and from the roosts will not be modified. No buildings, mature trees or bridges will be significantly modified during the construction of the grid connection. Therefore, there will be no significant impact on any bat roosts during construction works.

*Grid Connection Route*
No significant effects are expected to bats, as works avoid possible roost features. No evidence of bat roosts were recorded during surveys conducted in 2018 and during a site review (2020) of possible structures (e.g. bridges) that will be avoided by the grid route.

*TDR*
No significant effects are expected to bats, as works avoid possible roost features.

### *8.5.2.6 Other Species*

#### 8.5.2.6.1 Potential Direct Impacts

**Marsh Fritillary**

*CGEP*

There is no potential for direct effects resulting from habitat loss as there is no suitable habitat for Marsh Fritillary in or adjacent (50m) to the proposed CGEP infrastructure. There is no potential for mortality of in-flight adults or in-situ larvae, as no suitable habitat or Marsh Fritillary populations were recorded within the CGEP study area.

*Grid connection Route*

There is no potential for direct effects resulting from habitat loss as there is no suitable habitat for Marsh Fritillary in or adjacent (50m) to the proposed CGEP Grid Connection route. There is no potential for mortality of in-flight adults or in-situ larvae, as no suitable habitat or Marsh Fritillary populations were recorded within the CGEP Grid Connection Route study area.

*Turbine Delivery Route*

No Marsh Fritillary larvae or adults were identified during surveys of the proposed Turbine Delivery Route. Several Devil's Bit Scabious plants were noted at a single node location; however, these were not supporting any Marsh Fritillary larvae. Given the absence of suitable habitat within any oversail or load bearing areas along the Turbine Delivery Route, there is no potential for significant effects on Marsh Fritillary during construction.

**Amphibians and Reptiles**

*CGEP and Grid connection Route*

It is likely that the Construction Works will include some land-use change of suitable foraging or breeding habitat for Amphibians and Reptiles. The extent of permanent land-use change as a result of the construction is evaluated as negligible in the context of available habitat and low occurrence of species as described herein. The spatial extent of any loss of habitat for amphibians and reptiles will be limited to works within the construction boundary comprising permanent features, and therefore effects on amphibians or reptiles resulting from a loss of habitat impacts are evaluated as a long term, negative and **imperceptible effect**. The permanent removal of 30.4 HA of mature forestry around turbines and creation of more open semi natural habitats will provide some replacement habitat for these groups in the mid to longer term

There is potential also for direct mortality of amphibians and reptiles during construction operations e.g tracking of machinery, earthworks and site preparation etc. The effects of mortality on Common Frog and Smooth Newt are potentially greater during the breeding season (frogs: January-March and newts: March-May) when these species congregate at breeding sites such as ponds and ditches.

*Turbine Delivery Route*

Considering the extent of permanent land use change associated with construction stage works on the TDR is negligible in the context of available habitat, and that no reptiles or amphibians were recorded within the TDR survey area, construction stage impacts are evaluated as neutral.

#### 8.5.2.6.2 Potential Indirect Impacts

**Marsh Fritillary**

*CGEP and Grid Connection Route*

No potential for indirect disturbance or displacement effects during the construction of the grid connection activities, as no suitable habitat or Marsh Fritillary populations were recorded within or adjacent (50m) to the afforestation lands. No adverse effects are identified.

*Turbine Delivery Route*

No potential for indirect disturbance or displacement effects during the construction of the grid connection activities, as no suitable habitat or Marsh Fritillary populations were recorded within the oversail and load bearing areas of the TDR. No adverse effects are identified.

**Amphibians and Reptiles**

*CGEP and Grid Connection Route*

No likely indirect negative effects on amphibians or reptiles are foreseen.

*Turbine Delivery Route*

No likely indirect negative effects on amphibians or reptiles are foreseen.

### *8.5.2.7 Fisheries and Aquatic Ecology*

#### 8.5.2.7.1 Potential Direct Impacts

*CGEP and Grid Connection Route*

The construction phase of the CGEP and GCR involves works and activities that potentially impact the aquatic environment. These have been described in **Chapter 10 Hydrology** and consist of instream works associated with the construction of one culverted water body crossing and the replacement of an existing culvert for the proposed CGEP; and the replacement of one culvert associated with the GCR. Furthermore, although not involving instream works, other river water bodies and forestry drains will need to be crossed for the construction of the CGEP and the GCR. Three river water bodies and seven drains will be crossed with the use of standard trenching on existing surface (i.e. public road) and three river water bodies will be crossed for the GCR with Horizontal Directional Drilling. These works and activities involve water abstraction, excavation and movement of soils and machinery, and the use of hydrocarbons and cement-based compounds, which have the potential to cause:

- Changes to flow regime

Aquatic species are likely to be present in the river water bodies at instream construction works locations. Any change in the water body morphology which affects channel flow regimes can result in cross factor effects on aquatic ecological communities. Aquatic species are reliant on instream habitat heterogeneity (riffle/glide/pool structure); along with the availability of peak flow flushes (flood/spate); the provision of flows for upstream/downstream migration and the avoidance of barriers to passage; and avoidance of channel constriction during low flow.

As described in **Chapter 3**, instream works will be undertaken at three individual crossing points. As the mentioned structures are permanent, potential changes to flow regime at the river water bodies at these locations will also be permanent. Considering the river water bodies subjected to these construction activities have fish populations at least downstream and that due to their size and location are susceptible to highly variable flows, the installation/replacement of these instream structures is considered to be of **Short- term**

**Moderate significance** with regards to potential changes in the flow regime. All the other works associated with river or drain crossings that do not require instream works are associated with potential impacts considered of **Slight significance** with regards to changes in the flow regime.

- Disturbance / Displacement of Fish and Aquatic Species

Instream works and machinery operation within or in close proximity to any water body has the potential to directly disturb or displace salmonid fish and aquatic species within fish-bearing streams. Fish are likely to mobilise outside of their territories due to human disturbance but will return once the disturbance effect diminishes (i.e. brief temporary effect). Aquatic invertebrates are less sensitive to disturbance and displacement arising from human activity and are scoped out from evaluation of disturbance/displacement effects. The extent of disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the direct footprint of any instream works.

Fish populations occupying the river water bodies affected by the instream construction activities will, therefore, be displaced for the duration of the works. As these construction works will be of short duration (< 2 years), the significance of the impacts cause by the displacement of fish and aquatic species as a result of the instream construction activities is considered **Moderate**.

The river and drain crossings on the site involve instream works (e.g. trenching and HDD). These methods are associated with disturbance of freshwater species through noise and vibration. However, considering the localised nature and short-term duration of the works, the significance of such potential impacts is considered to be **Slight**.

- Riparian habitat degradation

The riparian corridor along a watercourse relates to the interface between the aquatic habitat, the bankside vegetation and terrestrial environment. An intact, semi-natural riparian zone has significant beneficial services in the protection of instream aquatic habitat quality, food/nutrient and sediment contributions, and temperature regulation. Existing riparian habitat quality within the vicinity of the instream works locations is subject to afforestation and agricultural management, including clearance works, drainage maintenance and channelization works.

The removal of, or damage to, riparian vegetation during instream works or excavation/ground clearance works in close proximity to any watercourse has the potential to impact on the quality of riparian habitats which in turn can affect watercourse morphology, shading, bank stability, and nutrient and sediment loading and result in indirect effects on aquatic species. The context of riparian habitat quality in the affected locations is considered, with regard to existing intensive forestry practices affecting baseline conditions which has resulted in degraded cover due to bank side clearance works at these locations. Riparian habitat impacts, although reversible and temporary, may induce long lasting effects in sensitive species if a long-term recovery is needed. Therefore, based on the localised scale of works impact magnitude is considered **Slight / Moderate**.

With regards to the river/drain crossings that do not involve instream works, no riparian habitat degradation is anticipated and their potential impacts are considered **Imperceptible** and excluded from further assessment.

*TDR*

As per the TDR Ecological Appraisal (**Appendix 8-C),** the proposed TDR does not involve instream works or works in the vicinity of water bodies, no direct impacts to the aquatic environment are anticipated.

#### 8.5.2.7.2 Potential Indirect Impacts

*CGEP and Grid Connection Route*

Water bodies located downstream of the proposed CGEP Development and their associated habitats and protected species are sensitive to potential indirect impacts resulting from the proposed construction works and activities. The present Section describes the potential indirect impacts to the aquatic environment.

- Potential to affect the water quality status of river water bodies located downstream (e.g. increased siltation, contamination)

Aquatic habitat relates to the instream features supporting aquatic biodiversity (bed substrate, morphology, water quality, etc.). Water bodies are highly sensitive to change, containing sensitive aquatic ecological receptors including salmonids, lamprey species, and a diverse macroinvertebrate community. The protected and sensitive species Freshwater Pearl Mussel, although not identified within the proposed CGEP and GCR

boundaries (**Section 8.3.7.5**), has registered populations downstream the construction area, at the Blackwater (Munster)_190 river water body (IE_SW_18B022300) (NPWS, 2012).

Erosion and deposition are natural processes in catchments, varying naturally throughout the year. However, additional sediment contributions entering the river water bodies, such as from construction works in, adjacent to or upstream of individual water bodies, can have negative implications for fish and invertebrates due to physical damage and reduced feeding/foraging, as well as negative impacts due to compaction of spawning gravels by sediment causing mortality impacts for salmonid eggs (affecting recruitment) and interfering with invertebrate life stages within gravel substrates (interstitial spaces). These impacts may be mobilised downstream and affect river reaches at a distance from the physical works.

The construction of the new culvert and the replacement of the two culverts will involve instream works that will require direct excavation of the banks and bed of the water bodies, which can change the physical character of the river and has the potential to degrade the quality of the baseline habitat which supports the structure, function and diversity of aquatic species. Trench and joint bay excavation works, minor works to bridge/culvert parapet walls and directional drilling works have potential to cause effects to water quality status of hydrologically connected river water bodies.

Even though the duration of the construction phase is limited (18 months to two years), the magnitude and consequences of the potential impacts of the proposed instream works, prior to mitigation, are considered to be **Significant**. For the river crossings not involving instream works, the potential impacts significance is considered **Moderate**.

In addition, water quality of the receiving river water bodies can also be affected by contamination by fuels, oils or cementitious material accidentally leaked into the aquatic environment. This type of contamination has the potential to lead to direct toxicity events, or sub-lethal degradation of aquatic habitat quality. Although the potential impacts associated with such contaminations are of high severity, the low likelihood for their occurrence makes them of **Slight** significance.

- Spread of invasive aquatic species

Invasive aquatic species include non-native, invasive flora and also fish and invertebrate fauna. Aquatic invasive species may be introduced to unaffected catchments or spread within infected watercourses during the course of instream works or transported via excavated material by site machinery.

Aquatic invasive species have the potential for significant ecosystem disturbance, disrupting the predator/prey balance or causing habitat disruption within aquatic systems. The spread of aquatic invasive species is not restricted in extent to the footprint of construction/instream works, but can be transported both upstream (mobile species and 3rd party transport) and downstream (hydrological transport) within a watercourse, potentially extending throughout the catchment.

Non-native, invasive species potentially affecting the aquatic environment can also include terrestrial species which compromise bank integrity, riparian structural diversity and riparian invertebrate production contributing to habitat diversity and feeding inputs within the aquatic system.

Himalayan balsam was recorded as widespread and abundant along both banks of channel at electrofishing site D2 in previous aquatic surveys (before the 2020 surveys detailed). This site is also the selected location for the replacement of an existing stone culvert with an RC box culvert, associated with the construction phase of the GCR. This construction activity carries a higher potential of spreading this already established invasive species and affect downstream water bodies. This potential impact of the spread of invasive species is, therefore, considered **Significant**.

*Turbine Delivery Route*

An indirect hydrological connection to works on the TDR is identified at Nodes 2.1, 2.5, 2.7, 2.8, 2.9, 2.10, 2.12and 2.13. Given the close proximity to nodes 2.1, 2.3, and 2.7, the nature of works in these areas, and the remote hydrological link; there is a potential effect of sediment input to occur. Based on the nature and scale of works impacts are evaluated as being of **imperceptible significance**.

## 8.5.3 Potential Operational Phase Impacts

### *8.5.3.1 Designated Nature Conservation Sites*

#### 8.5.3.1.1 Potential Direct Impacts

*CGEP and GCR*

As there is no overlap of the proposed CGEP project construction area with any designated nature conservation sites, there is no potential for direct impacts during the operational phases of the CGEP development.

*TDR*

No adverse effects will arise during the operational phase to designated sites as the operational windfarm is not located within a designated site.

#### 8.5.3.1.2 Potential Indirect Impacts

*CGEP and Grid Connection Route*

Given the low intensity of proposed maintenance works during the operational phase of the CGEP Development, no significant indirect operational stage impacts on European Sites and National Nature Conservation sites are predicted. Scheduled services will typically occur twice a year, and the operation of the wind turbines will be monitored remotely by a caretaker who will oversee the day to day running of the proposed wind farm. Large component works will not be expected to impact distant designated sites given design mitigation to control possible localised pollutant runoff. Taking into account the above, potential operational stage impacts on designated sites are evaluated as being of **imperceptible significance.**

*TDR*

No adverse indirect impacts are expected to arise during the operational phase to designated sites. If large components are required for delivery/ maintenance impacts would be expected to be, in a worst case scenario, similar to construction phase i.e. based on the nature and scale of works impacts are evaluated as being of **imperceptible significance**.

### *8.5.3.2 Habitats and Flora*

In this Section, the likely direct and indirect effects on habitats and flora during the operational phase of the CGEP development, which includes Grid Connection, Turbine Delivery Route, and Replant lands are identified and evaluated.

Following scoping, field studies and a review of the project design, a conceptual site model exercise (**Table 8-84**) was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) − Habitats and Flora. As a result of the exercise, some impacts were included and some were excluded.

**Table 8-84 List of Impacts included and excluded from the Impact Evaluation for the CGEP and GCR Operation Phase.**

| Impacts Included<br>**(Evaluated in the Impact Evaluation Sections)** | Impacts Excluded<br>**(Justification for exclusion provided here)** |
|---|---|
| **During Operation** | |
| Introduction or spread of invasive species<br><br>*Pathway Rationale*<br><br>Infestations of High and Medium Impact Invasive species occur within both the CGEP Grid Connection and Wind Farm study area. Maintenance activities during operation have the potential to introduce new infestations to the development site and/or spread existing infestations. | Direct loss of Flora Protection Order species<br><br>*Exclusion Rationale*<br><br>No FPO species were recorded within the development boundary |
| | Landscape level Habitat fragmentation<br><br>*Exclusion Rationale*<br><br>There will be no additional loss of habitat during the operational phase of the proposed development. |
| | Reduction in Terrestrial Habitats<br><br>*Exclusion Rationale*<br><br>As the operational phase procedures such as turbine maintenance will not involve additional landtake and will be limited to permanent features such as vehicular and personnel access on site roads, substations, hardstand areas and turbines, there will be no direct loss of habitat. |
| | Habitat degradation<br><br>*Pathway Rationale*<br>The potential for indirect effects on habitats resulting from operation stage impacts is not likely and excluded in the impact evaluation. |

#### 8.5.3.2.1 Potential Direct Impacts

*CGEP*

Potential impacts during the operational stage of the proposed development are expected to be of limited extent and magnitude. Temporary landtake resulting from the construction stage operations e.g. excavations, land clearance and temporary access, passing bays and turning heads will be subject to re-colonization by vegetation with a resultant limited but positive impact on habitats and flora. As the operational phase procedures such as turbine maintenance will not involve additional landtake and will be limited to permanent features such as vehicular and personnel access on site roads, substation, hardstand areas and turbines no direct habitat loss is expected.

*Grid Connection Route*

Potential operational stage impacts associated with the CGEP Grid Connection are expected to be minimal. As with the windfarm, following construction of the grid, which is largely confined to the public road, there will be no additional land take during the operational stage. Maintenance of the grid connection is envisaged to involve minor maintenance with any works limited to existing built surfaces. Taking into account the absence of additional landtake during the operational stage of the grid connection, cumulative impacts are assessed as being neutral in character, of negligible extent, and having an imperceptible magnitude. Therefore, operational stage effects associated with the grid connection are assessed as **not significant**.

*Turbine Delivery Route*

As with the operational stage of the wind farm and the grid connection there will be no additional land take associated with the turbine delivery route during the operational stage of the CGEP Project. Therefore, operational stage effects associated with the TDR are assessed as being not significant.

#### 8.5.3.2.2 Potential Indirect Impacts

*CGEP*

No indirect impacts on habitats and flora are expected during the operational stage of the proposed development. Possible impacts such as management of vegetation growth are expected to be of limited extent and magnitude and local to infrastructure only. Operational stage procedures will be limited to servicing of the turbines which is expected to occur twice yearly, and routine maintenance by a site caretaker. Seeing as maintenance works will not involve any permanent disturbance to habitats, with maintenance activities occurring predominantly within the extent of existing CGEP infrastructure i.e site roads, hardstands and substations the impacts are evaluated as being temporary in character, and of **imperceptible** significance in terms of impact on habitats and flora within the development. The duration of the operational stage activities will last the planning lifetime of the CGEP which is expected to last 30 years. Considering the above, potential indirect impacts relating to the operational stage procedures of the windfarm are evaluated as **imperceptible**.

*Grid Connection Route*

The potential for indirect impacts during the operational stage of the CGEP Grid Connection is limited to any effects which may arise during due to minor maintenance on the grid connection. Seeing as the grid connection is for the most part limited to the public paved road there is no potential for indirect impacts on terrestrial habitats other than the built surfaces within which the grid connection is located.

Following construction of the grid, which is largely confined to the public road, there will only be a requirement for minor maintenance with any works limited to existing built surfaces. Taking into account the absence of additional land take during the operational stage of the grid connection, cumulative impacts are assessed as being neutral in character, of negligible extent, and having an **imperceptible** magnitude. Therefore, operational stage effects associated with the grid connection are assessed as not significant.

*Turbine Delivery Route*

No potential indirect impacts on habitats and flora resulting from the TDR are expected during the operational phase of the CGEP project, as there will be no additional works required on the route subsequent to the turbines being delivered to site during the construction phase of the development. Any replacements e.g. blades will not require additional works to those highlighted in the construction phase for the TDR.

### *8.5.3.3 Avifauna*

#### 8.5.3.3.1 Potential Direct Impacts

CGEP

Studies of operational impacts of wind farms (Pearce-Higgins, *et al*., 2009) have shown that certain species do exhibit levels of turbine avoidance during operational phases which may be extrapolated to reductions in breeding bird densities; however this may not be as significant as previously thought, certainly in comparison to impacts during construction (Pearce-Higgins *et al*., 2012). It seems that there is little evidence for consistent post-construction population declines in any species, suggesting for the first time that wind farm construction can have greater impacts on birds than wind farm operation; this is supported in the literature (Devereux, Denny & Whittingham, 2008). A study on the effects of wind turbines on the distribution of wintering farmland birds (Devereux, Denny & Whittingham, 2008) did not find any consistent patterns of turbine avoidance across the species groups studied (Corvids, seed-eaters, gamebirds and Skylark).

The primary causes of direct impact on birds during the operational phase of a development is Collision Risk.

Not all bird species are equally susceptible to collision, and some species suffer proportionately high levels of collision mortality (Drewitt & Langston, 2008). Morphology, physical flight characteristics and differences in vision are all influencing factors. Martin and Shaw (2010), suggest that it is the characteristics of the section of a birds visual field that projects forward and hence 'looks' that are the key factors. In some species the vertical extent of the forward binocular vision is reduced and therefore the bird is rendered blind if, whilst in the process of flying, it undertakes behaviour such as the detection of conspecifics, remote food sources etc. (Martin, 2011; Martin & Shawn, 2010). Other species have reduced fovea, are emmetropic (default focus is distant) or may contain blind spots in their field of vision (as an evolutionary trait) which may cause susceptibility to collision. Flight height or the flight heights which birds habitually use along either migration or local flight paths is also an influencing factor. Relative size and high wing loading (or low manoeuvrability) are influencing factors as larger birds with poor manoeuvrability are generally perceived as at greater risk of collision with structures (see Brown *et al.*, 1992, quoted in Drewitt and Langston, 2006). Various species therefore exhibit different morphological and behavioural attributes which may contribute to collision risk. Recent studies show that modern, larger multi-MW turbines show comparable fatality estimates with older generation models and expected increases in fatalities due to increases in rotor surface are not as expected, possibly due to increased altitude, increased distance between turbines and slower rotation speeds (Krijgsveld, *et al*., 2009).

For the following appraisal, as set out in **Section 8.3.3**, a potential turbine rotor envelope of 20m-200m is appraised. Aviation lighting has also been considered in the appraisal.

For breeding hen harrier an important ecological feature of the site a detailed collision risk assessment (**Appendix 8-J**) was conducted which followed methods detailed Band *et al.* (2007) and Scottish Natural Heritage (SNH, 2000), with supporting information provided by Scottish Natural Heritage (SNH, 2018) was conducted. This was based on four full breeding seasons (6 months/ season) of flight records recorded during vantage point flightline surveys (2016 – 2019 inclusive) which followed best practise in terms of survey effort and methodology (SNH 2017).
A list of Impacts included and excluded from the Impact Evaluation for the CGEP and GCR Operation Phase on important bird receptors are outlined below in **Table 8-85**.

**Table 8-85: List of Impacts included and excluded from the Impact Evaluation for the CGEP and GCR Operation Phase.**

| Impacts Included<br>**(Evaluated in the Impact Evaluation Table sections)** | Impacts Excluded<br>**(Justification at the end of the Impact Evaluation Table sections)** |
|---|---|
| **During Operation Phase** | |
| **Birds of Prey:** Direct Mortality<br>*Pathway Rationale*<br>Direct collision with moving turbine blades. | **General Birds:** Habitat Loss<br>*Exclusion Rationale*<br>Habitat loss during operation stage will consist of clear felling of trees or trimming of trees around the turbine base. These works will be conducted outside of the bird nesting season, thus effects of birds are considered insignificant. |
| | **General Birds**: Secondary habitat degradation through water quality degradation.<br>*Exclusion Rationale*<br>No earth disturbance works will take place near watercourses. All refuelling will take place on hardstanding and in accordance with best practice guidelines. |
| | **General Birds:** Disturbance/Displacement<br>*Exclusion Rationale*<br>There is little scientific evidence consistently demonstrating significant impacts on bird populations during windfarm operation phase. Noise and visual disturbance for operational wind turbines seem to not affect breeding bird densities. |
| | **Woodcock**<br>*Exclusion Rationale*<br>Only one record of woodcock was recorded during the survey. There is no evidence to suggest that the site is of significance to this species. |

Based on impact identified (collision risk) **Table 8-86** below details an assessment of impacts for important bird receptors on the site.

**Table 8-86: Direct Impact assessment matrix for key avifauna receptors during operation**

| Key Receptor (Sensitivity) | | Operational Direct Impact Character | Significance without Mitigation |
|---|---|---|---|
| | Hen Harrier (High) | A collision risk analysis was conducted for hen harrier, **Appendix 8-J**. This was based on the extensive 4 years of flightline data collected during the breeding season. A total estimate of 11,610 seconds flight time was recorded within the predicted worst-case rotor envelope (20 -200m), *actual estimated at (30 – 169m)*.<br><br>The model indicates an overall risk of Hen Harriers colliding with the rotors of 0.0055 birds/season. This equates to approximately one Hen Harrier collision every 180 years.<br><br>Despite this very low estimate and given the significance of the local breeding Hen Harrier population (c.a. 1% national population), a precautionary approach is advised as the collision risk model provides an estimate only of collision and it is still possible that hen harrier collisions could arise. | Based on the collision risk assessment model and professional judgement, including consideration of available information of recorded hen harrier collisions, typical flight patterns of hen harrier (below the lowest level of the rotar swept area), the expected magnitude of effect of collision is Low and overall significance is therefore **low**.<br>Given turbines are located at least 500m from identified nest areas the increased risk to male hen harrier during male display periods and to fledglings during dispersal from the nest is also considered in this assessment. |
| Birds of Prey | Buzzard (Low) | **Collision Risk:**<br>A total of 82,106 seconds or 39.8% of all flight activity was within the predicted rotor envelope (30-169). Common Buzzard has been recorded as fatalities within the European Context with 27 recorded in a review of 46 wind farms up to 2004 (Hotker, Thompson & Jeromin, 2006). However, this number is low in relation to the estimated European population of up to one million pairs (Mebs & Schmidt, 2006) and best available knowledge suggests mortality due to wind farms is not sufficient to cause significant population declines (Hotker, Thompson & Jeromin, 2006). | Probability of Impact **Low**, based on recorded flight activity, published best scientific knowledge and results of collision risk modelling**,** Magnitude assessed as **negligible** (0-2% of local population annually is insufficient to cause population decline), overall significance appraised as **low.** |
| | Goshawk | **Collision Risk:**<br>A total of 996 seconds of all flight activity was within the predicted rotor envelope. Possible but unconfirmed as having bred within the study area or wider hinterland. | **Collision:** The risk of collision is assessed as **low** as there were only 15 observation of this species recorded throughout the entire monitoring period**.** |
| | Kestrel (Low) | **Collision Risk:**<br>100% of recorded flight activity was below the predicted rotor envelope. Low densities on site, possibly due to competition with increasing population of Common Buzzard. Has been recorded as fatalities in Europe (Hotker, Thompson & Jeromin, 2006) but collision risk at subject site predicted to be lower | The expected magnitude of effect of collision is **low** and overall significance is therefore **low**. |

| | | | |
|---|---|---|---|
| | | due to increased height of predicted rotor envelope in relation to commonest hunting technique of hovering at 10-40m. | |
| | Merlin (High) | **Collision:** Merlin mainly take prey from a perch, on the ground or in low flight (Gensbol, 2008). Wintering birds have been shown to employ low flight attacks for over 64% of total hunts (Dickson, 1996). Occasionally birds fly upwards during a pursuit flight but this only represents 10.8% of total hunts (Dickson, 1996), possibly due to increased energy expenditure. Recorded flight activity at the subject site exclusively below predicted rotor envelope. | **Collision:** Probability of impact **low**; magnitude assessed as **low**; overall significance **low**. |
| | Peregrine (High) | **Collision:** Evidence of collision fatality is low, with only 2 birds recorded in published reviews of wind farm fatalities, up to 2004 (Hotker, Thompson & Jeromin, 2006). Recommended avoidance rate (by SNH) for collision risk modelling is 98% suggesting high micro-avoidance capabilities. Height of predicted rotor envelope (30-169m) and corresponding low flight activity (24.6% of total) within said envelope results in a low collision risk estimate. | **Collision**: probability of long-term collision risk is **low**; magnitude assessed as **low**; overall significance is **low**. |
| | Barn Owl | While no fatalities have been recorded in an European basis to date (Hotker, Thompson & Jeromin, 2006), a single confirmed fatality has been record in the UK (Shawyer, 2011), although this was at a domestic turbine rather than a commercial turbine. Barn Owls typically forage up to 3m above ground level and, therefore, collision risk is significantly reduced[38]. | **Collision:** Probability of collision **low;** magnitude assessed as **medium** on a precautionary basis; overall significance **low.** |

*Grid Connection Route*

No negative impacts on birds are anticipated during the operational phase of the grid connection. Servicing and maintenance will be sporadic with little to no disturbance to birds.

*Turbine Delivery Route*

No negative significant impacts on birds are anticipated during the operational phase of the TDR. The movement of vehicles and machinery will occur within a short period of time and disturbance of birds, if occurring, will be insignificant.

#### 8.5.3.3.2 Potential Indirect Impacts

*CGEP*

No potential indirect effects are expected to most bird species during the operational phase of the proposed CGEP development, with the exception of potential displacement effects from suitable forage habitat for hen harrier and possible kestrel. Impacts to Kestrel (very low sensitivity) are considered imperceptible.

**Hen Harrier.**
Hen Harrier may theoretically be excluded from operational turbines up to a radius of 250m. The rationale behind the selected 250m distance relates to the recorded displacement of foraging and flight behaviour close to wind turbines as reported in the literature (100m for foraging and 250m for flight - Mike Madders & Whitfield, 2006; Pearce-Higgins et al., 2009; Whitfield & Madders, 2006). The area of suitable forage habitat has been mapped around each proposed turbine location and is detailed in **Appendix 8-I**. Based on estimates detailed in Appendix 8-I, an area up to 170.82ha may exclude hen harrier to some degree. This is considered unlikely as hen harriers do use areas close to turbines and an improvement in forage habitat due to woodland clearance within a buffer zone around all turbines would be expected to add some forage habitat value compared to what is available currently (mature forest). However, in a worst case scenario there may be some reduction in usage of suitable habitat within 250m of turbines which would be considered a **medium** magnitude as this area would include areas of suitable habitat within 2km of most recent hen harrier nest

[38] Available at https://www.barnowltrust.org.uk/hazards-solutions/barn-owls-wind-turbines/. Accessed in January 2020.

locations. An approach is therefore detailed in Appendix I to provide habitat enhancement measures that would be expected to provide net gain enhancement of forage habitat for hen harrier, refer to mitigation **section 8.7** and **Appendix I**.

*Grid Connection Route*

No negative impacts on birds are anticipated during the operational phase of the grid connection. Servicing and maintenance will be sporadic with little to no disturbance to birds.

*Turbine Delivery Route*

No negative impacts on birds are anticipated during the operational phase of the TDR.

#### *8.5.3.4 .Terrestrial Mammals (excluding bats)*

**Table 8-87** and **Table 8-88** below detail lists of Impacts included and excluded from the Impact Evaluation of CGEP and GCR and TDR respectively, on terrestrial mammals (excluding bats) during the Operation Phase. No impacts are identified.

**Table 8-87: List of Impacts included and excluded from the Impact Evaluation of CGEP and GCR Operation Phase.**

| Impacts Included **(Evaluated in the Impact Evaluation Table sections)** | Impacts Excluded **(Justification at the end of the Impact Evaluation Table sections)** |
|---|---|
| **During Operation** | |
| No Impacts included for evaluation | Disturbance/Displacement of Terrestrial Mammals<br>*Exclusion Rationale*<br>The levels of operational maintenance will have neutral disturbance effects to mammals. Potential disturbance/displacement effects resulting from light-spill are considered neutral due to project design, as lighting will be limited to poles around the substation and control buildings. |
| | Secondary Mortality of Terrestrial Mammals<br>*Exclusion Rationale*<br>Potential sources of mortality during the operation stage are restricted to accidental collision with vehicles. Due however to restricted speed limits on the operational site, and low traffic levels on-site during the operation stage, potential effects are considered neutral. |

**Table 8-88: List of Impacts included and excluded from the Impact Evaluation of TDR Operation Phase.**

| Impacts Included **(Evaluated in the Impact Evaluation Table sections)** | Impacts Excluded **(Justification at the end of the Impact Evaluation Table sections)** |
|---|---|
| **During Operation** | |
| No Impacts included for evaluation. | Mortality of Terrestrial Mammals<br>*Exclusion Rationale*<br>The Turbine Delivery Route will not be used for the delivery of Turbines during the operation of the wind farm, thus there will be no effects on mammals. |
| | Disturbance/Displacement of Terrestrial Mammals<br>*Exclusion Rationale*<br>The Turbine Delivery Route will not be used for the delivery of Turbines during the operation of the wind farm, thus there will be no effects on mammals. |

| Impacts Included<br>**(Evaluated in the Impact Evaluation Table sections)** | Impacts Excluded<br>**(Justification at the end of the Impact Evaluation Table sections)** |
|---|---|
| | Terrestrial Mammals – Habitat Loss<br>*Pathway Rationale*<br>No habitat loss will occur during the operation phase of the wind farm in relation to the Turbine Delivery Route. |

#### 8.5.3.4.1 Potential Direct Impacts

*CGEP*

Direct effects are not considered likely during the operation of the CGEP development. Due to restricted speed limits on the operational site, and low traffic levels on-site during the operation stage, no direct mortality of terrestrial mammals is anticipated. As no works other than routine maintenance are proposed for the operational stage, no other sources of direct impacts are foreseen.

*Grid Connection Route*

Following the installation of the proposed CGEP grid connection, maintenance works are anticipated to be infrequent and of a small scale and intensity. Therefore, the potential for direct impacts on terrestrial mammals during the operation stage of the CGEP grid connection is considered unlikely.

*TDR*

Direct effects on terrestrial mammals during the operational stage are considered unlikely. Turbine delivery will be brief to momentary in duration, and given the slow haulage speeds anticipated, direct mortality to mammals is considered unlikely. Following turbine delivery, no further works with potential to cause direct impacts are proposed during the CGEP operational stage.

#### 8.5.3.4.2 Potential Indirect Effects

*CGEP*

Potential indirect effects on Badger, Red Squirrel and Pine Marten are considered unlikely during the operational stage of the proposed CGEP development. Disturbance and displacement effects will not be significant due to low level of activity within the site post-construction, as routine maintenance will be brief to momentary induration and intermittent in occurrence. It is considered therefore that the significance of the indirect impacts are **imperceptible.**

*Grid Connection Route*

The potential for indirect effects during the operation stage of the CGEP grid connection route are considered to be unlikely as the cable is underground and located for the most part within an existing public road. Any indirect effects arising from proposed maintenance works are evaluated as having an **imperceptible** effect.

*TDR*

No direct effects on terrestrial mammals are considered likely during the operational phase of the TDR.

### *8.5.3.5 Bats*

#### 8.5.3.5.1 Potential Impacts

*CGEP*

*Background*

Although bat fatalities have been reported from operational windfarms in North America and parts of Europe for almost twenty years, evidence from the British and Irish Isles has only begun to emerge in recent years. The key reference in this regard is a large-scale study by researchers at Exeter University that was published by Mathews et al. in 2016, which was based on bat activity and corpse searches at 46 operational wind farms throughout the British Isles. Bat corpses were found at two-thirds of these sites, of which 48% of fatalities were common pipistrelles, 40% were soprano pipistrelles and 10% were noctule bats (which are closely related to Leisler's bats). The estimated casualty rates, which correct for predator removals and the efficiency of the searches, ranged from 0 to 5.25 bats per turbine per month, and from 0-77 bats per site per month, during the period of the survey. A relationship between weather conditions and bat fatalities was found: most nights where casualties occurred (81.5%) had low mean wind speeds (≤5 m/s measured at the ground) and

maximum night-time temperatures of >10°C. Formally, it was estimated that 95.3% of nights with mean wind speeds >5m/s would have no casualties.

However, there was not a clear relationship between recorded bat activity levels and the number of fatalities recorded at a site, as follows: "*Activity at the control locations* [a proxy for pre-construction surveys] *was not a useful predictor of the number of bat casualties, although it was a predictor of whether or not any casualties occurred (i.e. a binary yes/no categorisation)*". The nights of highest pipistrelle activity were considered to have the highest likelihood of casualties, although bat fatalities were only recorded in one third of these locations. In the Mathews et al. (2016) study, 'high activity' was defined as a night with more than 50 bat passes; which is used as the threshold for 'significant' levels of bat activity in this assessment.

Fatality research studies elsewhere in Europe have shown that, due to their different behaviour and flight style, bat species are affected differently by wind turbines (Rodrigues et al., 2014, SNH 2019). The species recorded in significant numbers at the proposed development site – common pipistrelles, and to a lesser extent Leisler's bats and soprano pipistrelles – are all considered to have a high collision risk from wind turbines (SNH 2019). Nathusius' pipistrelle is also considered to have a high collision risk, but it is not present at the proposed development site in significant numbers. All other Irish species – *Myotis* spp and brown long-eared bats – are considered to have a low collision risk. On this basis, the risk of impacts for each species are assessed below. A summary of bat activity recorded at each turbine location is outlined in **Table 8-89** below.

**Table 8-89. Description of habitat type at each proposed turbine location, and of the selection of representative sampling sites for automated detector surveys in 2019**

| Turbine | Habitat | Summary of significant bat activity |
|---|---|---|
| T2 | Mature, closed-canopy forestry | Occasional Leisler's activity |
| T3 | Edge between mature forestry and immature forestry | Frequent common pipistrelle and occasional Leisler's activity |
| T4 | Immature forestry | No significant activity |
| T5 | Semi-mature / patchy forestry | Similar to T2: Occasional Leisler's activity |
| T6 | Clearfelled in 2015, now immature forestry | Similar to T4: No significant activity |
| T7 | Clearfelled in 2015, now immature forestry | Similar to T4: No significant activity |
| T8 | Mature mixed broadleaved and coniferous forestry | Frequent common pipistrelle and occasional soprano pipistrelle activity |
| T9 | Edge between clearfell and mature forestry | Similar to T8: Frequent common pipistrelle and occasional soprano pipistrelle activity |
| T10 | Edge between mature forestry and improved grassland | Frequent common pipistrelle and occasional soprano pipistrelle activity |
| T11 | Improved agricultural grassland, no hedgerows or other linear features | Frequent common pipistrelle and Leisler's activity |
| T12 | Ride in mature, closed-canopy forestry | Frequent common pipistrelle |

| Turbine | Habitat | Summary of significant bat activity |
|---|---|---|
| T13 | Clearfelled in 2017, now immature forestry | No significant activity |
| T14 | Semi-mature / patchy forestry | Similar to T12: Frequent common pipistrelle |
| T15 | Edge between mature forestry and immature forestry | Occasional Leisler's activity |
| T16 | Semi-mature / patchy forestry | Similar to T12: Frequent common pipistrelle |
| T17 | Narrow track in mature, closed-canopy forestry | Occasional Leisler's activity |
| T18 | Semi-mature forestry | Frequent Leisler's activity |
| T19 | Mature forestry, near forest road | Frequent common pipistrelle and soprano pipistrelle, occasional Leisler's activity |
| T20 | Small clearing surrounded by mature forestry | Frequent common pipistrelle, occasional soprano pipistrelle and Leisler's activity |
| T21 | Semi-mature forestry, closed canopy | Similar to T18: Frequent Leisler's activity |
| T22 | Ride in mature, closed-canopy forestry | Similar to T19: Frequent common pipistrelle and soprano pipistrelle, occasional Leisler's activity |
| T23 | Ride in mature, closed-canopy forestry | Occasional Leisler's activity |

*Common Pipistrelles*

This was the most frequently-recorded species during baseline surveys, with highest activity levels along forest edge habitat, particularly roads and clearings. The construction of the proposed development will change many of the existing habitats, for example by creating clearings within areas of closed-canopy forestry. It is expected that common pipistrelle bats will adapt to these changes, for example by foraging along the new forest edge habitat on the margins of the cleared area. However, depending on the distance of the new edge habitat from the turbine-swept area, it is possible that common pipistrelle bats may forage within areas that would put them at risk of collision. If this was the case, it is possible that some bats could be struck by operational wind turbines.

However, high activity by common pipistrelles was also recorded in some areas of open habitat, notably at T11. This sampling location was in an open area of agricultural grassland, which did not have any hedgerow / treeline habitats. Considering the levels of bat activity at this location, it is possible that some bats could be struck by operational wind turbines.

Considering the high levels of common pipistrelle activity throughout the site, and that some may fly in relatively-close proximity to operational wind turbines, there is a risk of significant impacts. In the Mathews (2016) report it is acknowledged that pre-construction activity surveys do not provide an accurate estimate of post-construction mortality levels. However, in a worst-case scenario, it is possible that significant numbers of common pipistrelle bats could be killed, and that there could be an impact of Local significance on the populations of this species.

*Soprano Pipistrelles*

This species was present in much lower numbers than common pipistrelles, but appeared to follow a relatively similar pattern of activity, i.e. foraging along forest edge habitats. In a worst-case scenario, it also is possible that significant numbers of soprano pipistrelle bats could be killed, and that there could be a **moderate** impact of Local significance on their populations.

***Leisler's Bats***

This species was recorded in significant numbers at several of the proposed turbine locations, including both edge habitats and open areas. This is unsurprising, because Leisler's bats typically feed in open air or around the tops of trees, usually at heights of >5 m above ground level. Activity levels were generally higher in the north-east of the proposed development site (i.e. Turbines 17 – 23) than in the south-west).

Considering the moderate to high levels of Leisler's bat activity throughout the site, and its broad habitat requirements, there is a risk of significant impacts. In a worst-case scenario, it is possible that significant numbers of Leisler's bats could be killed at some locations, and that there could be a **significant** impact of Local significance on the populations of this species.

It is also noted that all bat species receive strict protection under the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended), under which it is an offence to kill, injure or disturb any bat species.

*Bat Roosts*
There are no proposals to modify or disturb any of the known bat roosts during the operation of the development. Although some of the bats using these roosts may forage near the proposed turbine locations, the primary species of interest – Natterer's bats – are considered to have a low collision risk from wind turbines, so they are highly unlikely to be affected.

*Lighting*
As outlined above, it is possible that some artificial lighting may be required during the operation of the proposed development, e.g. around the site compound. Depending on the intensity, direction and duration of lighting, it is possible that it could displace bats from roosts, foraging areas or commuting routes, which could have slight to moderate impacts on local populations.

Aviation warning lights are often fitted to turbine nacelles to improve visibility. These are not considered to be a concern for bats, as they typically face horizontally, and they are high above potential bat feeding areas.

*Grid Connection Route*
No significant adverse effects are likely on bats during the operational phase of the proposed development.

*TDR*
No significant adverse effects are likely on bats during the operational phase of the proposed development.

### *8.5.3.6 Other Species*

#### 8.5.3.6.1 Potential Direct Impacts

**Marsh Fritillary**
*CGEP*

There is no potential for direct effects resulting from habitat loss during the operational stage of the development, as there is no suitable habitat for Marsh Fritillary in or adjacent (50m) to the proposed CGEP infrastructure. There is no potential for mortality of in-flight adults or in-situ larvae, as no suitable habitat or Marsh Fritillary populations were recorded within the CGEP study area.

*Grid Connection Route*

There is no potential for direct effects resulting from habitat loss during the operational stage of the proposed development, as there is no suitable habitat for Marsh Fritillary in or adjacent (50m) to the proposed CGEP Grid Connection route. There is no potential for mortality of in-flight adults or in-situ larvae, as no suitable habitat or Marsh Fritillary populations were recorded within the CGEP Grid Connection Route study area.

*Turbine Delivery Route*

No impacts on Marsh Fritillary are predicted as no potential habitat is affected.

**Amphibians and Reptiles**

*CGEP and Grid Connection Route*

There is potential for direct mortality of amphibians and reptiles during routine site maintenance during operation. The effects of mortality on Common Frog and Smooth Newt are potentially greater during the breeding season (frogs: January-March and newts: March-May) when these species congregate at breeding sites such as ponds and ditches. Maintenance works however will be limited to the existing site infrastructure including roads and hardstands, and will be of low intensity, infrequent, and therefore is not considered to be significant.

*TDR*

No effects on Reptiles and Amphibians are predicted as any maintenance or other works will be within existing made ground/ hard surfaces which are unsuitable for these species.

#### 8.5.3.6.2 Potential Indirect Impacts

**Marsh Fritillary**

*CGEP and Grid Connection Route*

No potential for indirect disturbance or displacement effects during the operational stage maintenance activities on the CGEP and Grid Connection, as no suitable habitat or Marsh Fritillary populations were recorded within or adjacent (50m) to the grid connection route. Maintenance operations on the Grid Connection are expected to be infrequent and of low intensity.

*Turbine Delivery Route*

No effects on Marsh Fritillary are predicted as any maintenance or other works will be within existing made ground/ hard surfaces which are unsuitable for these species.

*Replant Lands*

Once planting is complete, no potential indirect impacts on Marsh Fritillary are predicted during the lifetime of the CGEP project within the replant lands.

**Amphibians and Reptiles**

*CGEP and Grid Connection Route*

No likely indirect negative effects on amphibians or reptiles are foreseen. No evidence of amphibian or reptile species was recorded within the CGEP and CGEP Grid Connection study area.

*TDR*

Works during the operational stage of the proposed CGEP project will be within existing made ground, no effects on Amphibians and Reptiles are predicted.

### *8.5.3.7 Fisheries and Aquatic Ecology*

#### 8.5.3.7.1 Potential Direct Impacts

*CGEP and Grid Connection Route*

Activities associated with the operation phase of the CGEP and GCR relate to scheduled services and general day-to-day inspection by a caretaker. No potential impacts are predicted from these two activities.

*TDR*

The proposed TDR does not involve instream works or works in the vicinity of water bodies, no potential operational impacts to the aquatic environment are anticipated.

#### 8.5.3.7.2 Potential Indirect Impacts

*CGEP and Grid Connection Route*

Potential indirect impacts from the operation of the proposed CGEP and GCR are related with the wastewater generation at the welfare facilities, silt control and flow rate changes via the drainage system on the site and the potential spread of invasive alien species by virtue of the maintenance activities within the CGEP site.

Operation of the CGEP will be undertaken from the control buildings at the substation compounds, which will be provided with welfare facilities. As wastewater is generated at these facilities, there is the potential for this wastewater to run towards surface water bodies and affect their water quality. However, as described in **Chapter 3**, all wastewater generated at these facilities will be tankered off site by a licensed waste collector and will not be discharged untreated to surface water bodies. In the event of accidental discharge of the wastewater to nearby surface water bodies, considering the insignificant volume held by these tanks, the potential impacts of an unlikely accidental discharge are considered **imperceptible**.

The drainage management system on the site has been designed to control rates of site water flow runoff. The potential impacts of change due to CGEP on natural runoff rates, at a river sub-catchment scale, on natural river flow rates in downstream rivers, compared to current levels, are considered **imperceptible** to sensitive aquatic biodiversity receptors.

Revegetated bunds, silt ponds and silt control within drains, will minimise silt runoff during operation of the windfarm, to downstream sensitive aquatic receptors. The potential impacts of excessive silt runoff to downstream rivers compared to current typical background levels are considered **imperceptible** to sensitive aquatic biodiversity receptors.

With regards to the potential for spreading invasive alien species during the operation phase of the CGEP and GCR, the majority of the activity is concentrated at the substation compounds and ongoing maintenance activity as required outside these areas. As access to the substation compounds is made through the primary national road network, it is considered that the Sustainable Drainage Systems (SuDS) infrastructure of this network is sufficient to rule the significance of this potential impact as **Imperceptible**.

*TDR*

The proposed TDR does not involve instream works or works in the vicinity of water bodies, no potential operational impacts to the aquatic environment are anticipated.

### 8.5.4 Potential Impacts during Decommissioning

#### *8.5.4.1 Designated Nature Conservation Sites*

#### 8.5.4.1.1 Potential Direct Impacts

*CGEP and GCR*

As there is no overlap of the proposed CGEP and GCR construction area with any designated nature conservation sites, there is no potential for direct impacts during the decommissioning phases of the CGEP development.

*TDR*

No direct impacts are anticipated to designated sites for the Turbine Delivery Route..

#### 8.5.4.1.2 Potential Indirect Impacts

*CGEP and Grid Connection Route*

Disassembling and transporting the turbines upon decommissioning of the CGEP will be associated with, besides the disassembling work itself, an increased movement of equipment and machinery (e.g. cranes) through the access tracks within the area. All of these components of the decommissioning phase of the CGEP encompass the potential for increased sediment release to water bodies in the vicinity of the access tracks through siltation and can potentially affect the water quality of river water bodies downstream and impact on designated sites with downstream connectivity to the proposed CGEP Development. This potential impact, in the absence of mitigation is considered to be of **short-term** duration and of **slight significance** on downstream relevant QI aquatic receptors connected via drainage, including River Blackwater SAC. The installed drainage management system will minimise risks.

Hydrocarbon contamination of water bodies through accidental leakage and/or discharge of fuels or lubricants to the aquatic environment has the potential to impact downstream designated nature conservation sites. However, since no fuels or lubricants are planned to be stored onsite during decommissioning phase, this potential impact is considered to be of **short-term** duration and **imperceptible**.

The movement of equipment and machinery during decommissioning has the potential to spread invasive alien plant species. This potential impact is considered to be of **long-term duration and significant** in the absence of mitigation.

*TDR*

Decommissioning phase impacts would be expected to be similar to construction phase i.e. based on the nature and scale of works impacts are evaluated as being of **imperceptible significance**..

### *8.5.4.2 Habitats and Flora*

#### 8.5.4.2.1 Potential Direct Impacts

Potential direct effects on terrestrial habitats during decommissioning are limited to the reinstatement of the turbine foundations. The foundations will not be removed and simply covered over using berm soil stored locally on the site. These areas will then be allowed to re-vegetate naturally. Reinstated turbine foundations will result in a slight positive impact of imperceptible significance. The impact quality is considered positive due to a change from unvegetated hard standings to semi-natural vegetation once recolonised.

#### 8.5.4.2.2 Potential Indirect Impacts

As decommissioning activities are envisaged to take place on the existing windfarm access roads and hardstand areas, no potential indirect impacts to terrestrial habitats through habitat loss/landuse change are expected.

The movement of equipment and machinery during turbine disassembly and site reinstatement has the potential to spread high impact invasive alien plant species as these may occur in next 30 years at the site. This potential impact is considered unlikely but if high impact invasives become established than long-term duration and **significant** impacts could arise.

### *8.5.4.3 Avifauna*

Potential impacts to avifauna considered during the decommissioning phase are outlined below in **Table 8-90**.

**Table 8-90: List of Impacts included and excluded from the Impact Evaluation for the CGEP and GCR Decommissioning Phase.**

| Impacts Included<br>**(Evaluated in the Impact Evaluation Table sections)** | Impacts Excluded<br>**(Justification at the end of the Impact Evaluation Table sections)** |
|---|---|
| **During Decommissioning** | |
| **General Birds**: Disturbance/Displacement<br>*Pathway Rationale*<br>Indirect Impacts: Noise, visual intrusion, clear felling, vegetation clearance and movement of operating machinery. | **General Birds** – Loss of Habitat<br>*Exclusion Rationale*<br>There will be no habitat loss during the decommissioning stage. |
| | **General Birds**– Secondary habitat degradation through water quality degradation.<br>*Exclusion Rationale*<br>Due to water protection measures, there will be no significant negative effects on these species. |

#### 8.5.4.3.1 Potential Direct Impacts

*CGEP*

No direct effects on birds are anticipated during the decommissioning stage of the project as all works would be within existing made ground subject to ongoing maintenance which is unsuitable for bird activity.

*Grid Connection*

The grid connection will not require decommissioning thus there are no anticipated direct effects.

*TDR*

No direct impacts on birds are anticipated during the decommissioning stage of the project.

#### 8.5.4.3.2 Potential Indirect Impacts

*CGEP*

*Disturbance/Displacement*

Disturbance and displacement effects will occur on the wind farm during the decommissioning stage. Works will be restricted to hardstand areas and will be less intrusive (no excavations, no concrete) than the construction stage. These effects will be temporary. Thus, it is anticipated that these effects will have insignificant effects on birds.

*Grid Connection*

The grid connection will not require decommissioning thus there are no indirect effects anticipated.

*Turbine Delivery Route*

No indirect effects on birds are anticipated during the decommissioning stage of the project.

### *8.5.4.4 Terrestrial Mammals (excluding bats)*

Potential impacts to terrestrial mammals (excluding bats) considered during the decommissioning phase are outlined below in **Table 8-91**.

**Table 8-91: List of Impacts included and excluded from the Impact Evaluation of the CGEP and Grid Connection Route Decommissioning Phase.**

| Impacts Included<br>**(Evaluated in the Impact Evaluation Table sections)** | Impacts Excluded<br>**(Justification at the end of the Impact Evaluation Table sections)** |
|---|---|
| **During Decommissioning** | |
| Red Squirrel and Pine Marten: Disturbance/displacement<br>*Pathway Rationale*<br>Red Squirrel and Pine Marten breeding or resting sites may be disturbed during any tree felling operations required to facilitate machinery for the decommissioning process. | General Non-Volant Mammals: Disturbance/Displacement to other Terrestrial Mammals<br>*Exclusion Rationale*<br>The levels of decommissioning will have neutral disturbance effects to mammals. Badger setts are unlikely to because established in areas that are affected by decommissioning works. Otter are unlikely to be affected by decommissioning works |
| Pine Marten: Mortality<br>*Pathway Rationale*<br>Direct impact with operating Machinery, accidental collision with vehicles. | Secondary Mortality of Terrestrial Mammals<br>*Exclusion Rationale*<br>Sources of mortality are restricted to accidental collision with vehicles, due to restricted speed on operational site and lower vehicles traffic during operation stage compared to construction state effects are neutral. |
| Red Squirrel: Mortality<br>*Pathway Rationale*<br>Direct impact with operating Machinery, accidental collision with vehicles. | |

#### 8.5.4.4.1 Potential Direct Impacts

*CGEP and Grid Connection Route*

Regarding Pine Marten and Red Squirrel accidental collision with vehicles on site are possible during the decommissioning stage. This is considered unlikely and an **imperceptible** effect. There may also be localised disturbance to vegetated areas around the turbines. No direct loss of breeding sites for red squirrel or pine marten are likely as forestry areas are unlikely to be disturbed during decommissioning.
Due to the passage of time from the construction stage to the decommissioning stage it is possible that Badgers could establish setts within suitable habitats on the site between now and decommissioning. Reinstatement works for decommissioning may directly impact badger setts. There is potential for **negative effects** if not avoided or mitigated for. It is considered that any unmitigated impacts on Badger will have **moderate** effects.

#### 8.5.4.4.2 Potential Indirect Impacts

*CGEP*

No disturbance/ displacement effects are likely to red squirrel as forestry areas are unlikely to be disturbed during decommissioning. Due to the passage of time from construction stage to decommissioning stage it is possible that Badgers could establish setts in suitable habitat within the zone of influence of works areas. Indirect impacts resulting from decommissioning stage noise and vibration have the potential to result in localised and short-term **negative effects** if not mitigated for. It is considered that any impacts on Badger will result in **moderate** effects.

*Grid Connection Route*

No decommissioning stage impacts are anticipated.

*TDR*
No indirect effects on birds are anticipated during the decommissioning stage of the project.

### *8.5.4.5 Bats*

#### 8.5.4.5.1 Potential Impacts

*CGEP and Grid Connection Route*

Foraging and commuting bats

All decommissioning work will be carried out from internal access tracks and hardstanding areas, so it will unlikely be necessary to clear any scrub, hedgerows or other vegetation. As a result, there will be no impact on feeding areas or commuting routes.

Bat Roosts
As noted above, the bat roosts are located more than 250 m from any of the proposed turbine locations, and will not be affected by any ongoing work at the site, including decommissioning. As a result, there will be no impacts on bat roosts during the decommissioning phase.

Lighting
As outlined above, it is possible that some artificial lighting may be required during the decommissioning of the proposed development. Depending on the intensity, direction and duration of lighting, it is possible that it could displace bats from roosts, foraging areas or commuting routes, which could have temporary slight to moderate impacts on local populations.

*TDR*
No indirect effects on bats are anticipated during the decommissioning stage of the project.

### *8.5.4.6 Other Species*

#### 8.5.4.6.1 Potential Direct Impacts

**Marsh Fritillary**

*CGEP & Grid Connection Route*

There is no potential for direct effects resulting from habitat loss during the decommissioning stage of the proposed development, as there is no suitable habitat for Marsh Fritillary in or adjacent (50m) to the proposed CGEP Grid Connection route. There is no potential for mortality of in-flight adults or in-situ larvae, as no suitable habitat or Marsh Fritillary populations were recorded within the CGEP Grid Connection Route study area.

*TDR*

No Marsh Fritillary larvae or adults were identified during surveys of the proposed Turbine Delivery Route. Several Devil's Bit Scabious plants were noted at a single node location; however, these were not supporting any Marsh Fritillary larvae. Given the absence of suitable habitat with oversail an load bearing area along the Turbine Delivery Route there is likely to be no potential for significant impact on Marsh Fritillary during decommissioning.

**Amphibians and Reptiles**

*CGEP & GCR*

There is potential for direct mortality of amphibians and reptiles during decommissioning operations. The effects of mortality on Common Frog and Smooth Newt are potentially greater during the breeding season (frogs: January-March and newts: March-May) when these species congregate at breeding sites such as ponds and ditches. Decommissioning works however will be limited to the existing site infrastructure including roads and hardstands, and will be of low intensity, of short duration, and therefore is not considered to be significant.

*TDR*

Delivery of turbine components from site during decommissioning is not expected to result in significant effects on Amphibians and Reptiles during the decommissioning phase of the development.

#### 8.5.4.6.2 Potential Indirect Impacts

**Marsh Fritillary**

*CGEP & GCR*

No potential for indirect disturbance or displacement effects during decommissioning stage maintenance activities on the CGEP Grid Connection, as no suitable habitat or Marsh Fritillary populations were recorded within or adjacent (50m) to the grid connection route. Maintenance operations on the Grid Connection are expected to be infrequent and of low intensity.

*Turbine Delivery Route*

Delivery of turbine components from site during decommissioning is not expected to result in significant effects on Marsh Fritillary during the decommissioning phase of the development.

**Amphibians and Reptiles**

*CGEP & GCR*

No likely indirect negative effects on amphibians or reptiles are foreseen. No evidence of amphibian or reptile species was recorded within the CGEP and CGEP Grid Connection study area.

*TDR*

Delivery of turbine components from site during decommissioning is not expected to result in significant effects on Amphibians and Reptiles during the decommissioning phase of the development.

#### *8.5.4.7 Fisheries and Aquatic Ecology*

##### 8.5.4.7.1 Potential Direct Impacts

*CGEP and GCR*

No potential direct impacts to fisheries and aquatic ecology are anticipated from the works and activities involved in the CGEP decommissioning phase.

*TDR*
No direct effects are anticipated to designated sites during the decommissioning stage of the project.

##### 8.5.4.7.2 Potential Indirect Impacts

*CGEP and GCR*

Disassembling and transporting the turbines upon decommissioning of the CGEP will be associated with, besides the disassembling work itself, an increased movement of equipment and machinery (e.g. cranes) through the access tracks within the area. All of these components of the decommissioning phase of the CGEP encompass the potential for increased sediment release to water bodies in the vicinity of the access tracks through siltation and can potentially affect the water quality of river water bodies downstream and impact on fisheries and aquatic ecology. This potential impact is considered to be of short-term duration and of **slight significance** as the drainage management system that will be installed will minimise risk of significant sediment release.

Hydrocarbon contamination of water bodies through accidental leakage and/or discharge of fuels or lubricants to the aquatic environment has the potential to impact aquatic ecology of surface water bodies located downstream. However, since no fuels or lubricants are planned to be stored onsite during decommissioning phase, this potential impact is considered to be of **short-term** duration and **imperceptible**.

The movement of equipment and machinery is, as it is the case with the construction phase, has the potential to spread invasive alien plant species. This potential impact is considered to be of **long-term** duration and **significant**.

*TDR*

Similar to construction phase impacts and based on the nature and scale of works impacts are evaluated as being of **imperceptible significance**.

## 8.6 CUMULATIVE IMPACT ASSESSMENT

### 8.6.1 Conceptual Modelling Exercise

This section outlines projects that have been considered for the purpose of the cumulative impact assessment. The replant lands at Moneygorm and Ballard form part of the overall project and relate to replant lands and these have been assessed in detail in **Appendix 8-I** of this EIAR but are considered cumulatively with other elements of the wind farm project in this section.

A conceptual modelling exercise was carried out to identify other projects and land use activities with potential to result in cumulative impacts with the proposed CGEP Project, the results of which are presented herein. **Table 8-92** lists the projects within the zone of potential cumulative effects and identifies the projects which require further consideration due to timeframe and/or geographical overlap with the proposed CGEP development. In **Table 8-93** the potential in-combination effects resulting from the developments identified are evaluated in terms of potential effects on sensitive biodiversity receptors. Finally, **Tables 8-94**Table 8-94 to **8-98** presents the potential for cumulative impacts on each sensitive receptor individually for each stage of the proposed CGEP development.

**Table 8-92 Developments considered for cumulative impacts with the CGEP Development.**

| Development Description | Address | Distance from Nearest Turbine | Timeframe Overlap | Geographical Overlap | Scoped in/out | Justification |
|---|---|---|---|---|---|---|
| The alteration of Mallow Sewerage Scheme to remove combined sewer overflows from the network. The proposed scheme will include: 1. The alteration of Mallow Wastewater Treatment Plant to provide for wastewater treatment capacity for 22,000pe (increased from 18,000pe) at Ballyellis, Mallow. The WWTP upgrade will comprise construction of new local pumping station, refurbishment/replacement of inlet works, distribution chambers, alteration of existing tanks, construction of plinths and kiosks, sludge import acceptance unit, sludge tanks, chemical storage tanks, associated pumps, replacement of sludge presses in existing sludge building with centrifuges, all with associated odour control facilities, electrical control panels and kiosks, standby power generation equipment and diesel tank, extensions to existing access roads and all associated site development and site excavation works above and below ground. 2. Construction of a new pump station at Bearforest Lower, Mallow, to transfer flows from the network to the WWTP at Ballyellis. The development will contain a foul sump, storm sump, valve chamber, lifting gantries, access stairs, control house with MV Substation, storm tank, interconnecting pipework and chambers, overflow pipework and chambers from storm tank to river Blackwater, twin rising mains to WWTP at Ballyellis, flow meter chambers, odour control equipment, 2.4m high boundary fence, access gate, access roads, hardstanding areas, landscaping and all associated site development and site excavation works above and below ground. Existing pump station to be decommissioned and above ground structure demolished on completion. 3. Upgrade of sections of the sewer network in Mallow comprising construction of pipelines and chambers in fields, public open spaces, roads and footpaths in the townlands of Ballyellis, Bearforest Lower, Ballydahin, Carhookeal, Quartertown Lower, Castlelands, Mallow, Annabella, Lackanalooha, Kilknockan and Spa Glen. Pipelines will include a crossing of the river Blackwater between Castlelands and Bearforest Lower east of Mallow Bridge. A Natura Impact Statement (NIS) will be submitted to the Planning Authority with this application. | Mallow WWTP, Mallow Bridge Pump Station,Mallow Ballyellis,Bearforest Lwr,Ballydahin.Spa Glen Carhookeal,Quartertown Lower,Castlelands,Annabella Lackanalooha,Kilknockan | | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| Construction of agricultural development consisting of 5 no. brooder houses to house 20,000 pullet hens per house, 5 no. sealed feed silos, a manure shed, a hayshed with offices and changing area, a septic tank and percolation area, 7 no. covered precast wash water tanks, Gas storage tanks at two locations, forming a new site | Cappagh Ballyhooly Mallow Co. Cork | 5km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |

| Development Description | Address | Distance from Nearest Turbine | Timeframe Overlap | Geographical Overlap | Scoped in/out | Justification |
|---|---|---|---|---|---|---|
| entrance, access road with access control barriers, service yard and all associated site works. This development required the preparation of An Environmental Impact Assessment. The Environmental Impact Assessment Report will be submitted to the Planning Authority with the application. This application relates to a development which comprises or is for the purpose of an activity requiring an Industrial Emissions Directive Licence issued by the Environmental Protection Agency (EPA) | | | | | | |
| The redevelopment, refurbishment and extension of the existing hotel structure facing onto Thomas Davis Street involving a change of use of ground floor from hotel to partial retail use to form a retail unit of 392sq.m (Unit 1) and a partial café/retail use to form a unit of 168sq.m (Unit 2), including ancillary storage and office to the rear. This development involves demolition on ground, first and second floor levels and will include the demolition of single storey function rooms, bars and storage areas, and the construction of an extension to incorporate retail units on ground floor and dwelling units over first and second floor and will include alterations to front, side and rear elevations of the hotel building. The total area to be demolished is approximately 2,287m2. The development involves a change of use of the existing upper floors [first and second floor] from hotel to residential use, with provision of 6 no. (2 bed) dwelling units, with access provided via existing western lane, through ground floor gate, to first floor common area and unit entrances. The development also includes the construction of a retail unit to the rear of the site of 672sq.m (Unit 3) with pedestrian access onto St. James's Avenue to the east. Vehicular and pedestrian access is to be provided to the rear of the site [south] onto St. James' Avenue. Pedestrian access from the lane to the west of the site will also be allowed, with a vehicular right of way for the credit union car park from Thomas Davis Street. Permission is sought for 21 no. car parking spaces plus 1 disabled and 1 set down and all associated site services including, but not limited to, plant [roof level], signage, landscaping and drainage etc.<br>all at the Former Central Hotel [Protected Structure]. | Former Central Hotel Thomas Davis Streetand St James' Avenue Mallow Co. Cork | 10km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| Residential development comprising 1) the construction of 9 no. dwelling units, 2) the refurbishment and reuse of the existing 'Hawthorn House' for residential use; 3) the alterations and conversion of adjoining outhouses to a granny flat; 4) the refurbishment of existing gate lodge for ancillary use (storage) to residential unit B3; 5) the re-routing and part undergrounding of the existing ESB line currently traversing the site; 6) the upgrading of the existing sewer line to the east of the property and 7) all | Navigation Road Annabella Mallow Co. Cork | 10+km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |

| Development Description | Address | Distance from Nearest Turbine | Timeframe Overlap | Geographical Overlap | Scoped in/out | Justification |
|---|---|---|---|---|---|---|
| associated ancillary development including pedestrian access, parking, landscaping and amenity areas and the removal of 2 no. corrugated iron sheds. The proposed development consists of works to a protected structure, 'Hawthorn House' Mallow Town Council Protected Structure Reference number RPS46. | | | | | | |
| Construction of: new CIP (Cleaning in Place) Bund with 6 no. tanks containing cleaning products (Bund 38), new part six-storey part single storey Production Building (Building 50) with new product bund and 12 no. silos and 2 no. single storey valve control buildings, new tanker unloading bay (Building 51), new part six-storey, part two-storey, Intermediate Product Store/Packaging Building (Building 52) and 2 no. loading bays, new single storey Finished Product Store 1 (Building 53) and 7 no. loading bays, new single storey Finished Product Store 2 (Building 54) and 6 no. loading bays, elevated visitor and operator access walkway from new laboratories and production building to the existing dryer and evaporator buildings, Relocation of existing Truck Washing Station, associated pipe racking, silos, compactor, signage and site works, new single storey Staff Entrance to existing Production Building 18, Alterations to and change of use of the existing Engineering Workshop and Stores Building to include new offices and laboratories and 2 no new loading bays (Building 04), Demolition of existing disused Garage (Building 27) and existing storage facility and loading bays (Buildings 05 and 20), The application relates to an establishment which has an Industrial Emissions Licence (P0403-03).The EIAR and the NIS will be submitted to the Planning Authority with the Application. | Annabella West End Mallow Co. Cork | 10+ km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| Construction of residential development of 6 no. residential units. The proposed development consists of the construction of 6 no. 3 bed semi detached dwellings. Vehicular access is proposed off Clyda Court to the north of the site. Permission is sought for the development outlined including, but not limited to, landscaping, boundary treatments, car parking and all ancillary site development works | off Clyda Court Quartertown Lower Mallow Co. Cork | 10+ km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| Construction of split level, four storey Primary Care Centre building with ancillary professional healthcare support services, separate three storey office building , 2 no. vehicular access points, 2 no. single storey ESB/MV switchrooms, car parking, service yard, landscaping to include earthworks, fencing/planting and all associated site works -Extension of Duration of Permission granted under Planning Ref. 07/7582. | Gooldshill Mallow Co.Cork | 10+ km | Yes | No | Out | The planning application was declared Invalid in 31/07/2017, 17 days after the application was made. |
| The development of 14 no. serviced sites for future employment uses comprising 4 no. enterprise sites, 4 no. general industry sites, | Ballydahin and Gooldshill Mallow | 10km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP |

| Development Description | Address | Distance from Nearest Turbine | Timeframe Overlap | Geographical Overlap | Scoped in/out | Justification |
|---|---|---|---|---|---|---|
| 6 no. sites for warehousing/distribution and all associated ancillary development works including vehicular entrance from the R638 access road network, separate pedestrian entrance from R620, services compound, foul and storm water drainage, water supply infrastructure (including fire fighting tank and potable water treatment station), 2 no. pump houses, ESB substation, landscaping and amenity areas. | Co. Cork | | | | | Development via the Blackwater River Catchment |
| 1) The construction of 108 no. dwelling houses, consisting of 3 no. 4 bed detached, 2 no. 3 bed detached, 68 no. 4 bed semi-detached, 32 no 3 bed semi-detached and 3 no. 3 bed terraced houses. These houses are to be accessed through the existing completed part of the housing development; 2) A crèche of 380sq.m of single/two storey construction, also accessed from the existing completed part of the housing development, including 11 carparking spaces and associated works; 3) The provision of a 1.2m diameter culvert within the development. This leads to an open water course which is to be provided in lieu of the existing pipeworks along the western boundary of the site; 4) All associated site development works. | "Clonmore" Ballyviniter Lower Mallow Co. Cork | 10+ km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| A residential development comprising the construction of 88 no. dwelling houses and all associated ancillary development works including vehicular access, parking, footpaths, foul and storm water drainage (including the provision of a surface water attenuation tank) landscaping and amenity areas. | Annabella Mallow Co. Cork | 10km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| Residential development comprising the removal of disused farm buildings and the construction of 61 no. dwelling houses and all associated ancillary development works including vehicular access, parking, footpaths, foul and storm water drainage (including the provision of a storm water attenuation tank at Woodview Drive) landscaping and amenity areas. | Annabella Mallow Co. Cork | 10km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| Construction of (1) new fabricating workshop (3200sqm) with attached two-storey office block and canteen area (1028sqm), (2) single storey ESB substation, (3) single storey stainless steel cleaning building, (4) 5X5m overground rainwater storage tank, and (5) all ancillary site works including on-site car park | Mallow Business & Technology Park Quartertown Lower Mallow | 10km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| Construction of a 160sqm crèche, 2 no. 3 bedroom dwellings, 2 no. 2 bedroom apartments and associated site works on a site of approx. 0.11 Ha. | Duntahane Fermoy County Cork | 10km | Yes | No | Out | Excluded due to small scale of work works and separation distance from the CGEP Development |
| The construction of 10 no. dwelling houses to replace 8 no. residential serviced sites permitted under planning reg. no. 17/5734 and all associated site works. A Natura impact statement will be submitted to the planning authority with the application. | An Gleann Ull Ballyhooly North Fermoy Co. Cork | 6km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |

| Development Description | Address | Distance from Nearest Turbine | Timeframe Overlap | Geographical Overlap | Scoped in/out | Justification |
|---|---|---|---|---|---|---|
| Removal of 16 no. partially constructed house bases (Permitted under Planning Reg. No. 03/6062, now out of date), and construction of 20 no. semi-detached 2-storey houses and associated site works. A Natura Impact Statement will be submitted to the Planning Authority with the application. | Lios Ard<br>Ballyhooly South<br>Fermoy<br>Co. Cork | 6km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| The construction of 31 no. dwelling houses and all associated ancillary site development works including access onto Main Street and the Fermoy Road, parking, drainage, landscaping and amenity areas. | Glanworth (Townland)<br>Fermoy<br>Co. Cork | 10+km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| Removal of 7 no. partially constructed house bases (permitted under planning Reg. No 05/2147, now out of date) and construction of 6 no semi-detached 3 storey houses and 8 no residential serviced sites and associated site works | An Gleann Ull<br>Ballyhooly North<br>Fermoy<br>Co Cork | 6km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| Construction of 103 no. dwelling houses, creche and associated site works, extension of duration of permission granted under planning ref. no. 05/3120 and extended under planning ref. no. 10/5816 | Ballynamona Pike Road<br>Fermoy | 10+km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| Residential development - Construction of 9 no. 5 bedroom split-level dwelling units, access road, waste water treatment plant, and associated site works on a site of approx. 2.0Ha | Owen Bawn Mor<br>Graigue West<br>Glenville<br>Co. Cork | 4km | Yes | No | Out | Application refused |
| The construction of 44 no. dwelling units (to replace 24 no. dwelling units as permitted under Council Ref. 05/1025 (ABP Ref. PL 04.214812) and extended under Council Ref. 10/8211) and all associated ancillary development works including access, parking, drainage, landscaping and amenity areas. | Farranastig (townland)<br>Whitechurch<br>Co. Cork | 8km | Yes | No | Out | Excluded due to separation distance from the CGEP Development and minimal hydrological connectivity via the Glashaboy River catchment. |
| A 5 MW solar farm comprising approximately 22,200 photovoltaic panels on ground mounted frames within a site area of 10.24 hectares, 2 no. single storey inverter/transformer stations, 1 no. single storey delivery station, security fencing, CCTV, and all associated ancillary development works. | Dromgarriff South<br>Whitechurch<br>Co. Cork | 7km | Yes | No | Out | Excluded due to separation distance from the CGEP Development, minimal hydrological connectivity via the Glashaboy River catchment and low ecological importance in respect of identified receptors. |
| 1) Construction of a creche facility to serve the adjacent permitted residential development (Cork County Council Ref. 18/6579); 2) the construction of 19 no. dwelling houses (to replace 19 no. units previously permitted under Cork County Council Ref. 18/6579); and 3) all associated ancillary development works including pedestrian access, parking, footpaths, drainage and landscaping. A Natura Impact Statement (NIS) will be submitted to the planning authority with the application. | Lisnagar Demesne (Townland)<br>Rathcormac<br>Co. Cork | 9km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| Residential Development - Construction of 96 no. dwelling houses and all associated ancillary site development works including | Lisnagar Demesne<br>Rathcormac | 9km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP |

| Development Description | Address | Distance from Nearest Turbine | Timeframe Overlap | Geographical Overlap | Scoped in/out | Justification |
|---|---|---|---|---|---|---|
| vehicular access, parking, footpaths, drainage, landscaping and amenity areas. A Natura Impact Statement (NIS) will be submitted to the planning authority with the application. | Co. Cork | | | | | Development via the Blackwater River Catchment |
| Residential development comprising 2 no. detached and 6 no. semi-detached dwellings and all associated ancillary development works including vehicular access, parking, footpaths, drainage, landscaping and amenity space. Access to the proposed development will be via the R639 road. | Bridgeland West Rathcormac Co. Cork | 10km | Yes | No | Out | Excluded due to separation distance from the CGEP Development and scale of works |
| To construct 29 no. one and two-storey detached and semi-detached dwelling houses, including the alteration, extension and refurbishment of the former dispansary/fever hospital building for use as a dwellinghouse, childcare facility, and underground LPG tank, together with associated site development works (completion of development previously granted permission under reg. no. 03/4444) | Shanowen Rathcormac Co. Cork | 10km | Yes | No | In | Included in cumulative assessment due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment |
| Bottlehill Landfill | | 0 | Yes | Yes | In | Included; the Bottlehill Landfill has been granted planning and constructed, and although not operational, there is some potential for operational phase maintenance and/or use impacting on ground water, surface water. |
| Esk Wind Farm | | 18.5 | Yes | No | In | Esk Windfarm has been granted planning and constructed and therefore forms part of the baseline environment. It has been included however due to potential for operational phase cumulative impacts to Hen Harrier. |
| Castlepook Wind Farm | | 21 | Yes | No | In | Castlepook Windfarm has been granted planning and constructed and therefore forms part of the baseline environment. It has been included however due to potential for operational phase cumulative impacts to Hen Harrier. |
| Boggeragh Wind Farm | | 24 | Yes | No | In | Boggeragh Windfarm has been granted planning and constructed and therefore forms part of the baseline environment. It has been included however due to potential for operational phase cumulative impacts to Hen Harrier. |
| Replant Lands Ballard | | c.a. 180 km | Yes | No | In | Replant works at Ballard are as a result of the CGEP project. Therefore, impacts are considered. |

| Development Description | Address | Distance from Nearest Turbine | Timeframe Overlap | Geographical Overlap | Scoped in/out | Justification |
|---|---|---|---|---|---|---|
| Replant Lands Moneygorm | | 1km | Yes | No | In | Replant works at Moneygorm are as a result of the CGEP project. Therefore impacts are considered. Included also due to hydrological connectivity with the CGEP Development via the Blackwater River Catchment and due to proximity to the CGEP Development. |
| Existing Forestry Activities | | 0 | Yes | Yes | In | Included due to spatial and timeframe overlap with the CGEP Development. |
| Existing Agricultural Activities | | 0 | Yes | Yes | In | Included due to spatial and timeframe overlap with the CGEP Development. |
| M20 Motorway Project | | 3 | Yes | No | Out | Included due to the scale of works, and potential timeframe overlap with the CGEP Development, and hydrological connectivity with the CGEP development via the Blackwater River catchment. Given the uncertainty of this project progressing and potential that the route may change it is scoped out. |
| M28 Motorway Project | | 19 | Yes | No | Out | Excluded from cumulative evaluation due to limited hydrological connectivity with the CGEP Development. |
| Dunkettle Interchange Project | | 19 | Yes | No | Out | Excluded from cumulative evaluation due to limited hydrological connectivity with the CGEP Development and small scale and short duration of upgrade works proposed for the TDR. |
| Consented Wind Turbine at Glannasack (Planning Ref. 11/06168) | | 1 | Yes | Yes | In | Included due to proximity to the CGEP Development |

**Table 8-93 Evaluation of potential in-combination impacts on each biodiversity receptor.**

| | | Biodiversity Receptors | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Development evaluated for in combination effects | Planning Reference | Designated Sites | Habitats and Flora | Avifauna | Hen Harrier | Mammals | Bats | Aquatic Habitats and Species | Potential cumulative impacts identified |
| CGEP Replant Lands Moneygorm | | x | x | x | x | x | x | x | A NIS and EcIA have been carried out for the replant lands at Moneygorm which concludes that there will be no significant adverse effects European sites or other important ecological features respectively resulting from the replant lands. Moneygorm has limited value as hen harrier forage habitat (improved grassland). Therefore no significant cumulative effects are expected. |
| CGEP Replant Lands Ballard | | x | x | x | - | x | x | - | A NIS and EcIA have been carried out for the replant lands at Ballard which concludes that there will be no significant adverse effects European sites or other important ecological features respectively resulting from the replant lands. Therefore no significant cumulative effects are expected. |
| Single Turbine Development | 116168 | x | x | x | | x | x | x | A NIS was carried out for this development which determined that the conservation interests of the Blackwater River SAC will not be significantly impacted upon as a result of the construction operation or decommissioning of a single wind turbine at Moneygorm Co. Cork. Taking into consideration the conclusion of the NIS, no in-cumulative impacts are foreseen on Designated sites or aquatic receptors. |
| Esk Wind Farm | 115276 | | | | | | | x | A NIS and EcIA was carried out for this development which determined no significant residual effects. Hence no cumulative impacts with CGEP are likely. |
| Castlepook Wind Farm | 114947 | | | | x | | | | A NIS and EcIA was carried out for this development which determined no significant residual effects to hen harrier. Hence no cumulative impacts with CGEP are likely. |
| Boggeragh Wind Farm | 108067 | | | | x | | | | A NIS and EcIA was carried out for this development which determined no significant residual effects to hen harrier. Hence no cumulative impacts with CGEP are likely. |
| Alteration of Mallow Sewerage Scheme | 195078 | | | | | | | x | An NIS and EIA Screening have been submitted and have concluded that the proposed development will not have an adverse effect on the integrity of the Blackwater River (Cork/Waterford) SAC or any other European sites. During construction, there will be a short-term impact on the River Blackwater which will be effectively minimised by the implementation of mitigation measures. The long-term impact is predicted to be negligible. During construction, there will be increased noise and disturbance which could potentially impact on birds and mammals including otter. However, such impacts will be temporary and the long-term impact is predicted to be negligible. No impact from the spread of invasive species or impacts relating to biosecurity will occur. |

| | | Biodiversity Receptors | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Development evaluated for in combination effects | Planning Reference | Designated Sites | Habitats and Flora | Avifauna | Hen Harrier | Mammals | Bats | Aquatic Habitats and Species | Potential cumulative impacts identified |
| | | | | | | | | | **A potential short-term impact on the River Blackwater is predicted, therefore the potential for in-combination impacts on aquatic habitats and species has been identified.** |
| Agricultural Development, Ballyhooly Mallow, Co. Cork | 186848 | x | | | | | | x | An EIS has been submitted and has concluded the following: *As the proposed development would take place primarily within habitats of low ecological value and given the small development footprint, the potential impacts upon bird and mammals species would be greatly reduced. Assuming all mitigation measures are put in place, there would be no significant residual impacts to the aquatic environment from the proposed development. It is considered that due to the drainage system design and the distance of the proposed development to the Blackwater River SAC and Blackwater Callows SPA, there would be no significant impact upon a designated site due to drainage.*<br><br>Considering the above, and given the separation distance from the proposed CGEP development no potential cumulative impacts on biodiversity receptors are identified. |
| Redevelopment of Former Central Hotel | 186167 | x | | | | | | x | An NIS has been submitted which concluded that "*the habitats to be affected are highly modified and of minimal ecological value. Thus, no potential impact from loss of habitat have been identified. Given the scale and nature of the project and proposed construction mitigation measures, it can be objectively concluded that the proposed development on its own, and in combination with other plans and projects, will not have a significant impact on qualifying interests and conservation objectives for Natura 2000 sites, and the integrity of these sites will not be adversely affected".*<br><br>Considering the above, and given the separation distance from the proposed CGEP development no potential cumulative impacts on biodiversity receptors are identified. |

| | | Biodiversity Receptors | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Development evaluated for in combination effects | Planning Reference | Designated Sites | Habitats and Flora | Avifauna | Hen Harrier | Mammals | Bats | Aquatic Habitats and Species | Potential cumulative impacts identified |
| Residential development and associated works, Navigation Road Annabella Mallow Co. Cork | 185112 | | | | | | | | An NIS has been submitted which concludes; *As none of the Natura 2000 sites overlap the proposed development site, direct impacts via habitat loss or disturbance/ displacement are not relevant. The development proposes to manage and control surface-water run off during both construction and operational phases prior to release into the environment by implementing standard environmental controls. Surface water run-off from other new proposed or permitted unbuilt developments that will also connect into the same public stormwater sewer network could result in a cumulative and in-combination effect. However, assuming that all developments closely adhere to best practice regarding water quality protection during construction and operational phases, then no significant negative cumulative impacts are expected to occur".*<br><br>Considering the above, and given the separation distance from the proposed CGEP development no potential cumulative impacts on biodiversity receptors are identified. |
| Dairygold Co-operative Society Ltd: Construction works. Annabella West End Mallow Co. Cork | 184946 | x | | | | | | x | An NIS and EIS has been submitted which concludes that "*No significant ecological residual impacts are expected as a result of the construction and operational phase of the proposed development. Provided the recommended mitigation measures are implemented in full it is not expected that the construction and operational phases will result in an adverse residual impact on the integrity of Natura 2000 sites considered in this NIS, namely Blackwater River (Cork/Waterford) SAC".*<br><br>Considering the above, and given the separation distance from the proposed CGEP development no potential cumulative impacts on biodiversity receptors are identified. |
| Development of residential units, Clyda Court Quartertown Lower Mallow Co. Cork | 176722 | x | | | | | | x | An AA Screening Report has been submitted which concludes that Theoretically the proposed development could impact on aquatic species due to increased silt run-off or chemical contamination of groundwater or surface during construction. Overall given the limited nature of the development and the distance from sensitive receptors, the precautionary measures described, the impacts on water quality and aquatic ecology is predicted to be negligible. The proposed development will not have a |

| | | Biodiversity Receptors | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Development evaluated for in combination effects | Planning Reference | Designated Sites | Habitats and Flora | Avifauna | Hen Harrier | Mammals | Bats | Aquatic Habitats and Species | Potential cumulative impacts identified |
| | | | | | | | | | significant impact on qualifying interests and conservation objectives for Natura 2000 sites, and that the integrity of these sites will not be adversely affected. No significant direct, indirect or cumulative impacts on Natura 2000 sites have been identified.<br><br>The impacts on water quality and aquatic ecology are predicted to be negligible, therefore no potential cumulative impacts on biodiversity receptors are identified in relation to the CGEP development. |
| The development of 14 no. serviced sites for future employment uses. Ballydahin and Gooldshill Mallow Co. Cork | 167121 | x | | | | | | x | Potential in-combination impacts with the proposed CGEP Development can be inferred from the Screening Assessment for the Proposed Quarry Industrial Estate Site at Ballydahin, Mallow, Co. Cork. These are based on the identified potential to spread invasive alien plant species (Japanese knotweed and Himalayan balsam) and downstream habitat degradation through increased siltation.<br><br>However, the project includes a number of best-practice and mitigation measures which deem these impacts as unlikely. Therefore, no potential cumulative impacts are anticipated. |
| The construction of 108 no. dwelling houses, "Clonmore" Ballyviniter Lower Mallow Co. Cork | 166949 | x | | | | | | x | An EIS an AA Screening Report have been submitted concluding that: *Due to the small scale of the run-off and additional discharges from the Glasha Stream that will be generated by the proposed development relative to the flows in the River Blackwater, and the distance of the site from the SAC, it can be concluded that the proposed development will not have an measurable impact on water quality or flow rates in the SAC. Construction work is not likely to cause significant disturbance to the local otter population, due to distance from suitable habitat.*<br><br>Considering the above, and given the separation distance from the proposed CGEP development, no potential cumulative impacts on biodiversity receptors are identified. |
| A residential development comprising the construction of 88 no. dwelling houses, Annabella Mallow Co. Cork | 156970 | x | | | | | | x | An AA Screening Report has been submitted which concludes that adopting the environmental design features as outlined for the proposed development will ensure no significant impact to any species for which the Blackwater SAC is designated will occur as a result of the development. |

| | | Biodiversity Receptors | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Development evaluated for in combination effects | Planning Reference | Designated Sites | Habitats and Flora | Avifauna | Hen Harrier | Mammals | Bats | Aquatic Habitats and Species | Potential cumulative impacts identified |
| | | | | | | | | | Assuming that the environmental design measures described in the report are complied with no potential cumulative impacts on biodiversity receptors are expected. |
| Construction of 61 no. dwelling houses, Annabella Mallow Co. Cork. | 156119 | x | | | | | | x | An AA Screening Report has been submitted which concludes that due to the location and nature of the proposed works and with the implementation of standard appropriate environmental actions and best practice negative impacts on the qualifying interests of the Blackwater River SAC will be avoided. The report also concludes that the proposed development will not have any significant impact on the water quality of the Blackwater River.<br><br>Assuming the implementation of standard appropriate environmental actions and best practice as described in the report are complied with, no potential cumulative impacts on biodiversity receptors are expected. |
| Construction of fabricating workshop, office block, ESB substation and other associated works, Mallow Business & Technology Park Quartertown Lower Mallow | 154690 | x | | | | | | x | An Appropriate Assessment Report has been submitted which concludes that there is no evidence to indicated that works will cause either directly or indirectly significant deterioration of important habitats, of the habitats of the habitats of the qualifying species and species of special conservation interest or significant disturbance to these species thus ensuring the integrity of the Blackwater SAC is protected.<br><br>The AA screening references standard construction mitigation measures to be implemented, documenting details that no surface water, soils or contaminants will be permitted to the nearby Quarterstown stream, precluding hydrological connectivity with sensitive receptors. Hence no cumulative impacts are likely. |
| The construction of 10 no. dwelling houses to replace 8 no. residential serviced sites, An Gleann Ull Ballyhooly North Fermoy Co. Cork | 196597 | x | | | | | | x | An EIAR and AA Screening Report has been submitted for this development which concludes that following a comprehensive evaluation of the propsed direct, indirect and cumulative impacts on the qualifying interests and conservation objectives for the Blackwater River SAC, it has been concluded that the proposed development will not have an adverse effect on the integrity of the Blackwater River SAC or any other Europeans Site. |

| | | Biodiversity Receptors | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Development evaluated for in combination effects | Planning Reference | Designated Sites | Habitats and Flora | Avifauna | Hen Harrier | Mammals | Bats | Aquatic Habitats and Species | Potential cumulative impacts identified |
| | | | | | | | | | The AA Report includes a number of generic and specific mitigation measures in relation to the management of wastewater, construction waste, noise and prevention of invasive species that would prevent any impacts to sensitive receptors. Hence no cumulative impacts are likely. |
| Construction of 20 no. semi-detached 2-storey houses and associated site works, Lios Ard Ballyhooly South Fermoy Co. Cork | 195486 | x | | | | | | x | An Appropriate Assessment Screening Report has been submitted which concludes that there is no evidence to indicated that works will cause either directly or indirectly significant deterioration of important habitats, of the habitats of the habitats of the qualifying species and species of special conservation interest or significant disturbance to these species thus ensuring the integrity of the Blackwater SAC is protected.<br><br>The AA Report includes the reference to a number of standard environmental controls to be followed during construction and operation phases, in relation to the management of wastewater, construction waste, noise and prevention of invasive species that would prevent any impacts to sensitive receptors. Hence no cumulative impacts are likely. |
| The construction of 31 no. dwelling houses and all associated works, Glanworth (Townland) Fermoy Co. Cork | 195486 | x | | | | | | x | An Appropriate Assessment Screening Report has been submitted which concludes there will be no significant effects on the Blackwater River SAC and Blackwater Callows SPA.<br><br>The Appropriate Assessment Screening indicates the implementation of standard environmental controls, during construction phase, and SuDS infrastructure, during operation phase, to eliminate the potential impacts affecting habitats or species due to increased silt-laden or contaminated surface water runoff. Disturbance/displacement impacts are also considered insignificant due to the absence of habitats of ecological interest or value within the vicinity of the development. Hence no cumulative impacts are likely. |
| 6 no semi-detached 3 storey houses and 8 no residential serviced sites and associated site works. An Gleann Ull Ballyhooly North Fermoy Co Cork | 175734 | x | | | | | | x | An Appropriate Assessment Report has been submitted which concludes there will be no significant effects on the Blackwater River SAC and Blackwater Callows SPA.<br><br>The Assessment concluded that the development is located at a distanced enough from a designated site to preclude any disturbance or displacement impacts on habitats and mobile species. The Assessment also mentions the management of surface and wastewater emissions, ensuring the water |

| Development evaluated for in combination effects | Planning Reference | Biodiversity Receptors | | | | | | | Potential cumulative impacts identified |
|---|---|---|---|---|---|---|---|---|---|
| | | Designated Sites | Habitats and Flora | Avifauna | Hen Harrier | Mammals | Bats | Aquatic Habitats and Species | |
| | | | | | | | | | quality of hydrologically connected receptors. Hence no cumulative impacts are likely. |
| Permit extension for the construction of 102 no. dwelling houses, creche and associated site works, Ballynamona Pike Road Fermoy | 155973 | x | | | | | | x | No environmental information available. |
| Construction of a creche facility to serve the adjacent permitted residential development (Cork County Council Ref. 18/6579), the construction of 19 no. dwelling houses and other site works, Lisnagar Demesne (Townland) Rathcormac Co. Cork | 196892 | x | | | | | | x | An NIS has been submitted which concludes that there will be no adverse impacts either alone or in combination with other plans and projects on the integrity of the Blackwater SAC as a result of the proposed development<br><br>The mitigation measures/best practice measures proposed in the NIS report are meant to prevent pollution to receiving water bodies. With the implementation of such measures, no impacts are anticipated to ecological receptors. Hence no cumulative impacts are likely. |
| Residential Development - Construction of 96 no. dwelling houses and all associated ancillary site development works, Lisnagar Demesne Rathcormac, Co. Cork | 186579 | x | | | | | | x | An NIS has been submitted which concludes that there will be no adverse impacts either alone or in combination with other plans and projects on the integrity of the Blackwater SAC as a result of the proposed development. Mitigation measures are proposed in the NIS to prevent pollution entering water bodies in the vicinity of the development. With the implementation of such measures, no impacts are anticipated to aquatic ecological receptors. Hence no cumulative impacts are likely. |
| 29 no. one and two-storey detached and semi-detached dwelling houses, including the alteration, extension and refurbishment of the former dispansary/fever hospital building, Shanowen Rathcormac Co. Cork | 156359 | x | | | | | | x | An AA Screening Report has been submitted which concludes there is no evidence that that the proposed development will not cause significant deterioration in the habitat or features of the Blackwater SAC. Furthermore, an Ecological Impact Assessment (EcIA) as also been undertaken to conclude about potential impacts from the development, ecological receptors, mitigation measures and residual impacts.<br><br>Neither of the environmental reports assigns potential impacts to terrestrial ecological receptors. Furthermore, the EcIA indicates for the implementation of a Construction Management Plan which would contain mitigation/best practice measure to ensure that no impacts to aquatic receptors would arise from the development. Local SuDS infrastructure is referred as sufficient to prevent any potential impacts during operation phase. Hence no cumulative impacts are likely. |

| | | Biodiversity Receptors | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Development evaluated for in combination effects | Planning Reference | Designated Sites | Habitats and Flora | Avifauna | Hen Harrier | Mammals | Bats | Aquatic Habitats and Species | Potential cumulative impacts identified |
| | | | | | | | | | |

## Table 8-94 Evaluation of cumulative impacts for Habitats and Flora

| | | Habitats and Flora | | | |
|---|---|---|---|---|---|
| | **Source Impact Pathway for Cumulative Impacts** | **Replant Lands Moneygorm** | **Existing Agricultural Activities** | **Existing Forestry Activities** | **Single Turbine Development at Moneygorm** |
| Construction | Direct impacts on habitats and flora | Direct effects resulting from the replant lands have been evaluated as having a long-term imperceptible effect, therefore no significant cumulative effects with the CGEP are predicted. | No changes likely in the current baseline of agricultural practices in the area of geographical overlap, no cumulative impacts on habitats and flora are predicted | Considering that temporary and permanent impacts on terrestrial habitats resulting from the CGEP will be of limited extent and has been assessed as not significant, no cumulative effects are expected to accrue as a result of forestry operations | Given the small scale of this development no cumulative construction stage impacts are predicted. |
| | Habitat degradation | Direct effects resulting from the replant lands have been evaluated as having a long-term imperceptible effect, therefore no significant cumulative effects with the CGEP are predicted. | No changes likely in the current baseline of agricultural practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation. | No changes likely in the current baseline of forestry practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation | Given the small scale of this development no cumulative construction stage impacts are predicted. |
| Operation | Direct impacts on habitats and flora | No cumulative impacts expected | No cumulative impacts expected | No cumulative impacts expected | No cumulative impacts expected |
| | Habitat degradation | No cumulative impacts expected | No cumulative impacts expected | No cumulative impacts expected | No cumulative impacts expected |
| Decommissioning | Direct impacts on habitats and flora | No cumulative impacts expected | No cumulative impacts expected | No cumulative impacts expected | No cumulative impacts expected |

| | | | | | |
|---|---|---|---|---|---|
| | Habitat degradation | No cumulative impacts expected | No cumulative impacts expected | No cumulative impacts expected | No cumulative impacts expected |

**Table 8-95 Evaluation of cumulative impacts for Avifauna.**

| | Source Impact Pathway for Cumulative | Replant Lands Moneygorm | Single Turbine Development Moneygorm | Existing Agricultural Activities | Existing Forestry Activities |
|---|---|---|---|---|---|
| Construction | **Disturbance and displacement** | An Ecological appraisal of the Moneygorm replant lands was carried out. No effects on avifauna were identified for the Moneygorm replant lands, therefore no cumulative impacts are predicted with the CGEP. | Should the construction stage of the single turbine development take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to avifauna receptors identified as being potentially impacted upon during CGEP construction stage. | No changes likely in the current baseline of forestry practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation | Should forestry operations e.g clearfelling take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to avifauna receptors identified as being potentially affected by disturbance during CGEP construction stage. |
| | **Habitat loss** | | Loss of bird foraging and breeding habitat resulting from the CGEP construction stage has been evaluated significantly impacting a number of species comprising Meadow pipits, Goshawk and Kestrel. Therefore, given the close proximity of the single turbine development a potential cumulative impact is identified here with regard to breeding and/or foraging habitat for these species. | No changes likely in the current baseline of forestry practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation | Loss of bird foraging and breeding habitat resulting from the CGEP construction stage has been evaluated significantly impacting a number of species comprising Meadow pipits, Goshawk and Kestrel. Therefore, given that the CGEP development is located within and adjacent to forestry plantation, a potential cumulative impact is identified here with regard to breeding and/or foraging habitat for these species. |
| | **Direct mortality** | | No direct effects resulting from mortality are anticipated during the construction stage of the CGEP development as all clear felling of trees or scrub/ground clearance will occur outside of the nesting season (March – August). | No direct effects resulting from mortality are anticipated during the construction stage of the CGEP development as all clear felling of trees or scrub/ground clearance will occur outside of the nesting season (March – August). | No direct effects resulting from mortality are anticipated during the construction stage of the CGEP development as all clear felling of trees or scrub/ground clearance will occur outside of the nesting season (March – August). |

| | | | | | |
|---|---|---|---|---|---|
| Operation | **Habitat loss** | | As there will be no significant habitat loss during the operation stage of the CGEP in in-combination effects are anticipated with the single turbine development. | As there will be no significant habitat loss during the operation stage of the CGEP in in-combination effects are anticipated with the single turbine development. | As there will be no significant habitat loss during the operation stage of the CGEP in in-combination effects are anticipated with the single turbine development. |
| | **Direct mortality** | | The potential for direct impacts to avifauna receptors during the operational stage of the proposed CGEP development relates to collision risk with operational turbines. As the overall impact significance for the avifauna receptors assessed has been evaluated as having negligible to low significance, cumulative effects of avifauna mortality are not anticipated. | No changes likely in the current baseline of forestry practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation | The potential for direct impacts to avifauna receptors during the operational stage of the proposed CGEP development relates to collision risk with operational turbines. As the overall impact significance for the avifauna receptors assessed has been evaluated as having negligible to low significance, cumulative effects of avifauna mortality are not anticipated. |
| | **Disturbance and displacement** | | No potential indirect effects on birds are predicted during the operational phase of the proposed CGEP development, therefore cumulative effects are not anticipated. | No potential indirect effects on birds are predicted during the operational phase of the proposed CGEP development, therefore cumulative effects are not anticipated. | No potential indirect effects on birds are predicted during the operational phase of the proposed CGEP development, therefore cumulative effects are not anticipated. |
| Decommissioning | **Direct mortality** | | No direct effects on birds are anticipated during the decommissioning stage of the project. | No direct effects on birds are anticipated during the decommissioning stage of the project. | No direct effects on birds are anticipated during the decommissioning stage of the project. |
| | **Habitat loss** | | As no significant habitat loss during the decommissioning stage of the CGEP is anticipated, the potential for cumulative impacts resulting from habitat loss is considered unlikely. | As no significant habitat loss during the decommissioning stage of the CGEP is anticipated, the potential for cumulative impacts resulting from habitat loss is considered unlikely. | As no significant habitat loss during the decommissioning stage of the CGEP is anticipated, the potential for cumulative impacts resulting from habitat loss is considered unlikely. |
| | **Disturbance and displacement** | | Given that disturbance and displacement effects on avifauna during decommissioning has been evaluated as insignificant, no cumulative impacts are anticipated. | Given that disturbance and displacement effects on avifauna during decommissioning has been evaluated as insignificant, no cumulative impacts are anticipated. | Given that disturbance and displacement effects on avifauna during decommissioning has been evaluated as insignificant, no cumulative impacts are anticipated. |

**Table 8-96 Evaluation of cumulative impacts for Terrestrial Mammals.**

| | | Terrestrial Mammals | | | |
|---|---|---|---|---|---|
| | **Source Impact Pathway for Cumulative Impacts** | **Replant Lands Moneygorm** | **Existing Agricultural Activities** | **Existing Forestry Activities** | **Single Turbine Development at Moneygorm** |
| Construction | **Disturbance and displacement** | No disturbance and displacement effects on non-volant mammals were identified for the construction stage of the Moneygorm replant lands, therefore no cumulative impacts are predicted with the CGEP. | No changes likely in the current baseline of forestry practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation | Should felling operations take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to all non-volant mammal receptors identified as being potentially impacted upon during CGEP construction stage, these are Red Squirrel, Pine Marten, Badger and Otter. | Should the construction stage of the single turbine development take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to all non-volant mammal receptors identified as being potentially impacted upon during CGEP construction stage, these are Red Squirrel, Pine Marten, Badger and Otter. |
| | **Direct mortality** | No potential direct impacts resulting from mortality on non-volant mammals were identified for the construction stage of the Moneygorm replant lands, therefore no cumulative impacts are predicted with the CGEP | No changes likely in the current baseline of forestry practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation | Should felling operations take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts on non-volant mammal receptors identified as being potentially directly impacted upon during CGEP construction stage, these are Red Squirrel, Pine Marten, Badger and Otter. | Should the construction stage of the single turbine development take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to all non-volant mammal receptors identified as being potentially directly impacted upon during CGEP construction stage, these are Red Squirrel, Pine Marten, Badger and Otter. |
| | **Habitat loss** | Habitat loss during the construction stage of the Moneygorm replant lands has been evaluated as not resulting in a significant negative effect on the distribution of local protected mammal fauna, therefore no cumulative impacts are predicted with the CGEP development | No changes likely in the current baseline of forestry practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation | Should felling operations take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to all non-volant mammal receptors identified as being potentially impacted upon during CGEP construction stage, these are Red Squirrel, Pine Marten, Badger and Otter. | Should the construction stage of the single turbine development take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to all non-volant mammal receptors identified as being potentially impacted upon via habitat loss during CGEP construction stage, these are Red Squirrel, Pine Marten, Badger and Otter. |
| Operation | **Disturbance and displacement** | As the operation of the Moneygorm replant lands are predicted to have a long-term **imperceptible** effect on mammal fauna no cumulative | Considering that potential indirect impacts on sensitive mammal receptors have been evaluated as being imperceptible during the operational stage of the CGEP | Considering that potential indirect impacts on sensitive mammal receptors have been evaluated as being imperceptible during the operational stage of the CGEP | Considering that potential indirect impacts on sensitive mammal receptors have been evaluated as being imperceptible during the operational stage of the CGEP |

| | | | | | |
|---|---|---|---|---|---|
| | | impacts with the operation of the CGEP development are foreseen. | development, no cumulative effects are anticipated. | development, no cumulative effects are anticipated. | development, no cumulative effects are anticipated. |
| | **Direct mortality** | Considering that potential indirect impacts on sensitive mammal receptors have been evaluated as being imperceptible during the operational stage of the CGEP development, no cumulative effects are anticipated. | Considering that potential direct impacts on sensitive mammal receptors have been evaluated as being imperceptible during the operational stage of the CGEP development, no cumulative effects are anticipated. | Considering that potential indirect impacts on sensitive mammal receptors have been evaluated as being imperceptible during the operational stage of the CGEP development, no cumulative effects are anticipated. | Considering that potential indirect impacts on sensitive mammal receptors have been evaluated as being imperceptible during the operational stage of the CGEP development, no cumulative effects are anticipated. |
| | **Habitat loss** | Considering that potential indirect impacts on sensitive mammal receptors have been evaluated as being imperceptible during the operational stage of the CGEP development, no cumulative effects are anticipated. | Considering that potential indirect impacts on sensitive mammal receptors have been evaluated as being imperceptible during the operational stage of the CGEP development, no cumulative effects are anticipated. | Considering that potential indirect impacts on sensitive mammal receptors have been evaluated as being imperceptible during the operational stage of the CGEP development, no cumulative effects are anticipated. | Considering that potential indirect impacts on sensitive mammal receptors have been evaluated as being imperceptible during the operational stage of the CGEP development, no cumulative effects are anticipated. |
| Decommissioning | **Disturbance and displacement** | No disturbance and displacement of non-volant mammal receptors is expected within the Moneygorm replant lands during the decommissioning phase of the CGEP therefore no cumulative effects are predicted. | No changes likely in the current baseline of forestry practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation | Should felling operations take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to all non-volant mammal receptors identified as being potentially impacted upon during CGEP decommissioning stage, these are Red Squirrel, Pine Marten, Badger and Otter. | Should the decommissioning stage of the single turbine development take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to all non-volant mammal receptors identified as being potentially impacted upon via habitat loss during CGEP construction stage, these are Red Squirrel, Pine Marten, Badger and Otter. |
| | **Direct mortality** | A cumulative impact resulting from direct mortality during the decommissioning phase of the CGEP is not anticipated | No changes likely in the current baseline of forestry practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation | Should felling operations take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to all non-volant mammal receptors identified as being potentially impacted upon during CGEP decommissioning stage, these are Red Squirrel, Pine Marten, Badger and Otter. | Should the decommissioning stage of the single turbine development take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to all non-volant mammal receptors identified as being potentially impacted upon via direct mortality during CGEP construction stage, these are Red Squirrel, Pine Marten, Badger and Otter. |

| | | | | | |
|---|---|---|---|---|---|
| | **Habitat loss** | As there will be no significant habitat loss during the decommissioning phase of the proposed CGEP development no cumulative impacts on non-volant mammals are anticipated. | As there will be no significant habitat loss during the decommissioning phase of the proposed CGEP development no cumulative impacts on non-volant mammals are anticipated. | As there will be no significant habitat loss during the decommissioning phase of the proposed CGEP development no cumulative impacts on non-volant mammals are anticipated. | As there will be no significant habitat loss during the decommissioning phase of the proposed CGEP development no cumulative impacts on non-volant mammals are anticipated. |

**Table 8-97 Evaluation of cumulative impacts for Bats.**

| | | Bats | | | |
|---|---|---|---|---|---|
| | Source Impact Pathway for Cumulative | Replant Lands Moneygorm | Existing Agricultural Activities | Existing Forestry Activities | Single Turbine Development Moneygorm |
| Construction | **Disturbance of bats during construction** | No significant effects on bat species are predicted for the Moneygorm replant lands, therefore no cumulative effects are predicted. | No changes likely in the current baseline of forestry practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation | Should felling operations take place within the timeframe of the CGEP there is potential for the occurrence of disturbance due to cumulative effects during the construction stage. | Given the proximity of this development to the CGEP there is a potential for disturbance effects to bats should the timeframe of construction overlap with the construction of the CGEP project. |
| | **Loss of foraging habitat** | No significant effects on bat species are predicted for the Moneygorm replant lands, therefore no cumulative effects are predicted. | Following felling of conifer plantation during the CGEP construction phase, the overall availability of edge habitat will not change significantly, it is expected that bats will adapt relatively quickly to the changes in their habitat. The construction of the grid connection will not require significant vegetation removal. Therefore, as habitat loss during site clearance works will not cause any significant adverse effects on foraging or commuting bats, no cumulative effects are predicted with existing agriculture activities. | Due to geographical overlap of existing forestry activities with the CGEP development, the potential for cumulative impacts relating to the loss of foraging habitat has been identified. | As the proposed single turbine development is located on habitat which is of low suitability for foraging bats (wet grassland) no loss of suitable bat foraging habitat is anticipated. |
| | **Loss of roosting habitat** | No significant effects on bat species are predicted for the Moneygorm replant lands, therefore no cumulative effects are predicted. | No significant impact on any bat roosts during CGEP construction works will occur, therefore no cumulative effects with existing agricultural activities are predicted. | No significant impact on any bat roosts during CGEP construction works will occur, therefore no cumulative effects with existing agricultural activities are predicted. | No significant impact on any bat roosts during CGEP construction works will occur, therefore no cumulative effects with existing agricultural activities are predicted. |
| | **Direct Mortality** | No significant effects on bat species are predicted for the Moneygorm replant lands, therefore no cumulative effects are predicted. | No changes likely in the current baseline of forestry practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation | No significant impacts resulting from direct mortality are predicted from the construction stage of the of the CGEP therefore no cumulative impacts are predicted. | No significant impacts resulting from direct mortality are predicted from the construction stage of the of the CGEP therefore no cumulative impacts are predicted. |

| | | Bats | | | |
|---|---|---|---|---|---|
| | Source Impact Pathway for Cumulative | Replant Lands Moneygorm | Existing Agricultural Activities | Existing Forestry Activities | Single Turbine Development Moneygorm |
| Operation | **Operational stage disturbance to bat species** | CGEP operational stage activities will be of low intensity and limited to periodic routine maintenance, therefore no cumulative impacts regarding the Moneygorm replant lands are predicted. | No changes likely in the current baseline of forestry practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation | CGEP operational stage activities will be of low intensity and limited to periodic routine maintenance, therefore no significant cumulative impacts regarding forestry activities are predicted. | CGEP operational stage activities will be of low intensity and limited to periodic routine maintenance, therefore no significant cumulative impacts regarding forestry activities are predicted. |
| | **Loss of foraging habitat** | No significant effects on bat species are predicted for the Moneygorm replant lands, therefore no cumulative effects are predicted. | No significant loss of foraging habitat will occur during the operational phase of the proposed development, therefore cumulative impacts resulting from loss of foraging habitat are predicted. | No significant loss of foraging habitat will occur during the operational phase of the proposed development, therefore cumulative impacts resulting from loss of foraging habitat are predicted. | As the proposed single turbine development is located on habitat which is of low suitability for foraging bats (wet grassland) no loss of suitable bat foraging habitat is anticipated. |
| | **Loss of roosting habitat** | No significant effects on bat species are predicted for the Moneygorm replant lands, therefore no cumulative effects are predicted. | No significant impact on any bat roosts during CGEP operational phase will occur, therefore no cumulative effects with existing agricultural activities are predicted. | No significant impact on any bat roosts during CGEP operational phase will occur, therefore no cumulative effects with existing agricultural activities are predicted. | No significant impact on any bat roosts during CGEP operational phase will occur, therefore no cumulative effects with existing agricultural activities are predicted. |
| | **Direct Mortality** | No significant effects on bat species are predicted for the Moneygorm replant lands, therefore no cumulative effects are predicted. | No changes likely in the current baseline of forestry practices in the area of geographical overlap, no cumulative impacts on terrestrial habitats and flora are predicted through construction stage habitat degradation | No changes likely in the current baseline of forestry activities in the area of geographical overlap, no cumulative impacts on bats are predicted. | Mortality of three species of bat (Soprano and Common Pipistrelle, and Leisler's) resulting from collision risk during the operational stage of the CGEP has been identified as a potential impact of local significance. Given the proximity of the single turbine development to the CGEP development, a potential cumulative impact is predicted. |
| Decommissioning | **Disturbance of bats during decommissioning** | No cumulative impacts are expected during decommissioning. | No cumulative impacts are expected during decommissioning. | No cumulative impacts are expected during decommissioning. | No cumulative impacts are expected during decommissioning. |
| | **Loss of foraging habitat** | No cumulative impacts are expected during decommissioning. | No cumulative impacts are expected during decommissioning. | No cumulative impacts are expected during decommissioning. | No cumulative impacts are expected during decommissioning. |

| | | Bats | | | |
|---|---|---|---|---|---|
| | Source Impact Pathway for Cumulative | Replant Lands Moneygorm | Existing Agricultural Activities | Existing Forestry Activities | Single Turbine Development Moneygorm |
| | **Loss of roosting habitat** | No cumulative impacts are expected during decommissioning. | No cumulative impacts are expected during decommissioning. | No cumulative impacts are expected during decommissioning. | No cumulative impacts are expected during decommissioning. |
| | **Direct Mortality** | No cumulative impacts are expected during decommissioning. | No cumulative impacts are expected during decommissioning. | No cumulative impacts are expected during decommissioning. | No cumulative impacts are expected during decommissioning. |

**Table 8-98 Evaluation of cumulative impacts for Aquatic Habitats and Species**

| | Source Impact Pathway for Cumulative | Alteration of Mallow Sewerage Scheme |
|---|---|---|
| Construction | **Direct Mortality** | Instream works and surface water emissions are identified in the environmental reports as potential sources of impacts on aquatic communities (specifically, fish communities) during the construction phase. |
| | **Loss of habitat** | Instream works and surface water emissions are identified in the environmental reports as potential sources of impacts on aquatic communities during the construction phase. However, the effects of loss of habitat (e.g. construction of a stop dam and consequent loss of lotic habitat; loss of river connectivity) has not been addressed. |
| | **Species disturbance** | Instream works and surface water emissions are identified in the environmental reports as potential sources of impacts on aquatic communities (specifically, fish communities) during the construction phase. Migration of fish species such as Sea and River Lamprey and Atlantic Salmon could potentially be impacted if the construction works created a barrier to migration. |

| | Source Impact Pathway for Cumulative | Alteration of Mallow Sewerage Scheme |
|---|---|---|
| | **Water quality degradation - siltation** | Instream works and surface water emissions associated with both the aquatic and terrestrial construction phase of the proposed development could impact on aquatic habitats via increased silt levels in surface water run-off and resuspension of riverbed sediments. |
| | **Water quality degradation – contamination (e.g. hydrocarbon spillages)** | No impact on water quality from hydrocarbons or other chemical spills during construction and thus on the aquatic qualifying interests and conservation objectives for qualifying interests is predicted to occur. |
| | **Indirect impacts through the food chain (e.g. birds)** | Instream works and surface water emissions are identified in the environmental reports as potential sources of impacts on aquatic communities (specifically, fish communities) during the construction phase. However, the indirect effects on other communities (e.g. birds; mammals) has not been addressed. |
| | **Spread of invasive species (e.g. Japanese knotweed, Himalayan balsam, Crayfish plague disease)** | Spread of invasive species has been identified as a potential impact from the Alteration of Mallow Sewerage Scheme. This potential can be augmented by the proposed CGEP Project invasive species potential impact. |
| Operation | **Water quality degradation due to increased WWTP capacity** | The volume of water to be discharged to the Blackwater River will increase upon the upgrade works. Although the concentration of pollutants (e.g. silt) in this increased volume of post-treatment wastewater is controlled, if other pollutant discharges occur cumulatively from other sources within the catchment, the overall water quality of the Blackwater River will be affected. |
| Decommissioning | **Decommissioning effects are likely similar to construction phase (worst case scenario)** | |

## 8.6.1 Potential Construction Phase Cumulative Impacts

### *8.6.1.1 Designated Nature Conservation Sites*

No potential direct cumulative impacts on designated nature conservation sites have been predicted as the proposed CGEP project does not overlap with any national or European Sites designated for nature conservation.

A conceptual modelling exercise was undertaken to identify any other projects or land use activities with the potential to result in indirect cumulative impacts with the CGEP on designated nature conservation sites **(see Section 8.6.1)** No indirect cumulative effects are predicted however as all other developments considered for in-combination impacts have AA Screening or NIS reports on the planning files; these reports conclude that there will be no adverse effects to European sites within the zone of influence. Therefore, given the absence of significant effects on European designated sites as a result of these developments, there is no potential for cumulative effects to occur with the CGEP.

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### *8.6.1.2 Habitats and Flora*

Potential direct impacts during construction have been identified as land take during construction of CGEP (including turbine hardstands, permanent and temporary compounds, substation, borrow pits, sections of new access roads and internal cabling), which will lead to some permanent loss of low value (ecologically) habitats dominated by plantation forestry.

Much of the current landuse with the proposed windfarm site consists of commercial coniferous forestry plantation, therefore there exists a potential for cumulative effects to accrue due to the overlap of the windfarm development during construction and operation and current forestry activities. The existing baseline of felling thinning and planting activities associated with forestry represents a background trend of periodic temporary habitat disturbance with potential to indirectly impact on aquatic habitats and groundwater dependant habitats. The existing forestry within the windfarm site has been evaluated as being of Local Importance (Lower Value) and therefore any direct disturbance resulting from forestry operations will consist of temporary disturbance of short duration with no change in habitat value for terrestrial habitats, for example a change in coniferous forestry to clearfell represents no change in habitat value (i.e low value to low value).

Therefore, indirect impacts resulting from forestry activities are assessed as being limited to potential effects on water quality due to site access, drainage etc. which is potentially impacting aquatic habitats and ground water dependant habitats within the study area. Considering however that temporary and permanent impacts on terrestrial habitats resulting from the wind farm will be of limited extent and has been assessed as not significant, no cumulative effects are expected to accrue as a result of forestry operations i.e no synergistic or additive effects are expected as a result of the existing forestry in combination with the construction or operation of the proposed development.

Existing and consented developments in the area comprise mostly of private dwellings, extensions to dwellings, associated septic tanks, and agricultural buildings, the majority of which occur outside of the study area for terrestrial habitats. Given the absence of spatial overlap between the proposed windfarm and the terrestrial habitats within the study area, no cumulative effects are expected to accrue with existing and consented developments as a result of the construction or operation of the wind farm. Land take from built development in the area is not sufficient to result in an in-combination significant effect.

### *8.6.1.3 Avifauna*

A conceptual modelling exercise was carried out in order to identify projects which have the potential to result in cumulative impacts with the proposed CGEP Project. With regard to avifauna receptors, this modelling exercise identified four projects/activities with the potential to result in cumulative impacts with the CGEP project, these are a consented single wind turbine development at Moneygorm, existing forestry activities, and existing agricultural activities in the vicinity of the CGEP project.

Should the construction stage of the single turbine development at Moneygorm take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to avifauna receptors identified as being potentially impacted upon during CGEP construction stage. Given the

small extent and short-term duration of the proposed Moneygorm turbine, the impact significance has been evaluated as **not significant.** Loss of bird foraging and breeding habitat resulting from the CGEP construction stage has been evaluated as potentially impacting Meadow pipits, Goshawk and Kestrel. Therefore, given the close proximity of the single turbine development to the CGEP, a potential cumulative impact is identified here with regard to breeding and/or foraging habitat loss for these species. Taking into account however the low magnitude of habitat loss in respect of the single turbine development, the impact significance for cumulative impacts is evaluated as **not significant.**

With regard to the potential for cumulative impacts to avifauna resulting from agricultural activities, no changes in the current baseline of agricultural practices are likely in the area of geographical overlap, no cumulative impacts on avifauna are anticipated.

No direct effects resulting from mortality are anticipated during the construction stage of the CGEP development as all clear felling of trees or scrub/ground clearance will occur outside of the nesting season (March – August).

Should forestry operations e.g clearfelling take place in adjacent lands within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to avifauna receptors identified as being potentially affected by disturbance during CGEP construction stage. Taking into account the short duration of felling activities, should they occur, and the medium magnitude of such activities, **a cumulative impact of medium significance is predicted.**

#### *8.6.1.4 Terrestrial Mammals (excluding bats)*

A conceptual model was carried out to identify the potential sources of in-combination impacts during the construction stage of the development to terrestrial mammal receptors. The construction phase of the wind farm is further evaluated for identified cumulative effects resulting from existing agricultural activities and commercial forestry activities in the area of geographical overlap, as well as the single turbine development consented in Moneygorm townland, and the proposed CGEP Replant Lands situated also in Moneygorm. The potential indirect impacts identified are disturbance and displacement, and habitat loss.

No changes are likely in the current baseline of agricultural practices in the area of geographical overlap with the CGEP development, no cumulative impacts on non-volant mammals resulting from direct and indirect impacts are predicted.

With regard to existing forestry operations, should felling operations take place within the timeframe of the CGEP construction stage, and within the area of geographical overlap, there is potential for the occurrence of cumulative impacts to all non-volant mammal receptors identified as being potentially impacted upon during CGEP construction stage; these are Red Squirrel, Pine Marten, Badger and Otter. Theses cumulative impacts resulting from construction stage disturbance and displacement are predicted to be of negative quality, short-term in duration and of moderate significance.

Should the construction stage of the consented single turbine development in Moneygorm take place within the timeframe of the CGEP construction stage, there is potential for the occurrence of cumulative impacts to all non-volant mammal receptors identified as being potentially impacted upon during CGEP construction stage, these are Red Squirrel, Pine Marten, Badger and Otter. Theses cumulative impacts are also predicted to be of negative quality, short-term in duration and of moderate significance.

No disturbance and displacement effects on non-volant mammals were identified for the construction stage of the Moneygorm or Ballard replant lands, therefore no cumulative impacts are predicted with the CGEP.

#### *8.6.1.5 Bats*

A conceptual model was carried out to identify the potential sources of in-combination impacts during the construction stage of the development to bat species receptors. The construction phase of the wind farm is further evaluated for identified cumulative effects resulting from existing agricultural activities and commercial forestry activities in the area of geographical overlap, as well as the single turbine development consented in Moneygorm townland, and the proposed CGEP Replant Lands situated also in Moneygorm and Ballard. The

pathways for potential indirect impacts are identified as disturbance and displacement, loss of foraging habitat and loss of roosting habitat; pathways for direct impacts relate to direct mortality of bats as a result of construction stage operations.

Seeing as no significant effects on bat species are predicted for the Moneygorm and Ballard replant lands, no construction stage cumulative effects relating to the CGEP development are predicted.

With regard to potential cumulative impacts resulting from habitat loss following felling of conifer plantation during the CGEP construction phase, the overall availability of edge habitat will not change significantly, it is expected that bats will adapt relatively quickly to the changes in their habitat. The construction of the grid connection will not require significant vegetation removal. Therefore, as habitat loss during site clearance works will not cause any significant adverse effects on foraging or commuting bats, no significant cumulative effects are predicted with existing forestry activities during the construction stage. As no significant impacts resulting from direct mortality are predicted from the construction stage of the of the CGEP no cumulative impacts are anticipated with regard to forestry activities.

Due to the absence of significant negative effects on bat species resulting from the construction stage of the CGEP no in-combination impacts are predicted with regard to the single turbine development at Moneygorm. For the same reason no construction stage impacts are expected from existing agricultural activities in the area of geographical overlap.

#### *8.6.1.6 Other Species*

The absence of significant adverse impacts on other species such as Marsh Fritillary or reptiles and amphibians predicted during the construction stage of the CGEP projects precludes significant negative cumulative impacts on these receptors.

#### *8.6.1.7 Fisheries and Aquatic Ecology*

Potential cumulative impacts during construction phase on Fisheries and Aquatic Ecology have been identified in **Table 8-93** egarding the only project identified with potential for cumulative impacts with the Proposed CGEP Project – Alteration of Mallow Sewerage Scheme. Based on the project's Environmental reports (DixonBrosnan, 2019), the potential cumulative impacts to the aquatic environment relate to: direct mortality of aquatic species; loss of habitat; species disturbance; water quality degradation due to increased siltation; water quality degradation due to contamination (e.g. hydrocarbon spillages); and spread of invasive species (e.g. Japanese knotweed, Himalayan balsam, Crayfish plague disease).

The works to be carried out for the alteration of mallow sewerage scheme will involve instream works. To avoid direct mortality and species disturbance, 3,600m$^2$ of river bed will be enclosed by barriers and dams and fish will be removed from the area of the river within the barriers and dams and within any silt curtain envelope. Furthermore, instream works will be limited to July to September, in accordance with IFI guidelines, to avoid the salmon and lamprey spawning season. Contract duration for pipeline works will be 2 years in order to allow for possibility of instream works occurring over two summer periods. Furthermore, works will be undertaken in the dry and detailed mitigation has been proposed to prevent any deposition of resuspending sediments on aquatic habitats. Riverbed material removed by the trench excavation for the laying of a pipeline within the River Blackwater will be used for backfill in order to maintain natural riverbed material in the reinstated bed area. This will result in no notable residual distortion of the pre-existing riverbed habitat profile post works, and no loss of aquatic habitat within the river channel is anticipated (DixonBrosnan, 2019).

Further to this, riparian habitats with overhanging vegetation are important for migration as they provide areas of cover in which fish rest and stabilise river banks. These marginal areas also provide protection from predators and direct sunlight and consequently fish may remain in these areas for extensive periods of time. The ecological mitigation proposed and the construction plans for the development involves limiting the removal of significant riparian vegetation which will regrow and/or be replanted. The long-term impact on riparian vegetation is predicted to be negligible (DixonBrosnan, 2019).

Migration of fish species, such as Sea and River Lamprey and Atlantic Salmon, could potentially be impacted if a barrier to migration is created. Delays to migration can make these species more susceptible to predation or poaching. However, as the pipeline within the Blackwater River will be laid in sections, there will be no

significant impedance of fish movement. In addition, construction activities will be undertaken during daylight hours only and will ensure that there is potential for undisturbed passage at night, when main surges of migratory fish are more likely to occur. Any day-term disturbance related impedance of migration will be short-term as instream works will only take place in the period from July to September in line with IFI guidelines to avoid the main migratory period. Assuming a worst-case scenario there will a direct, short-term impact on 3,600 $m^2$ of potential spawning habitat outside of the spawning season (DixonBrosnan, 2019).

Instream works and surface water emissions associated with the mentioned project could impact on aquatic habitats via increased silt levels in surface water run-off and resuspension of riverbed sediments. High levels of silt can impact on fish species, in particular spawning salmonids. If of sufficient severity, adult fish could be affected by increased silt levels as gills may become damaged by exposure to elevated suspended solids levels. If of sufficient severity, aquatic invertebrates may be smothered by excessive deposits of silt from suspended solids. In areas of stony substrate, silt deposits may result in a change in the macro-invertebrate species composition, favouring less diverse assemblages and impacting on sensitive species. Cement can also affect fish, plant life and macroinvertebrates by altering pH levels of the water. Silt can have a particularly detrimental impact on spawning habitat for salmon and lamprey species. Aquatic plant communities may also be affected by increased siltation. Submerged plants may be stunted and photosynthesis may be reduced. However, a range of standard mitigation procedures minimise the potential for impacts on water quality. Specific non-standard measures effectively prevent impacts from silt and hydrocarbons. In particular the use of a temporary dam allows works to be carried out in the dry, which minimises the risk of potential impacts (DixonBrosnan, 2019).

A Biosecurity Management Plan will be prepared prior to the commencement of site works to minimise risk of spread of high impact invasive species. The key elements of this plan will are outlined in **Mitigation Section 8.7.1**. Furthermore, where direct disturbance is unavoidable within 7m of a stand of Japanese Knotweed, an invasive species management plan will be drawn up which will include all relevant provisions for the hygiene and appropriate disposal of contaminated soil and subsoil (DixonBrosnan, 2019).

Considering the worst-case scenario (i.e. the mitigation measures for the Alteration of Mallow Sewerage Scheme would not be effective), a cumulative impact with the construction phase of the proposed CGEP Project would be likely if both projects would have their construction phases coinciding in time. However, as per Irish Water notice[39], the Alteration of Mallow Sewerage Scheme construction timeline has been finalised and will not be within timeframe of CGEP construction (if planning permission received). Thus, cumulative impacts with the construction phase of the CGEP Project are not likely.

### 8.6.2 Potential Operational Phase Cumulative Impacts

#### *8.6.2.1 Designated Nature Conservation Sites*

As operational stage activities within the CGEP development will be of a low intensity and periodic in nature no significant effects are likely to designated sites.

#### *8.6.2.2 Habitats and Flora*

Potential cumulative impacts during the operational stage of the proposed development are expected to be of limited extent and of **negligible magnitude**. Temporary landtake resulting from the construction stage operations e.g. excavations, land clearance and temporary access, passing bays and turning heads will be subject to re-colonization by vegetation with a resultant limited but positive impact on habitats and flora. As the operational phase procedures such as turbine maintenance will not involve additional landtake and will be limited to permanent features such as vehicular and personnel access on site roads, substation, hardstand areas and turbines.

Cumulative operational stage impacts where the grid connection and wind farm study areas overlap are expected to be minimal. As with the windfarm, following construction of the grid, which is largely confined to

[39] Available at https://www.water.ie/news/2-million-sewer-network-u/. Accessed in January 2020.

the public road, there will be no additional land take during the operational stage. Maintenance of the grid connection is envisaged to involve minor maintenance with any works limited to existing built surfaces. Taking into account the absence of additional landtake during the operational stage of both the wind farm and the grid connection, cumulative impacts are assessed as being neutral in character, of limited extent, and having a slight magnitude. Therefore, cumulative impacts during the operational stage are assessed as **not significant**.

#### *8.6.2.3 Avifauna*

As there will be no significant loss of bird habitat or disturbance to birds during the operation stage of the CGEP, no indirect cumulative effects are anticipated with the single turbine development at Moneygorm. The potential for direct impacts to avifauna receptors during the operational stage of the proposed CGEP development relates to collision risk with operational turbines. As the overall impact significance for mortality of avifauna receptors assessed has been evaluated as having negligible to low significance during the operation stage, significant negative cumulative effects resulting from avifauna mortality are not anticipated i.e the potential direct impacts remain at **imperceptible.**

No cumulative impacts resulting from the Moneygorm or Ballardreplant lands are anticipated as no effects on avifauna were identified in the ecological appraisal of the replant lands.

With regard to agricultural activities and forestry operations, no direct or indirect cumulative impacts on avifauna are anticipated during the operational stage of the CGEP.

#### *8.6.2.4 Terrestrial Mammals (excluding bats)*

As the operation of the Moneygorm replant lands are predicted to have a long-term **imperceptible** effect on mammal fauna, no cumulative impacts with the operation of the CGEP development are foreseen. Considering that potential direct impacts on sensitive mammal receptors have been evaluated as being imperceptible during the operational stage of the CGEP development, no cumulative effects are anticipated with regard to existing forestry and agricultural activities.

#### *8.6.2.5 Bats*

No significant indirect impacts on bats are predicted during the operational stage of the proposed CGEP development thus precluding indirect cumulative effects with existing forestry and agricultural activities and other developments. With regard to potential direct effects, mortality of three species of bat (Soprano and Common Pipistrelle, and Leisler's) resulting from collision risk during the operational stage of the CGEP has been identified as a potential impact of local significance. Given the proximity of the single turbine development at Glannasack to the CGEP development, a potential negative **significant** cumulative impact of local importance is predicted on Leislers Bat specifically in the absence of mitigation.

#### *8.6.2.6 Other Species*

The absence of significant adverse impacts on other species such as Marsh Fritillary or reptiles and amphibians predicted during the construction stage of the CGEP projects precludes significant negative cumulative impacts on these receptors.

#### *8.6.2.7 Fisheries and Aquatic Ecology*

Potential cumulative impacts during operation phase on Fisheries and Aquatic Ecology have been identified in **Table** 8-98 **8-98** regarding the only project identified with potential for cumulative impacts with the Proposed CGEP Project – Alteration of Mallow Sewerage Scheme. Based on the project's Environmental reports

(DixonBrosnan, 2019), the potential cumulative impacts to the aquatic environment relate to water quality degradation due to increased WWTP capacity.

The upgraded WWTP will increase the discharge volume to the Blackwater River by 4%. However, effluent limit values for discharges to the river will remain the same as before the upgrade works and volume discharge will only increase nominally. Predicted downstream concentrations in the river water body will remain within the relevant standard. Furthermore, Waste Assimilative Capacity and Mass Balance calculations were completed for the discharge from Mallow WWTP and the analysis demonstrates that the assimilative capacity of the river will not be exceeded as a consequence of the development and the 95%ile EQS for BOD, Ammonia and Orthophosphate required for the maintenance of Good Status in the river.

### 8.6.3 Potential Cumulative Impacts during Decommissioning

#### *8.6.3.1 Designated Nature Conservation Sites*

It is unknown what projects will be relevant at the time of decommissioning. Give the development in entirety is located outside designated sites no cumulative impacts are likely, with mitigation for the project detailed in Section 8.7.

#### *8.6.3.2 Habitats and Flora*

Potential cumulative impacts during decommissioning of the proposed development are expected to be of limited extent and magnitude. As the decommissioning phase procedures such as disassembling of turbines, and transport of turbine components offsite will not involve additional land-take and will be limited to permanent features such as vehicular and personnel access on the existing site roads, substations and hardstand areas. It is proposed that all turbine foundations will be left in situ in order to reduce the environmental effects associated with excavating and removing these from site. The internal site roads will also be left in-situ subject to agreement with local landowners and Cork Co. Council. Considering the brief duration of the decommissioning phase and the absence of additional disturbance to habitats and flora outside of the built footprint of the windfarm and associated infrastructure, no significant cumulative effects are predicted.

It is proposed that decommissioning of cabling will involve cutting the cables and leaving them in situ.

Removal of habitats and trimming/felling to facilitate the transport of turbines/towers offsite is likely to result in small scale negligible impacts of brief to momentary duration on terrestrial habitats and flora during the decommissioning stage of the development. As the lifetime of the proposed wind farm is 30 years, there may be a significant change in the habitats and flora along the turbine delivery route

#### *8.6.3.3 Avifauna*

Due to the prediction of an absence of direct effects on avifauna during the decommissioning stage of the project, no direct cumulative impacts will result with other projects or activities. Given that disturbance and displacement and habitat loss impacts on avifauna during decommissioning have been evaluated as insignificant, no cumulative impacts are anticipated in respect of indirect effects.

#### *8.6.3.4 Terrestrial Mammals (excluding bats)*

As no significant habitat loss during the decommissioning phase of the proposed CGEP development is anticipated, no cumulative impacts on non-volant mammals are expected with regard to the Moneygorm and Ballard replant lands, existing forestry and agricultural.

With regard to cumulative disturbance and displacement of terrestrial mammal receptors due to forestry activities, should felling operations take place within the timeframe of the CGEP decommissioning stage, there is potential for the occurrence of cumulative impacts to all non-volant mammal receptors identified as being potentially impacted, these are Red Squirrel, Pine Marten, Badger and Otter. Assuming no changes in the

current baseline of agricultural practices in the area of geographical overlap with the CGEP development, no cumulative impacts on non-volant mammals through disturbance and displacement are predicted.

#### *8.6.3.5 Bats*

Decommissioning works are anticipated to be of brief duration and therefore no significant cumulative impacts with other projects and exiting agriculture and forestry operations are predicted.

#### *8.6.3.6 Other Species*

The absence of significant adverse impacts on other species such as Marsh Fritillary or reptiles and amphibians predicted during the construction stage of the CGEP projects precludes significant negative cumulative impacts on these receptors.

#### *8.6.3.7 Fisheries and Aquatic Ecology*

All projects have identified mitigation to avoid significant adverse effects on sensitive aquatic receptors. In this regard proposed mitigation for CGEP and other project elements (**Section 8.7**) are proposed to rule out risks of significant adverse effects.

# 8.7 MITIGATION MEASURES

## 8.7.1 Mitigation Measures during Construction

### *8.7.1.1 Project Ecologist and Monitoring*

The implementation of all mitigation presented in this section will be overseen by a suitably qualified Project Ecologist during the construction stage of the proposed CGEP development. An onsite Ecological Clerk of Works (ECoW) will be present to oversee construction works where required, to ensure that all agreed mitigation measures are carried out by the appointed contractor(s). Ongoing monitoring of the efficacy of said mitigation measures will be carried out throughout the construction stage.

### *8.7.1.2 Designated Nature Conservation Sites*

#### 8.7.1.2.1 Generic Mitigation Measures and Best Practice

The potential impacts on designated nature conservation sites, which are identified in **Section 8.5.2**, relate to potential construction stage impacts due to downstream hydrological connectivity with 9 Nationally designated sites comprising 9 pNHA's and two European sites, the Blackwater River Callows SPA and the Blackwater River (Cork/Waterford) SAC. The mitigation measures presented for protection of water quality during construction stage and operational phases are applicable for the protection of national and European protected sites with downstream connectivity to the CGEP project and are outlined below. These will be built into CEMP / Contract Documents to ensure risk of impacts to aquatic biodiversity impacts are minimised.

### *8.7.1.3 Habitats and Flora*

#### 8.7.1.3.1 Generic Mitigation Measures and Best Practice

*CGEP and Grid Connection Route*
**Invasive Species**

To ensure that invasive alien species are not accidentally introduced or spread during construction, measures to be utilised to deal with invasive species will be included in the CEMP .These measures will follow as relevant the manual '*The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*' by NRA (2010); and Cognisance will be made of 'The Best Practice Management Guidelines' produced by Invasive Species Ireland (Maguire et al, 2008). This shall include measures as detailed in the guidance above to preclude the spread of invasive species through excavation of and/or backfilling of borrow pits. Wheel washes draining to silt traps will be implemented at site entrances to prevent the possible spread of any invasive species.

**Removal of Vegetation**

All works on trees, scrub or hedgerows, including internal roads, entrances and the proposed Turbine Delivery Route shall adhere to NRA guidelines for the protection of trees, hedgerows and scrub prior to, during and post construction of national road scheme.

In accordance with Section 40 of the Wildlife Acts 1976-2012, woody vegetation removal will be conducted outside the bird breeding season which runs from the 1st of March to the 31st of August inclusive. It should be noted that the provisions of Section 40 do not relate solely to birds, but a range of biodiversity that contributes to food chains and wider ecosystems. Where sections of hedgerow/ treeline are removed, these will be reinstated with native hedge/ tree species which are indigenous to the local area.

**General Site Remediation**

- Where feasible the areas around the turbine bases and other disturbed areas should be allowed to re-vegetate naturally. Larger trees as they grow over time will be trimmed back on an ongoing basis (every 2 – 3 years outside bird breeding season) if required. Woody material will be left in situ (deadwood) as an ecological habitat for invertebrates.
- It is important to note that the proposed reinstatement and planting regime will have a long-term goal to ensure that recolonisation of disturbed ground in keeping with the existing on-site semi natural scrub/ heath type vegetation. Therefore, natural regeneration of onsite flora will be encouraged where

appropriate. If this is deemed unsuccessful, further action will be taken in the form of reseeding with local species in keeping with the natural character of the surrounding environs.
- Replacement of harvested vegetated sod to disturbed bare areas post construction should encourage re-vegetation and avoid erosion in the vicinity of turbines, hardstands, access roads, drainage structures and all other associated infrastructure.
- Where applicable the harvested surface vegetation sods will be maintained in a moist state during construction in preparation for re-use at locations where the non-vegetative layer has been exposed.
- Harvested turves should be reused in the restoration of all bare/exposed surfaces around turbines, exposed peat/soil, borrow pits, and on peat berms adjacent to access tracks.
- Where applicable, excavated peat should not be spread on ecologically sensitive habitats or areas adjacent to watercourses;
- Some areas of bare/exposed surface may remain following the completion of construction works, however if these areas remain stable, natural re-colonisation should eventually occur. No action is needed from the contractor in this case.
- Bare surfaces on slopes greater than 2° should be stabilised or re-vegetated as soon as possible to minimise the risk of erosion which may result from sustained rainfall.
- Natural re-vegetation is the preferred method of recovery. However, where required (for example, where adequate quantities of vegetated peat are not available or natural re-vegetation processes are insufficient), bare material and/or reinstated peat should be secured using vegetation blankets such as Greenfix Embankment Mat, Geojute or similar approved product. An appropriately pre-seeded CoirMesh is also suitable, if required.

**Access Track Reinstatement**

- Soil and peat excavated during the course of the access track construction works should be reused on-site in the form of landscaping roadside peat berms in areas of minimal peat cover and as backfill at other locations on site (e.g. areas of exposed soil and bedrock, landscaping around turbine bases and hardstands etc).
- Harvested vegetative layers will be placed on the berms where required. This will provide resistance against rainfall events, and will minimise sediment and nutrient release until natural re-vegetation is established.
- As part of the appointed Ecological Clerk of Works recommendations, the re-vegetation of access tracks an berms will be monitored on an on-going basis.

**Cable Trench Reinstatement**

- Where trenching is to be carried out off-road, the excavated material will be laid alongside the trench for use in reinstatement following the laying of cables; vegetated surface layers will be stored separately.
- Once cable laying work has been completed the excavated material should be backfilled and compacted to a suitable standard.
- The refilled trenches should then be capped with harvested surface layers which will be encouraged to re-vegetate naturally.
- The appointed Ecological Clerk of Works will monitor the on-site reinstatement of trenches and will survey the progress of plant recolonisation on an on-going basis.

**Borrow Pit Reinstatement**

- The stored soil overburden will be replaced and graded to reflect the surrounding landscape.
- This will be capped with the surface layer of sod to encourage rapid re-establishment of indigenous vegetation.
- In all cases disturbed ground will be allowed to naturally re-vegetate initially and this progression will be assessed post construction by the appointed Ecological Clerk of Works.
- Should reinstatement result in a surface root-zone composed of a mix of subsoil and topsoil, it is possible that vegetation will quickly succeed to a European gorse cover within 10 years of restoration.
- Should this occur, alternative land management will be carried out in consultation (and monitored) by an ecologist to ensure maintenance as suitable forage habitat for Hen Harriers. The Site Ecologist will monitor this succession as part of the site management plan over the lifetime of the project.

**Settlement Pond Reinstatement**

- Settlement ponds will be in-filled, reinstated and managed as per borrow pit reinstatement.

**Protection of Aquatic and groundwater dependant habitats**

Material stockpiles will be kept to a minimum size, covered and located at least 10m from the drainage system

The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary site compounds. All fuel will be stored in bunded, locked storage containers. The designated storage location will be greater than 100m from a watercourse.

Works will be avoided during prolonged periods of very heavy rainfall. Refuelling of machinery shall be carried out at designated areas on the site. Safe-guards such as drip-trays for refuelling of machinery, machine servicing, concrete mixing, etc. shall be utilised.

Any existing pools or aquatic areas will be fenced off and protected from disturbance during the construction phase.

The use of wet concrete and cement in or close to any watercourses and semi-natural habitats will be carefully controlled, particularly from shuttered structures or the washing of equipment. The cleaning and wash-out of chutes of concrete batching plant or ready-mix lorries should be carried out in a dedicated, contained area as far from sensitive habitats and watercourses as practical. This will be for the wash-out of the chutes only— after the pour. Concrete trucks will then exit the site and return to the supply plant to wash out the mixer itself.

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#### 8.7.1.3.2 Project Component-Specific Mitigation Measures

Mitigation measures are outlined below specific to each/all identified potential significant effects which will avoid/reduce/offset to not significant.

**Invasive Species**

CGEP

Pheasant Berry

The 2 no invasions of Pheasant berry located along the existing access road to the Bottlehill Landfill facility will be resurveyed by an invasive species specialist 3-4 weeks prior to the commencement of works. If disturbance is required, than all Pheasant Berry plants will be dug out by hand and left in-situ to rot. Digging out is the selected method of treatment for this species as stumps can re-sprout following cutting back and treatment with herbicide. Digging out will not be carried out during the fruiting period for this species (October and November) as Pheasant berry spreads primarily by seed dispersal.

Japanese Knotweed

Three Japanese knotweed infestations were recorded during habitat assessments on the CGEP Grid Connection, two of which occur within the CGEP Grid Connection study area. The two Knotweed infestations occurring within the study area are located within 7m of the proposed works and will therefore require treatment. The introduction and spread of these invasive plant species will be avoided during the construction phase of the project by ensuring that appropriate precautionary measures are in place. Guidelines produced by the NRA (2010) on 'The management of noxious weeds and non-native invasive plant species on national roads' will be adhered to. It is of particular importance that excavated material from the areas where Japanese Knotweed is known to be present be appropriately managed.

The two Japanese knotweed infestations are located on the grid connection route at roadside locations in the townland of Cullenagh adjacent to Fermoy Golf Course. As the installation of the UGC will require excavation at this location, there is potential for spread of viable plant material to other areas during construction. The following specific mitigation measures will be applied at these infestations:

- Pre-Construction confirmatory surveys will be completed by an invasive species specialist, 3 – 4 weeks before construction begins. Mapping, showing the most up to date distribution and extent of Knotweed at the previously identified infestation locations, and also for any potential new infestations within the

zone of influence of the construction works;

- Based on the updated surveys a Biosecurity Management Plan will be prepared prior to the commencement of site works to minimise risk of spread of high impact invasive species. This will incorporate mitigation detailed herein.

- A toolbox talk will be provided by the invasive species specialist with the Contractors construction site engineers and general operatives to explain about all invasive species identified along the route and the restrictions that will apply for the full construction period. The toolbox talk will cover all pertinent topics including all relevant invasive species close to construction works and the biosecurity measures to be implemented while working The invasive species toolbox talk will cover the full lifecycle of every construction activity including, but not limited to, all onsite construction activities, mechanical excavation, transportation and disposal of all material from excavations, through to the backfilling of excavations, and reinstatement of the construction works area;

- Where works are being carried out within 7m of a Japanese Knotweed infestation, the covering of infestations will be completed on sections seven days in advance of works. The infestations will be covered so that their full extent plus 1 metre is covered entirely and no vegetation is visible;

- The covering of vegetative knotweed infestations will be carried out using high density polyethylene grass carpet terram at all identified locations prior to any works commencing. When taking the terram off an infestation area, the construction team will need to ensure that all adherent material has been removed and placed within the adjacent infestation i.e. it will be important not to spread the infestation;

- The covering of knotweed infestations will only be carried out by the invasive species specialist i.e. this work will not be carried out by any general construction staff. No posts will be used to secure the coverings i.e. there will be no uncontrolled ground interference within 7 meters of any infestation during any of these operations;

- Once each knotweed infestation has been covered, works can begin at that location, an invasive species specialist will be present to provide supervision of all works adjacent to infestations;

- The site Environmental Clerk of Works will ensure that the Contractor engages a suitable waste disposal company with the requisite license for handling any hazardous waste (i.e. invasive species material). The Contractor will maintain records of all wastes arising, and the documentation will include the waste contractors local authority license and proof of appropriate haulage license per individual haulage vehicle.

Himalayan Balsam

Himalayan Balsam is most invasive in damp habitats particularly along river corridors, where it out-competes native vegetation in summer and dies back in winter, exposing river banks to erosion. It spreads rapidly downstream in river catchments due to its prolific seed production. Himalayan Balsam was recorded at a single location at a proposed watercourse crossing on the CGEP grid connection, where it was found to be growing on the riverbank upstream and downstream of the crossing location.

Prior to the commencement of works at this location on the Grid Connection Route, the infestation will be re-surveyed by an appropriately qualified invasive species expert to establish the extent of the infestation. Should the proposed woks at this location come into contact with vegetative material, control measures will be required. A range of methods are recommended for the treatment of *I. glandulifera* (Invasive Species Ireland, 2015; Inland Fisheries Ireland, 2015; Cabi, 2015), one of which is manual control. Manual control is carried out by physically pulling the plants by hand. If deemed necessary, manual control will be carried in late spring/early summer when newly germinated plants are distinguishable from surrounding vegetation, but prior to plants setting seed. Vegetative material will be left in-situ to rot, and not removed from site to avoid spreading viable material in transport. All operators must be trained in biosecurity protocol, control methodology, and in the identification of Himalayan Balsam at all stages of growth. At least one successive visit is recommended as Himalyan Balsam can germinate throughout the growing season. Manual control has been applied successfully in Ireland e.g within the River Allow catchment in Co. Cork (IRD Duhallow Ltd., 2015). Works at the watercourse crossing can only commence upon successful removal of Himalyan Balsam from the works area.

**Habitat Loss**

Habitat disturbance in areas of semi-natural habitat during construction work should be strictly confined to within the direct land-take of the proposed wind farm and associated infrastructure. A working corridor will be set out in advance of the works, identified by low impact markers. The extent of construction activities will be controlled to limit vegetation removal and the exposure and/or compaction of soils. The setting out of the corridor will be preceded by a site walkover by an appropriately qualified ecologist to ensure that the working area is reduced to the minimum required for the works, taking account of minimising rutting and compaction by vehicles. A suitably qualified Ecological Clerk of Works will be appointed to oversee environmental protection measures during the construction phase of the proposed site works to ensure full compliance with environmental protection measures which have been set out both here and within the CEMP. Excess peat or soil excavated to create the access road and other infrastructure shall not be side Cast or spread over existing habitats of local ecological value such as scrub, wet heath and wet grassland.

A total of 1.65ha of scrub will be permanently removed during the construction of the windfarm. This loss of scrub habitat will be compensated through allowing approximately 30.4ha of lands around turbines to develop a semi natural wet grassland / low scrub habitat as a result of mature tree clearance within a buffer around each turbine.

**Hedgerow loss**

During the construction of the project there will be a loss of 206m of hedgerow/ linear scrub habitat. Planting of a new hedgerow of equal length is proposed around the new substations using native woody species of local provenance only. Replanting should be carried out using native species only and species chosen should reflect the character of the locality and should consist of appropriate species for the receiving soil conditions.

*TDR*
Detailed mitigation measures to manage invasive species in particular Japanese Knotweed will follow similar approaches for minimising risk of invasive spread, as outlined above for CGEP and TDR. Mitigation measures for the TDR are outlined in detail in section 1.3.3 of the TDR ecological assessment, **Appendix C**.

#### *8.7.1.4 Terrestrial Mammals (excluding bats)*

##### 8.7.1.4.1 Generic Mitigation Measures and Best Practice

*CGEP and GCR*

Water protection measures will prevent water pollution events and thus prevent negative impacts on Otter.

- A Construction and Environmental Management Plan (CEMP) has been prepared, and is included as **Appendix 3.1** of this EIAR. The CEMP will be in place prior to the start of the construction phase.
- Machinery and materials will be parked/stored in the specified compound areas to minimise disturbance. Wherever possible, vehicles will be refuelled off-site in designated areas. This will be the case for regular, road-going vehicles.
- On-site refuelling of machinery will be carried out using a mobile double skinned fuel bowser at dedicated locations away from watercourses.
- The fuel bowser, a double-axle custom-built refuelling trailer will be towed around the site by a four-wheel drive jeep to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the cranes, excavators, etc. that will be used during the construction of the proposed wind farm. The jeep will also carry fuel absorbent material and pads in the event of any accidental spillages.
- The fuel bowser will be parked on a level area in the construction compound when not in use.
- Refuelling operations will be carried out only by designated trained and competent operatives.
- Mobile anti-pollution measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.
- Materials excavated (e.g. peat, soil, gravel or rock) during construction of the turbine bases, electrical sub-station, or during construction of new roadways or the upgrading works on existing roadways will be reused within the site.
- Re-use of these materials within the site will occur under conditions where there is no possibility of the material becoming mobile in the environment and entering into either surface or ground waters.
- The CEMP also provides for the appointment of a Site Supervisor/Construction Manager and/or Environmental Manager to maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. In addition, an Environmental Clerk of Works or Project Ecologist, Project Hydrologist, Project Geotechnical engineer will visit the site regularly and

report to the Site Environmental Office. This structure will provide a "triple lock" review/interaction by external specialists during the construction phase.

#### 8.7.1.4.2 Project Component-Specific Mitigation Measures

*CGEP*

Project design measures will involve conducting all construction work during daylight hours where possible. This will minimise the likelihood of disturbing and displacing mammal which are exclusively nocturnal or are most active at dawn and dusk, such as Badgers, Pine Marten, Otter and Stoat. In the event that lighting is required cowled lighting will be employed to minimise potential disturbance in mammals due to light-spill.

In accordance with NRA Guidance, to account for the passage of time between the aforementioned mammal surveys and the commencement of construction activities/ clear felling in suitable habitat confirmatory surveys will be undertaken pre-construction to re-confirm the presence/absence of Badger setts, Otter holts, Pine Marten resting places or Red squirrel drays. Should new resting/breeding places of protected mammals be discovered then appropriate mitigation will be undertaken in agreement with NPWS and following NRA Guidance where applicable to prevent significant negative effects of the species. For example, any identified Badger setts will be protected by following NRA guidance, which states that no heavy machinery should be used within 30m of badger setts outside of the breeding season, and 50m during the breeding season (unless carried out under licence).

Construction work will be supervised by an on-site ECoW with stop works authority. This will further reduce the likelihood of destruction of the resting places of protected mammals.

*GCR*

Confirmatory surveys of the grid route connection will be undertaken prior to commencement of construction works. Should any resting/breeding places of protected mammals be discovered then appropriate mitigation will be undertaken in agreement with NPWS and following NRA Guidance where applicable to prevent significant negative effects of the species. For example, any identified Badger setts will be protected by following NRA guidance such as no heavy machinery should be used within 30m of badger setts (unless carried out under licence). Therefore, any effects are evaluated as negligible.

Water protection measures will be used when works are within 50 metres of a water body, thus the impact on Otter as a result of water pollution is considered as imperceptible. Given the design of the development and the construction methodologies and best practice, disturbance/displacement related impacts are also considered to be Imperceptible.

*TDR*

Prior to the clearing of vegetation or trees, confirmatory surveys will be conducted to ensure that no resting/breeding places of protected mammals are within the area of clearance.

### *8.7.1.5 Bats*

#### 8.7.1.5.1 Generic Mitigation Measures and Best Practice

It is anticipated that the majority of construction works will be carried out during daylight hours, but some works may be carried out at night. In these cases, all lighting will be cowled in order to prevent light spill. Lights will be operational when work is taking place, but will be switched off when no long required; no lighting will be left turned on overnight. In the site compound, lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational.

#### 8.7.1.5.2 Project Component-Specific Mitigation Measures

The ground around turbine bases up to 92 M from Turbines will be cleared of mature conifer trees in order to reduce bat activity in the vicinity of turbines, and hence reduce risk of collision. Clearance works will be carried out in the construction phase, but the rationale for this measure is outlined in the operational section.

#### *8.7.1.6 Avifauna*

##### 8.7.1.6.1 Generic Mitigation Measures and Best Practice

Best practice recommendations for mitigation measures with regard to birds and wind farms, as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds, will be attended to during all construction works (Drewitt & Langston, 2006).

Ahead of any works to be undertaken, a confirmatory survey will be undertaken by the Project Ecologist, or experienced Ornithologist, to assess the presence of birds nests, irrespective of the time of the year. Beyond any clear felling works to be avoided until the end of the bird breeding season (i.e. March to August, inclusive), in the event of nests being found within the study area, works will cease. The survey findings will be reported to the competent authority and an application for a derogation license will be made to NPWS.

Pre construction monitoring surveys will be conducted from early March and prior to any site clearance, enabling or forest clearance works focussed on breeding status determination of Goshawk and hen harrier relative to proposed works areas. No works will take place where evidence of possible nesting is recorded and a minimum 500m buffer will be retained between all works areas and possible nest areas or subject to advice from a competent adequately experienced ornithologist (minimum 10 years experience). In this regard a wider or possibly narrower buffers may be required/ appropriate. Given risks of disturbance to these specific bird species no licencing will be sought as no works will be conducted between March 1st and August 31st within buffers identified or as advised by the site ornithologist and depending on breeding status. NPWS will be informed of breeding status and monitoring audits will be conducted and full disclosure provided to NPWS.

##### 8.7.1.6.2 Project Component-Specific Mitigation Measures

*CGEP and GCR*

In order to avoid the potential impacts to breeding birds , tree removal and clearance of any other vegetation likely to hold nesting birds will be undertaken outside of the bird breeding season, i.e. not during the period of March to August, inclusive. In the eventuality of this not being possible, these works/activities will not take place before a confirmatory survey of the affected area (i.e. aerial and ground-based nests) is undertaken by the Project Ecologist. This includes hedgerow and scrub removal in addition to hedgerow trimming along turbine delivery routes and proposed cable routes. In the event of any nests being found, the works will immediately cease, the survey findings will be reported to the competent authority and an application for a derogation license will be made to NPWS. Any license requirements shall be facilitated by a complete confirmatory re-survey prior to works commencing and all future works associated with the derogation license will be supervised by the Project Ecologist.

Any works to be undertaken on existing culverts or other types of water-crossings must be preceded by a confirmatory nest survey by the Project Ecologist or an experienced Ornithologist. The survey will determine presence or absence of nests of riparian birds (e.g. Kingfisher) or birds that can use these habitats to nest (e.g. Grey Wagtail, Dipper). In the event of any nests being found that may be at risk of disturbance, than works will immediately cease, the survey findings will be reported to the competent authority and an application for a derogation license will be made to NPWS. Any license requirements shall be facilitated by a complete confirmatory re-survey prior to works commencing and all future works associated with the derogation license will be supervised by the Project Ecologist.

Sections of hedgerow/ treelines scheduled for removal and/or trimming and containing mature trees suitable for nesting Barn Owls will be surveyed prior to construction for occupancy by Owls. Should Owls be present then minimum protection zones as outlined in published guidance will be adhered to for the period of construction (Shawyer, 2011).

Toolbox talks shall be held with construction staff on disturbance to key species during decommissioning. This will help minimise disturbance. This in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt & Langston, 2006).

Any re-instated habitats will include native species where possible to enhance diversity of birds. This in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt & Langston, 2006).

*TDR*

Sections of hedgerow scheduled for removal and/or trimming and containing mature trees suitable for nesting Barn Owls will be surveyed prior to construction for occupancy by Owls. Should Owls be present then minimum protection zones as outlined in published guidance will be adhered to for the period of construction (Shawyer, 2011).

#### *8.7.1.7 Other Species*

##### 8.7.1.7.1 Generic Mitigation Measures and Best Practice

*CGEP and GCR*

**Reptiles and Amphibians**

As Viviparous lizards are widespread in Ireland and can be found in a range of habitat types such as in bog, heath, the margins of coniferous woodlands, in addition to being common in a range of grassland habitats, particularly those not subject to heavy grazing pressure, a confirmatory survey will be conducted within these habitats prior to the commencement of construction activities to confirm the presence/absence of individuals. Capture and relocation operations for this species can be extremely labour-intensive and, in most cases, the most efficient approach is to cut down and rake-off vegetation during warm weather, with the intention of displacing the resident lizards prior to earthworks or other activities that could result in their incidental mortality (NRA, 2009). Whether or not reptile-proof fencing is then required to exclude the animals will need to be reviewed on a location-specific basis by the ECoW.

Should construction activities be proposed and scheduled for areas proximal to habitat suitable for breeding common frog or smooth newt during the species' respective breeding seasons (frogs: January-March and newts: March-May), confirmatory surveys following standardised methodologies will be required at those locations to confirm the presence/absence of breeding adults and/or spawn. If evidence of frog or newts is confirmed proximal to the work locations, it is essential the areas are fenced off with appropriate signage in order to protect these areas during construction activities.

Protecting the hydrological regime of the habitat is particularly important. Thus, it is particularly important that the appointed ECoW has a clear understanding of the drainage characteristics of wet areas such as ponds, pools and drains which have the potential to support breeding amphibians along the route to ensure that these areas are maintained into the future.

#### *8.7.1.8 Fisheries and Aquatic Ecology*

The potential impacts on fisheries and freshwater ecology associated with the works and activities for the construction of the proposed CGEP Development have been identified in Section 8.5.1. It is possible though to minimise or even eliminate the effects of such impacts on freshwater ecology by applying sound and effective mitigation measures and best practices. The following Sections address mitigation measures with the purpose of reducing or, if possible, eliminate the potential impacts of the construction of the proposed CGEP Development to fisheries and aquatic ecology.

##### 8.7.1.8.1 Generic Mitigation Measures and Best Practice

As per NRA (2008) guidance, all works should be agreed and documented in consultation with Inland Fisheries Ireland (IFI), the National Parks and Wildlife Service (NPWS) of the Department of the Environment, Heritage and Local Government, the Engineering Services, Department of Communications, Marine and Natural Resources (DCMNR), Office of Public Works (OPW) and Cork County Council. It is important to note that works beyond those agreed at the design stage and described in **Chapter 3** should not be undertaken unless there is a written agreement between the Contractor and the relevant statutory authority.

An appropriate drainage design is the primary mitigation measure for the subject development which will incorporate silt protection control measures and reduce the rate of surface water runoff from the proposed development. The generic mitigation measures for aquatic ecology potential impacts are reliant on CIRIA best practice guidance for SuDS (2015) and the Hydrology mitigation measures referred in **Chapter 10** and Surface Water management Plan (SWRP), included with the CEMP.

#### 8.7.1.8.2 Project Component-Specific Mitigation Measures

*CGEP and Grid Connection Route*

Notwithstanding the conclusions of **Chapter 10 – Hydrology** and the information in Surface Water Management Plan detailed in the CEMP (**Appendix 3.1**), specific mitigation measures for the avoidance of the potential negative impacts identified in **Section 8.5.2** with regards to the construction activities are described below:

- **Instream works**

  - Instream works shall only take place during the period July to September (as required by IFI for instream works). However, as stated above, all instream works shall take place in written agreement with the IFI;
  - Operation of machinery in-stream should be kept to an absolute minimum. All construction machinery operating in-stream should be mechanically sound to avoid leaks of oils, hydraulic fluid, etc. Machinery should be checked prior to commencement of in-stream works. Furthermore, machinery should be steam cleaned and appropriate measures for the spread of, amongst others, the crayfish plague shall be carried:
    - Before contact with water is made, any equipment or machinery that will be used in the water, including Personal Protective Equipment (e.g. footwear, gloves), will be sprayed and cleaned with a 1% solution of Virkon® Aquatic (or other proprietary disinfectant);
    - Upon completion of the work or moving the equipment or machinery from the water, these will be visually inspected for any possible sources of contamination and any attached plant or animal material or debris will be removed. The equipment and machinery will be further sprayed and cleaned with a 1% solution of Virkon® Aquatic (or other proprietary disinfectant); and
    - Any observations of mass mortality of Crayfish will be reported to the relevant authorities within 1 hour of evidence being found.
  - As the river water bodies hold fish species protected under the Wildlife Act and/or the EU Habitats Directive (e.g. Atlantic salmon, Brown trout, European eel), a pre-construction electrofishing survey will be conducted, in agreement with IFI, in the water bodies affected by the proposed CGEP Development watercourse crossings. This survey results, in addition with the results presented in **Section 8.3.8**, will inform about the significance of the fish abundances in relation to the local populations. If deemed significant by the IFI, dewatering of these water bodies will not be employed. If IFI considers the fish abundances not significant and authorises dewatering of the water body reach as part of the instream works, a fish salvage operation shall be undertaken. The fish salvage operation shall be authorised and licensed by the IFI and carried out by either the IFI or by fully qualified, licensed and authorised freshwater ecologists.
  - If temporary diversion channels are necessary as part of the instream works, they should provide for fish passage, be non-eroding, and be of similar width to the natural stream channel. The channel diversion should be compliant with the following 1) to 28) measures:
    1) Diversion of water to and from temporary channels should only take place during the period July to September (as required by IFI for instream works) and in accordance with the IFI;
    2) Consultation with the NPWS should also be carried out as species protected under the Wildlife Act, EU Habitats Directive and the EU Freshwater Fish Directive occur within the river water bodies affected by the instream works;
    3) The works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
    4) A minimum 10 meter vegetative buffer zone will be maintained between disturbed areas and the water body. There will be no storage of material/equipment, excavated material or overnight parking of machinery inside the 10m buffer zone;
    5) Double silt fencing will be placed upslope of the buffer zone on each side of the water body. The silt fencing will have removable "gates" as required to allow access of

excavator while maintaining ease of replacement overnight or during periods of heavy rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location;

6) Bog mats will be used underneath the excavator inside the 10 meter vegetative buffer zone to prevent soil erosion and potential water quality impacts from localised surface water runoff;

7) Temporary storage of excavated overburden from the diversion channel will be undertaken outside of the 10m buffer on flat ground or within a local hollow. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the water body;

8) The water body dam (in the stream to be diverted) will be made of sand (clean) bags, cobbles or clean well-graded coarse gravel fill. Poorly sorted material will not be used as it would be a potential source of fine sediment (the dam will be installed once the diversion channel is in place);

9) The banks and bottom of the diversion channel will be lined with impermeable geotextile to prevent erosion and surface water quality impacts. A layer of clean course gravel will be placed over the geotextile on the bed of the channel to keep it in place;

10) An energy dissipater (such as clean rock fill or splash plates) will be placed on the water body bed and opposing bank of the receiving water body downstream of the diversion channel. This will prevent scouring and erosion of the water body bed and bank at the outfall during diversion;

11) Water body bed trench excavation works will commence once stream flow is fully diverted from the crossing excavation area;

12) Temporary storage of excavated material from the crossing trench will be undertaken separately to the material from the diversion channel. All storage areas will be outside the 10m buffer zone. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the water body;

13) Sediment laden water from trench dewatering will be discharged onto a well vegetated, dry, flat area at least 50m from a water body via a straw bale dewatering structure or geotextile filter bag. The outfall will also be surrounding by silt fencing;

14) If there is no suitable area for discharge onto ground, settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;

15) Any water from trench dewatering will not be discharged directly to a water body;

16) Clay bunds will be placed within the trench backfill on either side of the water body to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts;

17) Once the lean mix concrete is in place in the trench, a layer of fine sand (5−10cm) will be over the cement prior to backfilling. This will prevent release of cement into the water body when flow is restored;

18) Upon completion of the in-stream works, the stream crossing will be restored to its original configuration and stabilised to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required (Project Design Measure);

19) The diversion channel will be backfilled and reinstated to its original level and rock armour will be placed at the stream banks where the inflow and outflow of the diversion channel previously existed;

20) The ground surface along the reinstated diversion channel will be re-seeded at the soonest opportunity to prevent soil erosion;

21) The silt fencing on either side of the stream buffer will be left in place and maintained until the disturbed ground has re-vegetated;

22) Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;

23) Disturbance of bankside soils and stream sediments will be restricted to the minimum required for the cable laying process to avoid unnecessary impact on the stream morphology;

24) There will be no batching or storage of cement allowed at the stream crossing;

25) There will be no refuelling allowed within 100m of the stream crossing;

26) All plant will be checked for purpose of use prior to mobilisation at the stream crossing;

27) Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted; and

28) Once construction of the structure is completed, reconnection to the existing water body can be made and this should only occur within the approved operational window for in-stream works.

- **Culverts**

  - Construction/Replacing of culverts will only be done over a dry period between July and September (as required by IFI);
  - Use of weather forecasts will be made, and works will be planned when a dry spell of weather is forecasted;
  - Work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface water bodies;
  - Where there is a requirement to disturb either the bed or bank as a result of the construction/replacement works, the watercourse will be dammed upstream and pumped prior to work commencing;
  - A temporary berm (i.e. sandbags and/or rectangular straw bales) will placed along the edge of the track/road to prevent loose material being dislodged or washed into the water body;
  - All culverts to be installed as part of the works, new and replacements, shall be of the open-bottomed type. These should be oversized, so that they can be set a minimum of 500 mm below bed-level, with a minimum diameter of 900mm regardless of the anticipated flood flow;
  - The culverts should be of similar width to that of the natural low-flow channel;
  - The culverts should be laid at a level and grade which allows the upstream invert to remain drowned (by back-watering) under low-flow conditions, to a depth suitable for the easy passage of the largest species frequenting the stream (150mm for salmon);
  - The effective slope of the culvert should not exceed 5%. If a higher slope is necessary, a site specific design is required;
  - Pools should be formed at each end of the culvert to provide for transition from the shape of the culvert to the shape of the river downstream;
  - Culvert screening shall not be adopted in any circumstance;
  - Where culvert widening has been completed, only clean, well-sorted fill or hardcore will be used to widen the road/track at the crossing location. Poorly sorted material will not be used as it would be a potential source of fine sediment;
  - Before the road/track surface layer is put in place, a layer of geotextile will be placed over the fill to prevent wash down of fines into the fill and potentially into the water body;
  - If high levels of silt or other contamination is noted in any local watercourse, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
  - All disturbed ground will be re-seeded at the soonest opportunity to prevent erosion;
  - There will be no batching or storage of cement allowed at the watercourse crossing;

- There will be no refuelling allowed within 100m of the watercourse crossing; and
- All plant will be checked for purpose of use prior to mobilisation at the water body crossing.

- **Excavation works within the proximity (<50m) of surface water bodies**

To prevent river water quality impacts from sediment runoff during excavation works within the proximity of surface water bodies (<50m), the following measures shall be put in place:

- Weather forecasting resources will be used, and works will be planned when a dry spell of weather is forecasted;
- Where the cable trench/access track/road/ works area is running within the 50m of a surface water body, a minimum 5m buffer will be maintained between the works area and the water body wetted width limit, except where works at existing culverts required, see above;
- Silt fencing will be placed down-gradient of the works during construction at all locations within the 50m water body buffer;
- Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;
- In a case where only a 5 - 10m buffer is being maintained, double silt fencing will be put in place on the downslope side;
- Additional silt fencing or temporary straw bales (rectangular bales, pinned down firmly with stakes) will be placed across any natural surface depressions/channels that slope towards a local water body;
- Where the cable trench/access track/road route slopes down perpendicular towards a water body (i.e. base of stream valley), regularly spaced, temporary bunds or shallow swales will also be put in place perpendicular across the route corridor to dissipate surface water runoff from the works area and onto adjacent vegetated ground. Additional silt fencing will be put at the outfall location of the bunds/swales;
- Temporary check dams/silt fencing arrangements will be placed in any drainage ditches within 30m of the works corridor (this will also include existing road drains along the haul route works);
- The check dams/silt fencing arrangements will be placed every 10m;
- Bog mats will be used in wet/boggy areas zone to prevent ground rutting and soil erosion which could lead to potential water quality impacts. All ground rutted by vehicles/machinery will be levelled or backfilled to prevent their progression as preferential pathways for surface water runoff;
- If high levels of silt or other contaminants are noted in any local water body, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- Excavation work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface water bodies;
- All disturbed ground will be re-seeded at the soonest, practicable opportunity to prevent erosion;
- All temporary surface water control/protection measures, such as silt fencing and check dams, will be kept in place until disturbed ground has vegetated and stabilised. Regular daily checks will be undertaken;
- Where the cable trench route runs downslope for long distances (>50m) towards a water body or drainage ditch, regular spaced impermeable bunds will be placed within the trench backfill to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts from surface water drainage within the trench;
- There will be no refuelling allowed within 100m of a water body/drainage ditch; and
- All plants will be checked for purpose of use prior to mobilisation.

- **Management of invasive alien species**

To avoid the introduction, establishment and spread of invasive species in and to the proposed CGEP Development during the construction phase, the following measures shall be attended to:

- Prior to arrival of vehicles that will be kept on the site for extended periods e.g. earth moving machinery, the contractor's vehicles and equipment will be thoroughly cleaned and then dried using high-pressure steam cleaning, with water >65 °C, in addition to the removal of all vegetative material. Items difficult to soak/spray will be wiped down with a suitable disinfectant (e.g. solution of 1% Virkon® Aquatic);
- Evidence that all machinery has been cleaned will be required to be on file for review by the statutory authorities. The level of evidence required of the Contractor will be actual registration plates of vehicles onsite and a register of when, how and where each of these were cleaned before they arrived on site;
- The flagmen, which will be present at each active site access points, will be responsible for inspecting and cleaning delivery vehicles both entering and exiting the site, and will receive training in the correct techniques;
- Each flagman will be equipped with a 'disinfection box'. This will contain Virkon® Aquatic or another proprietary disinfectant, a spraying mechanism, cloths or sponges, a scrubbing brush and protective gloves. Protective gloves will be worn when using any disinfectant solution;
- Visual inspections will be carried out on all machinery and equipment (particularly for machinery and equipment exiting the site and 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 the waste storage area in the Temporary Compound at the end of the work day;
- No removed material or run-off will be allowed to enter a water body of any sort;
- Following cleaning, all equipment and vehicles will be visually inspected to ensure that all adherent material and debris has been removed manually;
- Records of supplies and cleaning of delivery vehicles will be kept by the flagmen and will be regularly inspected by the Environmental Clerk of Works; and
- Spot checks on the adequacy of cleaning will be carried out by the Project Ecologist.
- The above measures may not apply for vehicles that require regular on and offsite movements e.g. deliveries of cement during construction. These vehicles are highly unlikely to be at risk of contamination/ contact with aquatic habitats or invasive species. Before deliveries start the site EcoW/ Environmental Manager will review quarries supplying cement to confirm if the above disinfectant measure applies.

*TDR*

Mitigation Measures for protection of watercourses are outlined in section 1.3.4 of **Appendix 8C**.

## 8.7.2 Mitigation Measures during Operation

### *8.7.2.1 Project Ecologist and Monitoring*

A Project Ecologist will be appointed to oversee all works and mitigation measures during construction, operational and decommissioning phases.

### *8.7.2.2 Designated Nature Conservation Sites*

#### 8.7.2.2.1 Generic Mitigation Measures and Best Practice

The potential impacts on Designated Nature conservation sites which are identified in **Section 8.5.2**, relate to potential construction stage impacts due to downstream connectivity to 9 Nationally Designated Sites comprising 9 pNHA's and two European Sites, the Blackwater River Callows SPA and the Blackwater River

(Cork/Waterford) SAC. Please refer to **Section 8.7.2.8** for generic operational stage mitigation measures for the protection of aquatic habitats and species; the mitigation measures proposed therein are applicable to the habitats and species within these designated sites potentially affected by the proposed CGEP development.

#### 8.7.2.2.2 Project Component-Specific Mitigation Measures

The potential impacts on Designated Nature conservation sites which are identified in **Section 8.5.2**, relate to potential construction stage impacts due to downstream connectivity to 9 Nationally Designated Sites comprising 9 pNHA's and two European Sites, the Blackwater River Callows SPA and the Blackwater River (Cork/Waterford) SAC. Please refer to **Section 8.7.2.8.2** for generic operational stage mitigation measures for the protection of aquatic habitats and species; the mitigation measures proposed therein are applicable to the habitats and species within these designated sites potentially affected by the proposed CGEP development.

### *8.7.2.3 Habitats and Flora*

#### 8.7.2.3.1 Generic Mitigation Measures and Best Practice

Operational stage impacts on terrestrial habitats and flora have been assessed as not significant and therefore mitigation measures are not required during the operation of the proposed CGEP project.

#### 8.7.2.3.2 Project Component-Specific Mitigation Measures

Operational stage impacts on terrestrial habitats and flora have been assessed as not significant and therefore mitigation measures are not required during the operation of the proposed CGEP project.

### *8.7.2.4 Terrestrial Mammals (excluding bats)*

#### 8.7.2.4.1 Generic Mitigation Measures and Best Practice

*CGEP & Grid Connection Route*

As significant negative impacts are not considered likely during the operation of the CGEP development, no specific operational stage mitigation measures are required. Due to restricted speed limits on the operational site, and low traffic levels on-site during the operation stage, no direct mortality of terrestrial mammals is anticipated. As no works other than routine maintenance are proposed for the operational stage, no other sources of impact are foreseen, precluding the need for mitigation measures. Mitigation measures are not required to prevent negative effects on mammals during the operation phase of the grid connection, as potential impacts have been evaluated as imperceptible. Should more extensive maintenance works be required e.g. change of a turbine blade then standard pollution controls as outlined for the construction phase of the project will apply. Existing hard surfaces will be used for storage of materials minimising risks of disturbance to mammals.

*TDR*

Mitigation measures are not required to prevent negative effects on mammals during the operation phase of the TDR as effects are considered to be imperceptible in the absence of mitigation.

#### 8.7.2.4.2 Project Component-Specific Mitigation Measures

*CGEP & Grid Connection route*

Water protection measures will remain in place during the operation of the wind farm.

### *8.7.2.5 Bats*

#### 8.7.2.5.1 Generic Mitigation Measures and Best Practice

No generic mitigation is proposed as site specific measures are proposed, see below.

#### 8.7.2.5.2 Project Component-Specific Mitigation Measures

The automated detector surveys in spring 2019 provided a comparison of activity levels at 14 of the proposed turbine locations, and can be used to develop an initial strategy to avoid or minimise impacts on bats. 2020 surveys confirmed the findings of the 2019 surveys still applied despite some minor turbine location changes. However, it is important to acknowledge that the habitat will change following the construction of the proposed development, and thus that bat activity will change. It is acknowledged by Mathews et al (2016) that pre-construction bat surveys do not provide an accurate prediction of bat activity post-construction, and that wind energy sites should incorporate an adaptive mitigation strategy based on post-construction data.

Therefore, the initial strategy described below adopts three techniques – vegetation buffers, curtailment and feathering – using a precautionary approach based on pre-construction data. However, bat activity will be re-assessed following the completion of the development, and the mitigation strategy will be revised.

The approach to mitigation differs at each turbine location depending on the relative activity levels for the three species of high collision risk – common pipistrelles, soprano pipistrelles and Leisler's bats – and the slight differences in flight behaviour for these species. Common pipistrelles and soprano pipistrelles typically feed along linear vegetation features such as forest edge features, so the primary approach to mitigation is to maintain a sufficient distance between the turbine blades and any surrounding linear vegetation features. This is referred to as 'vegetation buffers', and described in **Section 8.3.5**. This would apply to all turbine locations.

In contrast, Leisler's bat typically feed in open air, and their activity is not strictly associated with linear habitat features. Therefore, where significant activity levels (i.e. nights with moderate or high activity levels, refer to **Tables 8-61 and 8-62**) were frequent, it is proposed that turbines would be curtailed, i.e. the operation of these turbines would be reduced during periods of highest risk to bats. This is referred to as 'operational curtailment'. It would apply at all locations in which Leisler's activity was frequent (i.e. significant activity levels recorded on more than 50% of nights): T11, T18 and T21.

Finally, it is noted that bat activity varied substantially between nights, e.g. with one or two nights of significant activity, and negligible activity on all other nights. This is relatively common, and may represent spatial variations in foraging conditions between nights, for example, an exposed area that has high insect abundance when wind speeds are low, but much lower insect abundance when wind speeds are high. Therefore, it is recommended that the blades of wind turbines are 'feathered' below the cut-in speed, in order to minimise the risk of impacts at low wind speeds. This will apply to all wind turbines.

*Vegetation Clearance*
For bat species that typically forage along linear habitat features (e.g. pipistrelles), the risk of impacts can be reduced my increasing the distance between the turbine and the surrounding linear vegetation features, i.e. by clearing a larger area of forestry around each turbine. The SNH (2019) guidelines recommend "*a distance of 50m between turbine blade tip and nearest woodland (or other key habitat features)*". The 50m buffer is measured obliquely, i.e. from the nearest point of the turbine-swept area to the nearest point of the habitat feature.

Using the maximum potential dimensions of the proposed turbines and feature heights of 20m (based on the height of the forestry), it was calculated that buffer zones of up to 92 m are required around all turbines. During the site clearance phase, all trees and shrubs will be cleared within this radius. The buffer zone will be kept clear throughout the operational period of the proposed development.

**Operational Curtailment**

The curtailment of operational wind turbines - both by increasing the cut-in speed of turbines, and by feathering turbines below the cut-in speed - has been shown to significantly reduce the number of fatalities at wind farms in the USA (Arnett et al., 2013), and is widely implemented throughout Europe (Rodrigues et al., 2014). The following is noted in Mathews et al. (2016):

> *"To minimise economic loss, it may be possible to undertake focused curtailment when the risk of collision has been shown to be highest, for example in warm weather, at low wind speeds, during migratory periods*

*and/or when bat activity levels are high. Seasonal variation in risk, with a peak in fatalities in late summer and early autumn, is consistently reported in both Europe and North America, with a smaller peak sometimes being reported in late spring [primarily of migratory bats], and mitigation strategies therefore usually focus curtailment in these periods"*

In addition, the potential effectiveness of operational curtailment for British windfarms was addressed in the Mathews et al. (2016) report, as follows:

*"Weather conditions were also linked with bat fatalities, as had been expected from previous research in other countries. Most nights where casualties occurred (81.5%, 95% Confidence Interval* 69.2, 89.6) had low mean wind speeds (≤5 m/s measured at the ground) and maximum night-time temperatures of >10°C. It is possible to be confident that most nights with wind speeds >5m/s will have no casualties: formally, we can estimate that 95.3% (95% CI 91.5, 97.4) of nights with mean wind speeds >5m/s will have no casualties.*

*However, it must be noted that most nights in the study had low wind speeds, and only 3.6% (95% CI 2.7-4.8) of these had casualties. It can therefore be concluded that whilst curtailing wind turbines in low winds would be extremely effective in minimising the collision risk to bats, it would also mean that turbines would be curtailed on most nights and, on average, only 3.6% of these nights would present a risk to bats."*

In recognition of the risk to Leisler's bats at some locations, some turbines will be curtailed on a precautionary basis during the operation of the Development. This applies to the two turbines at which Leisler's activity was frequent – T11 and T18 – but also one additional turbine – T21– that was not sampled in 2019, but that was considered to be most similar to T18.

The objective of curtailment is to limit turbine activity during periods of highest risk to bats. This can involve a range of parameters, including the time of the year, time of night, and weather conditions. However, it is also important to identify the periods in which there is little or no risk to bats, in order to avoid curtailing turbine activity unnecessarily, and thus reducing the productivity of the development. For example, if bats are only present in significant numbers in one or two months, then turbines should be curtailed at that time, but not for the remainder of the year. Similarly, if bats are only active in significant numbers at sunset and sunrise, then curtailment should be targeted only on these periods. Where bat activity is strongly influenced by weather conditions, curtailment should occur during suitable conditions (i.e. low wind speeds and high temperatures), but not during unsuitable conditions (high wind speeds and low temperatures).

A number of potential curtailment parameters are considered in this report, and the conclusions (of relevance to Leisler's bats) are summarised as follows:

- Leisler's activity peaked in May and June, with lower levels in mid-summer months, and low counts in September and October. Sampling was not carried out in April, but on a precautionary basis it will be assumed that activity levels would be high in this month, until proven otherwise
- Activity levels are relatively constant throughout the night, particularly during the peak of activity in May
- 88% of Leisler's passes occurred when bat activity was less than 6 m/s
- 92% of Leisler's passes occurred when air temperatures were above 9°C

On that basis, the following curtailment strategy is proposed for Turbines 11, 18 and 21. Turbines will be curtailed in April, May and June, throughout the night (starting 30 minutes prior to sunset, and ending 30 minutes after sunrise), when wind speeds are below 6 m/s, and when air temperatures are above 9°C. This will apply when all of the above conditions are met, but will not apply when one of the conditions is not met, i.e. turbines will operate as normal between April and June when wind speeds exceed 6 m/s. Similarly, turbines may operate as normal during daylight hours during these days, and in all other months of the year. The implementation of the curtailment will be via software which will automatically send a "pause" command to the relevant turbine when the parameters are met, initiating a 'feathering' of the blades to the fully open position using the pitch controls, and disengagement of the generator. The wind speed and external temperature will be obtained from each turbine anemometry apparatus (on the nacelle) via the Supervisory Control and Data Acquisition (SCADA) interface.

It is important to note that this is an initial curtailment strategy, based on pre-construction data. Spatial patterns of bat activity are likely to change after construction works (due to the felling of trees), which may affect the way that bats use the site. Therefore, post-construction monitoring will be undertaken, and based on the results, this curtailment strategy may be adapted.

**Feathering of Turbines**

When wind speeds are insufficient for power generation, the blades of wind turbines continue to rotate slowly, which is referred to as 'idling'. It is understood that a significant number of bat fatalities occur when turbines are idling, because the tips of blades can maintain relatively high speeds even the centre of the turbine is rotating slowly. The risk of impacts on bats can be reduced by 'feathering' all turbine blades during low wind speeds, which means rotating the turbine blades parallel to the wind. Turbines can continue to rotate very slowly, but at speeds that pose much less of a risk to bats.

The following is noted in the SNH (2019) guidelines:

> *"The reduction in speed resulting from feathering compared with normal idling may reduce fatality rates by up to 50%. As this option does not result in any loss of output, as best practice, it is recommended wherever it is practically possible and there remains uncertainty over the risk posed to bats. It can be applied at any site with a blade pitch control system which can be automated using SCADA data.*
>
> *The curtailment is achieved by feathering (not the actual braking of the turbine) so that the blades continue to rotate slowly (at ~2 rpm or less)."*

**Restrictions on Lighting**

Where artificial lighting is required during the construction, operation and/or decommissioning phases, 'bat-sensitive' lighting techniques will be implemented. Site-specific advice will be given by the Ecological Clerk of Works, but the design principles will be in accordance with the Bats and Lighting guidelines (Stone 2013), as follows:

- Low-UV LEDs or low / high pressure sodium lamps will be the preferred bulb type, as they have least effect on bats. Mercury or metal halide bulbs will not be used.
- All outdoor lights will be fitted with directional hoods and/or luminaires to direct the light onto targeted areas and to prevent unnecessary light-spill.
- No lights will be directed towards any of the bat roosts, or towards any linear habitat features.
- Where lighting is required for staff safety (e.g. at site compounds), lights will be installed at a low level, e.g. on lighting poles of 1 - 2 metres height. Lux levels will be the minimum required for pedestrian safety.
- Where feasible, lights will be fitted with motion sensors and timers in order to provide light only when required. Constant, overnight lights will not be permitted.

**Monitoring**

Due to the clearance of forestry around wind turbines, it is highly likely that bat activity will change following the construction of the proposed development. The mitigation strategy outlined above adopts a precautionary approach based on pre-construction bat activity data, but post-construction monitoring will be required to confirm that it is effective.

> The monitoring strategy will involve two components: surveys of bat activity using automated detectors (allowing comparison of activity with pre-construction levels), and searches for bat carcasses around the base of each turbine. This will be carried out during the first three years of operation, using standardised methods outlined in the SNH (2019) guidance, and/or other relevant guidelines available at the time. The monitoring strategy will include the following:
>
> - Monitoring of bat activity at ground level using automated detectors for periods of at least ten nights during spring (April, May), mid-summer (June, July) and autumn (August, September). Bat activity will be compared with the baseline levels.
> - Searches for bat carcasses around the base of each turbine using trained search dogs, carried out twice per month between May and October (inclusive), i.e. a total of twelve occasions.

Depending on the results of the monitoring, the initial mitigation strategy may be revised, for example by optimising curtailment parameters at some turbines, or by employing curtailment at additional locations. Annual monitoring reports will be provided to relevant statutory bodies (where required), and if significant bat fatalities are recorded, avoidance or mitigation measures will be proposed, such as the curtailment and feathering of turbines during periods of high bat activity, and/or other approaches that may be developed in the future.

### *8.7.2.6 Avifauna*

#### 8.7.2.6.1 Generic Mitigation Measures and Best Practice

The implementation of mitigation measures outlined in **Chapter 10 Hydrology**, to minimise and prevent direct potential impacts on hydrology, will also act on the prevention of potential indirect impacts to avifauna.

#### 8.7.2.6.2 Project Component-Specific Mitigation Measures

*CGEP*

A post construction monitoring programme is to be implemented at the subject site in order to confirm the efficacy of the bird diverters. The results of this programme are to be submitted annually to the competent authority and NPWS. Published guidance on assessing the impacts of wind farms on birds from English Nature and the Royal Society (Drewitt & Langston, 2006) for the protection of birds recommends the implementation of an agreed post development monitoring programme as a best practice mitigation measure.

In addition, published recommendations on swans and wind farms (Rees, 2012) suggests that systematic post construction monitoring adapted to quantify collision, barrier and displacement to be conducted over a period of sufficient duration to allow for annual variation or in combination effects. The following individual components are proposed:

1) Fatality Monitoring: A comprehensive fatality monitoring programme is to be undertaken following published best practice; the primary components are as follows:
    a. Initial carcass removal trials to establish levels of predator removal of possible fatalities. This is to be done following best recommended practice and with due cognisance to published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results (Smallwood, *et al*., 2010). No turbines which are used for carcass removal trials are to be used for subsequent fatality monitoring.
    b. Turbine searches for fatalities are to be undertaken following best practice (Fijn, Krijgsveld & Tijsen, 2012; Grunkorn, 2011) in terms of search area (minimum radius hub height) and at intervals selected to effectively sample fatality rates based on carcass removal rates (e.g. 2 per month). To be conducted for an initial period of 7 years to allow for annual variation and cumulative effects. Dependant on results, further monitoring to be agreed with NPWS.
    c. The large scale of the proposed wind development allows for a standardised approach with a possible control group of Turbines and/or variation in search techniques, such as straight line transects/ randomly selected spiral transects/ dog searches as a means of robustly estimating the post construction impact in terms of fatality.
    d. Recorded fatalities to be calibrated against known predator removal rates to provide an estimate of overall fatality rates.

An annual report will be submitted to the competent authority and copied to NPWS for each of the first three years of operation. Following the first 7 years, a report shall be disseminated publicly via publication in a recognised journal. Although post-construction mortality is considered unlikely to be significant, in the event of significant fatalities during *post-construction monitoring*, the following adaptive management techniques shall be considered and an appropriate approach implemented. The approach implemented will be based on the survey findings and recommendations of an experienced ornithologist (>10 years relevant experience) in consultation with Bird Experts in NPWS:

- Curtailment or feathering of turbine blades at specific time periods dependent on target species affected[40].
- Use of Bird Deterrent Systems such as DTBird[41].

[40] An example would be feathering at dawn and dusk for a minimal period to avoid collision risk to roding woodcock during the summer months.

[41] DTbird is a self-working system that detects flying birds in real time and takes programmed actions such as dissuasion of birds in collision risk with turbines or controlled stopping of the turbine. It can also be used to monitor collisions if occurring.

- Use of on the ground observers to determine feathering requirement during periods of peak bird activity[42].
- Use of DeTect MERLIN Avian Radar system or similar as a control mechanism for specific turbine operation[43].

2) Flight Activity Survey: A flight activity survey is to be undertaken to:

   a. Record any barrier effect, i.e. the degree of avoidance exhibited by species approaching or within the wind farm (Rees, 2012). Target species to be …

   b. Record changes in flight heights of key receptors post construction.

An annual report will be submitted to the competent authority and copied to NPWS. To be conducted for an initial period of 7 years to allow for annual variation and cumulative effects. A review will be conducted after 4 years to determine if the level of survey is warranted. Dependant on results, further monitoring to be agreed with NPWS. Following the first 7 years, a report shall be disseminated publicly via publication in a recognised journal.

3) Breeding Hen Harrier and Goshawk survey: A breeding Hen Harrier and Goshawk survey, following methods used in the baseline survey to be repeated yearly March – July (inclusive). This aims to:

   a. Assess any displacement effects such as those recorded in the literature (Pearce-Higgins *et al*., 2009, 2012; Reichenbach & Steinborn, 2011). Overall density of these species to be annually recorded.

   b. To be conducted for an initial period of 7 years to allow for annual variation and cumulative effects. A review will be conducted after 4 years to determine if the level of survey is warranted. Dependant on results further monitoring to be agreed with NPWS. Following the first 7 years a report shall be disseminated publicly via publication in a recognised journal.

As the local hen harrier breeding population is showing evidence of declining numbers of breeding pairs; offsite hen harrier forage habitat enhancement measures are proposed to improve forage habitat quality in the wider region of the windfarm development. These enhancement measures are to benefit conditions for local breeding hen harrier noting that medium short term (construction phase) effects, and low long term operational (collision risk) effects are possible. Further details on this measure are provided in **Appendix 8-K.**

*Grid Connection Route*

No mitigation measures are required for Avifauna during the operation stage of the grid connection.

*TDR*

No mitigation measures are required for Avifauna during the operation stage of the grid connection.

#### *8.7.2.7 Other Species*

##### 8.7.2.7.1 Generic Mitigation Measures and Best Practice

As no significant impacts on Marsh Fritillary or Reptiles and Amphibians are predicted during the operational stage of the proposed CGEP Development, mitigation measures are not required.

##### 8.7.2.7.2 Project Component-Specific Mitigation Measures

As no significant impacts on Marsh Fritillary or Reptiles and Amphibians are predicted during the operational stage of the proposed CGEP Development, mitigation measures are not required.

[42] Studies in Spain, at an operational wind farm site, have found that controlled stopping of turbines based on observation reduced mortality of certain species by up to 48% (Munoz Gallejo *et al*., 2011).

[43] The DeTect MERLIN Avian Radar System can precisely track targets within avian size ranges and then provide deterrent techniques such as laser, or interface with the wind farm control system to curtail turbines.

#### *8.7.2.8 Fisheries and Aquatic Ecology*

##### 8.7.2.8.1 Generic Mitigation Measures and Best Practice

It is not envisaged that the operation period will involve any significant impacts on the hydrological regime of the area **(Chapter 10 - Hydrology**) and, by association, to fisheries and aquatic ecology. The operation of the development will incorporate effective maintenance of the drainage system and the permanent mitigation measures detailed. The maintenance regime will include inspection and servicing of:

- Drains, cross-drains and culverts for any blockages
- Outfalls to existing field drains and watercourses
- Existing roadside swales for any obstructions
- Swales
- Progress of the re-establishment of vegetation.

##### 8.7.2.8.2 Project Component-Specific Mitigation Measures

In order to prevent the spread of invasive alien species that are already established within the proposed CGEP Development or may become established, the following measures shall be conducted:

- Monitoring in the form of confirmatory surveys will be carried out by the Project Ecologist to accurately determine the current status of invasive species locations identified during baseline studies; and identify any other infestations close to the construction works areas or operational stage maintenance works areas;
- Surveying will be carried out each year of operation and this survey information will be used to inform any construction works/operational stage maintenance activities. Surveys will focus always on the works area plus 7m;
- The results of this will be made available to Project Team, and any bodies as agreed at the consenting stage; and
- The measures included in the Invasive Species Management Plan will be implemented.

*TDR*

No mitigation measures are proposed in the TDR for the Operation Phase. If a large component change is required than mitigation as detailed for the construction phase will apply.

### 8.7.3 Mitigation Measures during Decommissioning

#### *8.7.3.1 Project Ecologist and Monitoring*

A Project Ecologist will be appointed to oversee all works and mitigation measures during construction, operational and decommissioning phases. The project ecologist will monitor the baseline ecology prior to decommissioning and provide mitigation measures at this time based on what biodiversity receptors are relevant.

#### *8.7.3.2 Designated Nature Conservation Sites*

##### 8.7.3.2.1 Generic Mitigation Measures and Best Practice

The potential impacts on Designated Nature conservation sites which are identified in **Section 8.5.2**, relate to potential construction stage impacts due to downstream connectivity to 9 Nationally Designated Sites comprising 9 pNHA's and two European Sites, the Blackwater River Callows SPA and the Blackwater River (Cork/Waterford) SAC. Given that the drainage system with mitigation to control pollutant runoff etc will be present, risks to downstream receptors will be reduced compared to the construction phase. Please refer to **Section 8.7.3.8.1** for generic decommissioning stage mitigation measures for the protection of aquatic habitats and species; the mitigation measures proposed therein are applicable to the habitats and species within these designated sites potentially affected by the proposed CGEP development.

#### 8.7.3.2.2 Project Component-Specific Mitigation Measures

The potential impacts on Designated Nature conservation sites which are identified in **Section 8.5.2**, relate to potential construction stage impacts due to downstream connectivity to 9 Nationally Designated Sites comprising 9 pNHA's and two European Sites, the Blackwater River Callows SPA and the Blackwater River (Cork/Waterford) SAC. Please refer to **Section 8.7.3.8.2** for project component specific decommissioning stage mitigation measures for the protection of aquatic habitats and species; the mitigation measures proposed therein are applicable to the habitats and species within these designated sites potentially affected by the proposed CGEP development.

### *8.7.3.3 Habitats and Flora*

#### 8.7.3.3.1 Generic Mitigation Measures and Best Practice

None

#### 8.7.3.3.2 Project Component-Specific Mitigation Measures

The introduction of invasive species has been identified as a significant potential impact during the decommissioning stage of the CGEP Development. To avoid the introduction, establishment and spread of invasive species in and to the proposed CGEP Development during the construction phase, the following measures shall be attended to:

- Prior to arrival of vehicles that will be kept on the site for extended periods e.g. earth moving machinery, the contractor's vehicles and equipment will be thoroughly cleaned and then dried using high-pressure steam cleaning, with water >65 °C, in addition to the removal of all vegetative material. Items difficult to soak/spray will be wiped down with a suitable disinfectant (e.g. solution of 1% Virkon® Aquatic);
- Evidence that all machinery has been cleaned will be required to be on file for review by the statutory authorities. The level of evidence required of the Contractor will be actual registration plates of vehicles onsite and a register of when, how and where each of these were cleaned before they arrived on site;
- The flagmen, which will be present at each active site access points, will be responsible for inspecting and cleaning delivery vehicles both entering and exiting the site, and will receive training in the correct techniques;
- Each flagman will be equipped with a 'disinfection box'. This will contain Virkon® Aquatic or another proprietary disinfectant, a spraying mechanism, cloths or sponges, a scrubbing brush and protective gloves. Protective gloves will be worn when using any disinfectant solution;
- Visual inspections will be carried out on all machinery and equipment (particularly for machinery and equipment exiting the site and 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 the waste storage area in the Temporary Compound at the end of the work day;
- No removed material or run-off will be allowed to enter a water body/drainage ditch of any sort;
- Following cleaning, all equipment and vehicles will be visually inspected to ensure that all adherent material and debris has been removed manually; and
- Spot checks on the adequacy of cleaning will be carried out by the Project Ecologist.
- The above measures may not apply for vehicles that require regular on and offsite movements e.g. deliveries of cement during construction. These vehicles are highly unlikely to be at risk of contamination/ contact with aquatic habitats or invasive species. Before deliveries start the site EcoW/ Environmental Manager will review quarries supplying cement to confirm if the above disinfectant measure applies.

### *8.7.3.4 Terrestrial Mammals (excluding bats)*

#### 8.7.3.4.1 Generic Mitigation Measures and Best Practice

A project ecologist as outlined in **Section 8.7.3.1** above will be on site during the decommissioning phase.

#### 8.7.3.4.2 Project Component-Specific Mitigation Measures

*CGEP & Grid Connection Route*

No significant impacts are likely on terrestrial mammals as no decommissioning is likely for the grid connection which will be operated by ESBN and EirGrid

*TDR*

The TDR will be used during the decommissioning phase, to remove the turbines from sites. Trees and vegetation may be required to be trimmed back or possibly removed in certain locations (nodes) similar to the construction phase. Mitigation measures as outlined in Sections 1.3.3 and 1.3.4 of **Appendix 8-C** will apply, as relevant.

### *8.7.3.5 Bats*

#### 8.7.3.5.1 Generic Mitigation Measures and Best Practice

None.

#### 8.7.3.5.2 Project Component-Specific Mitigation Measures

*CGEP & Grid Connection Route*
No impacts are likely to bats during decommissioning, hence no specific mitigation is required subject to site surveys by the project ecologist.

*TDR*
No impacts are likely to bats during decommissioning, hence no specific mitigation is required subject to site surveys by the project ecologist.

### *8.7.3.6 Avifauna*

#### 8.7.3.6.1 Generic Mitigation Measures and Best Practice

Refer to site ecologist above.

#### 8.7.3.6.2 Project Component-Specific Mitigation Measures

*CGEP*

Decommissioning operations will take place predominantly during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species. This in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt & Langston, 2006). Limited operations, such as turbine removal, may require night time operating hours. These operations are detailed in the CEMP and will be supervised by the project ecologist.

Toolbox talks shall be held with construction staff on disturbance to key species during decommissioning. This will help minimise disturbance. This in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt & Langston, 2006).

Any re-instated habitats will include native species where possible to enhance diversity of birds. This is line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt & Langston, 2006).

*Grid Connection Route*

No mitigation is proposed for the decommissioning phase of the GCR as no works are involved in this phase.

*TDR*

The TDR may be used during the decommissioning phase, to remove the turbines from sites. Trees and vegetation may be required to be removed. Mitigation measures as outlined in Sections 1.3.3 and 1.3.4 of **Appendix 8-C** will apply, as relevant.

### *8.7.3.7 Other Species*

#### 8.7.3.7.1 Generic Mitigation Measures and Best Practice

As no significant impacts on Marsh Fritillary or Reptiles and Amphibians are predicted during the decommissioning stage of the proposed CGEP Development, mitigation measures are not required.

#### 8.7.3.7.2 Project Component-Specific Mitigation Measures

As no significant impacts on Marsh Fritillary or Reptiles and Amphibians are predicted during the decommissioning stage of the proposed CGEP Development, mitigation measures are not required.

### *8.7.3.8 Fisheries and Aquatic Ecology*

#### 8.7.3.8.1 Generic Mitigation Measures and Best Practice

A project ecologist as outlined in **Section 8.7.3.1** above will be on site during the decommissioning phase.

#### 8.7.3.8.2 Project Component-Specific Mitigation Measures

*CGEP and GCR*

During decommissioning phase, all mitigation measures indicated for the construction phase with regards to excavation works within the proximity (<50m) of surface water bodies and Management of alien invasive species shall be implemented, namely:

- Where the cable works or vehicle/machinery movement is within the 50m of a surface water body, a minimum 5m buffer will be maintained between the works area/access track and the water body wetted width limit;
- Silt fencing will be placed down-gradient of the works during construction at all locations within the 50m water body buffer;
- Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;
- In a case where only a 5 - 10m buffer is being maintained, double silt fencing will be put in place on the downslope side;
- Additional silt fencing or temporary straw bales (rectangular bales, pinned down firmly with stakes) will be placed across any natural surface depressions/channels that slope towards a local water body;
- Where the access tracks/road routes slopes down perpendicular towards a water body (i.e. base of stream valley), regularly spaced, temporary bunds or shallow swales will also be put in place perpendicular across the route corridor to dissipate surface water runoff from the works area and onto adjacent vegetated ground. Additional silt fencing will be put at the outfall location of the bunds/swales;
- Temporary check dams/silt fencing arrangements will be placed in any drainage ditches within 30m of the works corridor (this will also include existing road drains along the haul route works);

- The check dams/silt fencing arrangements will be placed every 10m;
- Bog mats will be used in wet/boggy areas zone to prevent ground rutting and soil erosion which could lead to potential water quality impacts. All ground rutted by vehicles/machinery will be levelled or backfilled to prevent their progression as preferential pathways for surface water runoff;
- If high levels of silt or other contaminants are noted in any local water body, all works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- Excavation work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface water bodies;
- All disturbed ground will be re-seeded at the soonest, practicable opportunity to prevent erosion; and
- All temporary surface water control/protection measures, such as silt fencing and check dams, will be kept in place until disturbed ground has vegetated and stabilised. Regular daily checks will be undertaken.

- **Management of invasive alien species**

To avoid the introduction, establishment and spread of invasive species in and to the proposed CGEP Development during the construction phase, the following measures shall be attended to:

- Prior to arrival of vehicles that will be kept on the site for extended periods e.g. earth moving machinery, the contractor's vehicles and equipment will be thoroughly cleaned and then dried using high-pressure steam cleaning, with water >65 °C, in addition to the removal of all vegetative material. Items difficult to soak/spray will be wiped down with a suitable disinfectant (e.g. solution of 1% Virkon® Aquatic);
- Evidence that all machinery has been cleaned will be required to be on file for review by the statutory authorities. The level of evidence required of the Contractor will be actual registration plates of vehicles onsite and a register of when, how and where each of these were cleaned before they arrived on site;
- The flagmen, which will be present at each active site access points, will be responsible for inspecting and cleaning delivery vehicles both entering and exiting the site, and will receive training in the correct techniques;
- Each flagman will be equipped with a 'disinfection box'. This will contain Virkon® Aquatic or another proprietary disinfectant, a spraying mechanism, cloths or sponges, a scrubbing brush and protective gloves. Protective gloves will be worn when using any disinfectant solution;
- Visual inspections will be carried out on all machinery and equipment (particularly for machinery and equipment exiting the site and 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 the waste storage area in the Temporary Compound at the end of the work day;
- No removed material or run-off will be allowed to enter a water body of any sort;
- Following cleaning, all equipment and vehicles will be visually inspected to ensure that all adherent material and debris has been removed manually;
- Records of supplies and cleaning of delivery vehicles will be kept by the flagmen and will be regularly inspected by the Environmental Clerk of Works; and
- Spot checks on the adequacy of cleaning will be carried out by the Project Ecologist.
- The above measures may not apply for vehicles that require regular on and offsite movements e.g. deliveries of cement during construction. These vehicles are highly unlikely to be at risk of contamination/ contact with aquatic habitats or invasive species. Before deliveries start the site EcoW/ Environmental Manager will review quarries supplying cement to confirm if the above disinfectant measure applies.

*TDR*

The TDR may be used during the decommissioning phase, to remove the turbines from sites. Trees and vegetation may be required to be removed. Mitigation measures as outlined in Sections 1.3.3 of **Appendix 8-C** will apply.

### 8.7.4 Mitigation Measures for Whole Project Cumulative Impacts

With regard to all biodiversity receptors relevant on the site, any potential whole project cumulative impacts will be addressed through the application of the mitigation measures presented for the construction stage (**Section 8.7.1**), Operation stage (**Section 8.7.2**) and decommissioning stage (**Section 8.7.3**). As these mitigation measures are considered sufficient to prevent any significant adverse effects, no specific whole Project cumulative mitigation measures are required. This assessment includes consideration of the CGEP, Grid Connection Route, TDR and off site replant lands.

## 8.8 RESIDUAL IMPACTS

### 8.8.1 Designated Nature Conservation Sites

*CGEP and Grid Connection Route*

With the implementation of the aforementioned mitigation measures, no residual impacts are anticipated to designated sites in particular downstream hydrologically connected fisheries and aquatic ecology from the proposed CGEP.

*TDR*

No potential residual impacts to the aquatic environment are anticipated as a result of the TDR.

### 8.8.2 Habitats and Flora

The habitats within the subject site reflect the predominant land uses of livestock farming and commercial forestry plantations within the Nagles and surrounding lands,

Habitats comprise a mostly agricultural landscape mosaic with improved agricultural grassland and conifer plantation dominating percentage cover. The main negative residual impacts relate to habitat loss as there will be landtake during the construction process.

Total predicted habitat loss as a result of the proposed development is 38.6ha; of this, 36.3HA of the landtake is from habitats classified as of low ecological value. There will also be a permanent loss of 206m of linear scrub/ hedgerow required which will be replanted. Not all landtake is permanent as borrowpits will be reinstated. Any hedgerows to be re-instated will utilise locally sourced native species which will minimise residual impacts.
In addition, 30.4 ha of new semi natural habitat (low scrub/ wet grassland) will be allowed to develop naturally around a buffer zone at each turbine. This area will be subject to ongoing management to prevent taller trees growing.
Mitigation measures as outlined in the current chapter and **Chapter 10** 'Hydrology and Water Quality' will ensure no significant loss of aquatic habitat.

Measures to be undertaken to deal with invasive species are included in **Section 8.7** of this Chapter and will be implemented prior to commencement of construction. With the application of the appropriate mitigation measures as outlined in this chapter), it is considered that the impacts of the proposed development will be minimised to an acceptable level, resulting in imperceptible residual impacts (i.e. An effect capable of measurement but without significant consequences ).

### 8.8.3 Avifauna

*CGEP*

Upon the implementation of the mitigation measures indicated in **Section 8.7**., no significant residual impacts are predicted from the construction, operation and decommissioning phases of the CGEP.

**Hen Harrier**

Displacement and or disturbance impacts are considered unlikely ,in the mid to longer term, to breeding and wintering hen harrier in the area of the windfarm including the site. Impacts to forage habitats are reduced though; general avoidance of important hen harrier foraging habitat (development in mature forest and improved farmland predominantly); provision of new potentially suitable forage habitat onsite (30.4ha) and proposed offsite habitat enhancement measures (**Appendix 8-K)**. Maintenance of a minimum 500m buffer from all recently (since 2005) identified nesting areas for hen harrier means nesting areas are distant from the proposed turbines. In summary, mitigation and the design approach will be implemented to ensure the wind farm will not create a significant additional pressure on the conservation status of local hen harrier

breeding populations in the wider Nagles Mountains and slopes, including the windfarm site. Post construction monitoring proposed and use of bird deterrent systems will further minimise operational collision risks.

Overall residual impacts to hen harrier are considered to be imperceptible.

**Other Bird Species**

Residual impacts to other avifauna species are considered to be imperceptible with mitigation detailed.

*Grid Connection Route*

Upon the implementation of the mitigation measures indicated in **Section 8.7**., no residual impacts are predicted from the construction, operation and decommissioning phases of the GCR.

*TDR*

It is considered that no measurable residual impacts are likely upon the implementation of the mitigation measures outlined in **Appendix 8C**.

### 8.8.4 Terrestrial Mammals (excluding bats)

*CGEP*
Residual impacts on Badger, Pine Marten, Otter and Red squirrel are considered to be **imperceptible** upon implementation of mitigation measures. Secondary effects on Otter through habitat degradation through water pollution will be mitigated for by the use of water protection measures further described in the fisheries and aquatic habitat mitigation measures (8.7.2.8). Thus, significance of effects on Otter is considered to be **imperceptible** in the presence of mitigation measures. In the presence of mitigation measures and best practice measures there will be no residual effects on all other terrestrial mammal receptors during the construction, operation and decommissioning phase of all elements of the project either alone or in combination with other plans or projects.

*TDR*

It is considered that no measurable residual impacts are likely upon the implementation of the mitigation measures outlined in **Appendix 8C**.

### 8.8.5 Bats

*CGEP and Grid Connection Route*
The proposed avoidance and mitigation measures will substantially reduce the risk of collisions to common pipistrelle, soprano pipistrelle and Leisler's bats form the turbines. Confirmatory monitoring will be carried out after the completion of construction works, and the mitigation strategy may be adapted further. This approach follows current best practice in the British Isles, as outlined in the SNH (2019) guidelines and the Mathews *et al* (2016) report.

Overall, these methods will avoid or minimise impacts on bats, and will ensure that the proposed development will not have a significant impact on bat populations. It will also avoid an offense under the *EC (Birds and Natural Habitats) Regulations 2011* (as amended).
No residual impacts are likely on the Grid Connection route.

*TDR*
No residual impacts are likely on the TDR.

### 8.8.6 Other Species

*CGEP, Grid Connection Route and TDR*

With the implementation of the aforementioned mitigation measures, no residual impacts are anticipated to other species including Marsh Fritillary and amphibians from the proposed CGEP.

### 8.8.7 Fisheries and Aquatic Ecology

*CGEP and Grid Connection Route*

With the implementation of the aforementioned mitigation measures, no residual impacts are anticipated to fisheries and aquatic ecology from the proposed CGEP.

*Turbine Delivery Route*

No potential impacts to the aquatic environment are anticipated as a result of the TDR.

## 8.9 BIODIVERSITY ENHANCEMENT

A range of biodiversity enhancement measures are proposed for the CGEP development. All biodiversity enhancement measures will be overseen by a suitably qualified ecologist; measures will also be subject to ongoing monitoring to record their efficacy and to implement changes where required.

Bat boxes will be placed throughout the site and attached to suitable trees in order to increase to value of the CGEP development site to bats. These bat boxes will provide additional roosting habitat for bats. Suitable locations which are not subject to felling are most suitable e.g. biodiversity buffer broadleaved woodland. The provision of additional invertebrate habitat will also benefit bat species by providing increased diversity and abundance of prey. All species of bat in Ireland except for lesser horseshoe bat have been recorded using bat boxes.

Mature conifer plantation will be felled surrounding site access roads, hardstanding (turbines) and compounds, this will provide suitable foraging nesting areas for ground nesting birds, small mammals, amphibians and reptiles once it has revegetated following clear-felling. These clear-felled areas will naturally regenerate over time following a succession pattern with a transition from semi-natural grassland/heath vegetation eventually succeeding to native scrub species such as willow and gorse. In order to enhance the habitat sections will be maintained as semi-natural grassland/heath through regular trimming at two-three year intervals during the non-breeding season, in order to prevent rank growth and larger trees becoming established. The change from low-biodiversity value commercial forestry plantation represents a positive for biodiversity.

The most appropriate management is to retain small amounts of scrub amongst other habitat types. Scrub provides a valuable habitat for birds, mammals and invertebrates. However, it can encroach onto habitats such as species rich grasslands and can make sites look untidy and unmanaged. If left unmanaged scrub will develop into woodland. The existing areas of gorse and willow scrub within the CGEP site will be maintained; should any cutting be required for operational reasons this will be kept to a minimum area and carried out outside of the bird breeding season. By maintaining a mix of scrub and open habitats this will maximise the sites biodiversity value for a wide range of bird species including ground-nesting, and scrub nesting birds. Providing habitat diversity will also potentially benefit birds of prey by providing a diversity of prey types and foraging habitats. Hen Harrier will benefit from the provision open habitats i.e. grassland and heath as this will increase the occurrence of ground nesting birds.

Long-eared owl nest baskets made from natural material e.g. willow or wicker will be placed within suitable woodland habitat, baskets should be placed halfway up trees. Long-eared owls typically nest in disused corvid nests also use nest baskets when provided.

Woodpiles will be created within the site to provide habitat of wildlife. Dead and decaying wood are of great value to wildlife, especially insects, fungi, mosses and lichens, and in turn help to provide a food source for birds and other small mammals. Woody cuttings and larger pieces of wood should be used to create woodpiles, which are best located in direct contact with the ground in a shaded area. Untreated wood should be used. Pesticides and herbicides will not be used in areas of semi natural habitat. Invertebrate diversity will be enhanced through the provision of nesting habitat for bumblebees and solitary bees through the installation of bee hotels in areas of suitable habitat within buffer areas. Where drainage ditches and standing water occurs within the site these sites will be maintained as habitat for aquatic invertebrates and as breeding sites for amphibians. Drainage ditches within clear-felled buffer zones will be enhanced through the excavation of

small pools to provide habitat variety. This will enhance the site for a range of species which rely on standing water for their larval stages including dragonflies and many hoverfly species.

The local hen harrier breeding population is showing evidence of declining numbers of breeding pairs. In this regard offsite hen harrier forage habitat enhancement measures are proposed to improve forage habitat quality in the wider region of the windfarm development. These enhancement measures are to benefit conditions for local breeding hen harrier. Further details on this measure and lands selected for appropriate management are detailed in **Appendix 8- K.** These measures would be expected to provide a net gain for local hen harrier and other wildlife even despite the presence of the proposed development.

## 8.10 BIODIVERSITY CONCLUSION

Biodiversity is defined as the variability among living organisms from all sources, including, inter alia, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems.

Relevant ecosystems within the study area of the proposed development, including terrestrial and aquatic habitats, along with their respective individual receptors scoped in for appraisal have been subject to full consideration in this chapter and the resultant conclusion is that with the implementation of the mitigation and project design as outlined herein, no residual effects remain. No significant effects on the interaction, variety or variability within species comprising terrestrial and aquatic ecosystems or European Sites comprising parts of their ecosystem functioning are anticipated.

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## 8.12 GLOSSARY OF TERMS

| Term | Definition |
|---|---|
| **Afforestation** | The establishment of a forest or stand of trees (forestation) in an area where there was no previous tree cover |
| **Anadromous** | Fish that migrate up rivers from the sea to spawn |
| **Appropriate Assessment** | An assessment required by the EU Habitats Directive where a project (or plan) would be likely to have a significant effect on a European site, either alone or in combination with other plans or projects |
| **Avoidance** | Prevention of impacts occurring, having regard to predictions about potentially negative environmental effects (e.g. project decisions about site location or design). |
| **Baseline Environment** | The conditions that would pertain in the absence of the proposed project at the time that the project would be constructed / operated / decommissioned. The definition of these baseline conditions should be informed by changes arising from other causes (e.g. other consented developments) |
| **Bern Convention** | Convention on the Conservation of European Wildlife and Natural Habitats in Bern in 1992 ensures that governments take into account the conservation needs of species during the formulation of planning and development policies |
| **Biodiversity** | The biological diversity of the earth's living resources. The total variability among organisms and ecosystems. In common usage, and within these Guidelines, biodiversity is used to describe the conservation of the natural environment, rather than describing the variation within it. |
| **Catchment** | A catchment area is a hydrological unit. Each drop of precipitation that falls into a catchment area eventually ends up in the same river. Catchment areas are separated from each other by watershed |
| **Climate change** | A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels. |
| **Compensation** | Measures taken to make up for the loss of, or permanent damage to, ecological features despite mitigation. Any replacement area should be similar in terms of biological features and ecological functions that have been lost or damaged, or with appropriate management have the ability to reproduce the ecological functions and conditions of those biological features. |
| **Competent Authority** | An organisation or individual who is responsible for determining an application for consent for a project. Competent authorities in relation to Appropriate Assessment in Ireland are set out in SI 477 of 2011. |
| **Conceptual Site Model** | Model used to facilitate the identification of source-pathway-receptor links between a project and the receiving environment |
| **Connectivity** | A measure of the functional availability of the habitats needed for a particular species to move through a given area. Examples include the flight lines used by bats to travel between roosts and foraging areas or the corridors of appropriate habitat needed by some slow colonising species if they are to spread. |
| **Conservation objective** | Objective for the conservation of biodiversity (e.g. specific objective within a management plan or broad objectives of policy). |
| **Conservation status** | The state of a species or habitat including for example, extent, abundance, distribution and their trends. |
| **Couches** | Overground nest like structure used by Otter for resting and/or breeding |
| **Cumulative impact / effect** | Additional changes caused by a proposed development in conjunction with other developments or the combined effect of a set of developments taken together. |
| **Degradation** | The condition or process of degrading or being degraded. |

| Term | Definition |
|---|---|
| **Designated Sites** | General term for sites which have been designated for nature conservation and for which legal protection has been conferred onto the sites. In Ireland, these included Special Areas of Conservation and Special Protection Areas. In addition to Natural Heritage Areas designated under national legislation. |
| **Displacement** | The action of moving something from its place or position. |
| **Distribution** | The geographical presence of a feature. This can depend on factors such as climate and altitude. |
| **Disturbance** | Disturbance is a temporary change in environmental conditions that causes a pronounced change in an ecosystem. |
| **Ecosystem** | A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit |
| **Effect** | Outcome to an ecological feature from an impact. For example, the effects on a dormouse population from loss of a hedgerow. See also 'Impact'. |
| **EIAR** | Environmental Impact Assessment Report |
| **Endangered** | A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (Section V of IUCN Red List Categories and Criteria (2012) Version 3.1 2nd edn.), and it is therefore considered to be facing a very high risk of extinction in the wild. |
| **Enhancement** | The genuine enhancement of the natural heritage interest of a site or area because the project includes improved management or new habitats or features, which are better than the prospective management, or the habitats or features present there now. There is, therefore, a net or new benefit to the natural heritage |
| **Environmental Impact Assessment (EIA)** | Assessment of projects carried out under the EIA Directive and Regulations. |
| **Environmental Impact Assessment Report** | A document describing the effects of a project on the environment prepared during EIA |
| **European sites** | Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs) which comprise the Natura 2000 network which are designated under European legislation |
| **Fauna** | Fauna is all of the animal life of any particular region or time. |
| **Favourable condition** | Satisfactory condition of an ecological feature. In some cases, favourable condition is specifically defined (e.g. for some designated sites). |
| **Flora** | Flora is the plant life occurring in a particular region or time. |
| **Flora Protection Order** | The current list of plant species protected by Section 21 of the Wildlife Act, 1976 is set out in the Flora (Protection) Order, 2015 (S.I. No. 356/2015) which supersedes orders made in 1980, 1987 and 1999. |
| **Fragmentation** | The breaking up of a habitat, ecosystem or land-use type into smaller parcels with a consequent impairment of ecological function. |
| **Groundwater** | Groundwater is the water found underground in the cracks and spaces in soil, sand and rock. It is stored in and moves slowly through geologic formations of soil, sand and rocks called aquifers. |
| **Habitat** | The place or type of site where an organism or population naturally occurs. Often used in the wider sense referring to major assemblages of plants and animals found together |
| **Hinterland** | Area of surrounding landscape |
| **Holts** | Created or existing underground shelter used by Otter for resting and/or breeding |

| Term | Definition |
|---|---|
| **Hydrological** | Associated with or related to the scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere. |
| **Impact** | Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow. See also 'Effect' |
| **Important ecological features** | Ecological features requiring specific assessment within EcIA. Ecological features can be important for a variety of reasons (e.g. quality and extent of designated sites or habitats, habitat / species rarity). |
| **Larvae** | Plural form of larva; The active immature form of an insect, especially one that differs greatly from the adult and forms the stage between egg and pupa |
| **Life-cycle stages** | In this context, the stages of a project; i.e. Construction, Operational and Decommissioning |
| **Mitigation / Mitigation Measures** | Measures taken to avoid or reduce negative impacts. Measures may include: locating the development and its working areas and access routes away from areas of high ecological interest, fencing off sensitive areas during the construction period, or timing works to avoid sensitive periods. An example of a reduction measure is a reed bed silt trap that is designed to minimise the amount of polluted water running directly into an ecologically important watercourse. See also compensation (which is separate from mitigation). |
| **Natura Impact Statement** | Under the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011) (as amended) an EcIA report including the scientific assessment of a plan or project in relation to relevant Natura 2000 sites and other information required to enable a competent authority to carry out an Appropriate Assessment |
| **Natural Heritage Area** | The basic designation for wildlife in Ireland is the Natural Heritage Area (NHA). This is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. |
| **Non-native invasive species** | Any non-native animal or plant that has the ability to spread causing damage to the environment, the economy, our health and the way we live. Equivalent of 'alien species' as used by the Convention on Biological Diversity |
| **Non-Volant** | Incapable of flight |
| **Population** | A collection of individuals (plants or animals), all of the same species and in a defined geographical area. |
| **Precautionary Principle** | The principle that the absence of complete information should not preclude precautionary action to mitigate the risk of significant harm to the environment. |
| **Project Design Measure** | Measures for environmental protection, incorporated into the design of the project. |
| **Proposed Natural Heritage Area** | Proposed NHAs (pNHAs) were published on a non-statutory basis in 1995 and have not since been statutorily proposed or designated. These sites are of significance for wildlife and habitats are subject to limited protection, in the form of agri-environmental farm planning schemes, NPWS approval for afforestation schemes on pNHA lands and recognition of the ecological value of pNHAs by Planning and Licencing Authorities |
| **Qualifying Interest** | Habitats listed on Annex I and Species listed on Annex II of the EU Habitats Directive for which Special Areas of Conservation have been designated. |
| **Rarity** | A measure of relative abundance |
| **Receptors** | Any ecological or other defined feature (e.g. human beings) that is sensitive to or has the potential to be affected by an impact. |
| **Replacement** | The creation of a habitat that is an acceptable substitute for the habitat which has been lost. |
| **Restoration** | The re-establishment of a damaged or degraded system or habitat to a close approximation of its pre-degraded condition. |

| Term | Definition |
|---|---|
| **Riparian** | Relating to or situated on the banks of a river |
| **Roost** | Resting place for a bird or bat |
| **SAC/cSAC** | Site designated according to the habitats directive. Special area of conservation means a site of Community importance designated by the Member States through a statutory, administrative and/or contractual act where the necessary conservation measures are applied for the maintenance or restoration, at a favourable conservation status, of the natural habitats and/or the populations of the species for which the site is designated |
| **Scoping** | The process of determining the content and extent of the matters which should be covered in the environmental information (the EIA Report) to be submitted to a Competent Authority for developments which are subject to EIA. |
| **Screening** | Determination of whether or not an EIA is necessary. |
| **Sensitive Aspect** | Any sensitive receptor in the local environment which could be impacted by the project. |
| **Sett** | Series of underground tunnels and chambers of varying complexity used by Badgers for resting and breeding |
| **Significance** | The importance of the outcome of the impact (or the consequence of change) for the receiving environment. |
| **Source-Impact-Pathways** | Method used to identify the source of any potential impacts, predicting any potential impacts and identifying the pathways by which the potential impacts can reach the sensitive receptor |
| **SPA** | Area classified under Article 4 of the Birds Directive (Council Directive 2009/147/EC of 30 November 2009on the conservation of wild birds). |
| **Special Conservation Interest** | Species listed on Annex I of the EU Birds Directive (Council Directive 79/409/EEC of 2 April 1979) as well as wetland habitats for which Special Protection Areas have been designated for the conservation of birds. |
| **Sustainable Development** | Sustainable development is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for future generations. |
| **Taxa** | Plural form of Taxon; a taxonomic group of any rank, such as a species, family, or class. |
| **Tributary** | A river or stream which flows into a larger river or lake |
| **Turbary** | Turf-cutting, the legal right to cut turf or peat for fuel on common ground or on another person's ground |
| **Upland** | Area of hilly or mountainous land. Upland habitats are defined as unenclosed areas of land over 150 m and contiguous areas of related habitat that extend below this altitude |
| **Vulnerable** | A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V of IUCN Red List Categories and Criteria (2012) Version 3.1 2nd edn.), and it is therefore considered to be facing a high risk of extinction in the wild. |
| **Zone(s) of Influence** | The area(s) over which ecological features may be affected by the biophysical changes caused by the proposed project and associated activities. |

## 8.13 LIST OF ABBREVIATIONS

| Abbreviation | Full Term |
|---|---|
| **AA** | Appropriate Assessment |

| Abbreviation | Full Term |
|---|---|
| **ABP** | An Bord Pleanála |
| **AMM** | Additional Mitigation Measure developed by members of the EIAR Team |
| **BCI** | Bat Conservation Ireland |
| **BOCCI** | Birds of Conservation Concern in Ireland |
| **BPM** | Best Practice Measure developed by members of the EIAR Team |
| **BWI** | Birdwatch Ireland |
| **CIEEM** | Chartered Institute of Ecology and Environmental Management |
| **CIRIA** | Construction Industry Research and Information Association |
| **CGEP** | Coom Green Energy Park |
| **DAHRGA** | Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs |
| **DoEHLG** | Department of Environment, Heritage and Local Government |
| **EcIA** | Ecological Impact Assessment |
| **EIA** | Environmental Impact Assessment |
| **EIAR** | Environmental Impact Assessment Report |
| **EMP** | Environmental Management Plan |
| **EPA** | Environmental Protection Agency |
| **ERFB** | Eastern Regional Fisheries Board |
| **FPO** | Flora Protection Order |
| **GCR** | Grid Connection Route (for the project) |
| **GSI** | Geological Survey of Ireland |
| **IEEM** | Institute of Ecology and Environmental Management |
| **IFI** | Inland Fisheries Ireland |
| **IFM** | Institute of Fisheries Management |
| **JNCC** | Joint Nature Conservation Committee |
| **NBDC** | National Biodiversity Data Centre |
| **NGO** | Non-Governmental Organisation |
| **NHA** | Natural Heritage Area |
| **NIS** | Natura Impact Statement |
| **NPWS** | National Parks and Wildlife Service |
| **NRA** | National Roads Authority |
| **OSI** | Ordnance Survey of Ireland |
| **PD** | Project Design Environmental Protection Measure developed by members of the EIAR Team |
| **PEA** | Preliminary Ecological Appraisal |
| **pNHA** | Proposed Natural Heritage Area |
| **RFI** | Request for Further Information |
| **SAC/cSAC** | Special Area of Conservation |
| **SEA** | Strategic Environmental Assessment |
| **SNH** | Scottish Natural Heritage |

| Abbreviation | Full Term |
|---|---|
| **SPA** | Special Protection Area |
| **TDR** | Turbine Delivery Route (for the project) |