

Environmental Impact
Assessment Report

NISA
North Irish Sea Array

Volume 4: Onshore Chapters

Chapter 23

Biodiversity



Contents

| | | |
|-------|---|--------|
| 23. | Biodiversity | 23.1 |
| 23.1 | Introduction | 23.1 |
| 23.2 | Methodology | 23.2 |
| 23.3 | Baseline Environment | 23.20 |
| 23.4 | Characteristics of the Proposed Development | 23.57 |
| 23.5 | Potential Effects | 23.60 |
| 23.6 | Mitigation and Monitoring Measures | 23.82 |
| 23.7 | Residual Effects | 23.96 |
| 23.8 | Transboundary Effects | 23.100 |
| 23.9 | Cumulative Effects | 23.101 |
| 23.10 | References | 23.101 |

Tables

| | | |
|-------------|---|-------|
| Table 23.1 | Overview of Ecological Surveys undertaken at the Proposed Development | 23.8 |
| Table 23.2 | Domin scale in relation to percentage cover | 23.10 |
| Table 23.3 | Conditions needed for suitable breeding newt habitat (Meehan, 2013) | 23.12 |
| Table 23.4 | Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape, to be applied using professional judgement (Collins, 2016) ³⁰ | 23.12 |
| Table 23.5 | Bat activity transect survey effort | 23.13 |
| Table 23.6 | Bat static detector survey effort | 23.13 |
| Table 23.7 | Emergence/re-entry roost survey effort | 23.14 |
| Table 23.8 | Categories for bat activity levels associated with bat passes per hour (bp/h) Adapted from Kepel et al. (2011) | 23.14 |
| Table 23.9 | Geographic frame of reference used to determine ecological value Source: Adapted from CIEEM (2018) | 23.17 |
| Table 23.10 | Summary of European designated sites occurring within 15km of the onshore development area, and those with identified connectivity to the onshore development area. | 23.22 |
| Table 23.11 | Summary of nationally designated areas within 15km of the onshore infrastructure of the onshore development area, and those with identified connectivity to the onshore development area. | 23.28 |
| Table 23.12 | Overview of habitats within the Study Area | 23.39 |
| Table 23.13 | Total bat passes recorded during the transect survey undertaken on 3 August 2022 at the Landfall and Grid facility locations | 23.43 |
| Table 23.14 | Bat activity recorded by static detectors during the deployment | 23.43 |
| Table 23.15 | Species recorded and their breeding status within the onshore development area during the breeding bird surveys across 2021, 2022 and 2023 | 23.44 |
| Table 23.16 | Peak count and distribution of wintering waterbirds recorded during high and low-tide count surveys at the proposed landfall and grid facility, and Malahide Estuary during winter 2021-22 | 23-48 |
| Table 23.17 | Review of water quality within the Study Area (Source: Catchments.ie) | 23.53 |
| Table 23.18 | Valuation of Important Ecological Features in relation to the onshore infrastructure of the proposed development | 23.56 |

| | |
|---|-------|
| Table 23.19 Significance statement for aquatics and fisheries at each watercourse crossing within the onshore development area. | 23.76 |
|---|-------|

Photographs

| | |
|---|-------|
| Photograph 23.1 BC1 Arable crops at the proposed grid facility location | 23.32 |
| Photograph 23.2 CB1 Shingle and gravel banks at the landfall site | 23.32 |
| Photograph 23.3 CD1 Embryonic dunes at the landfall site | 23.33 |
| Photograph 23.4 CD3 Sedimentary Sea cliffs at the landfall site | 23.33 |
| Photograph 23.5 FW2 Lowland depositing river located at Blakes Cross South | 23.34 |
| Photograph 23.6 FW4 Drainage ditch located at Blakes Cross South | 23.34 |
| Photograph 23.7 GA1 Improved agricultural grassland at Blakes Cross North | 23.35 |
| Photograph 23.8 GS Semi-natural grassland at Blakes Cross South specifically Wx12 (Deanestown Stream) | 23.35 |
| Photograph 23.9 GS1 Dry calcareous and neutral grassland west of the existing Belcamp substation | 23.36 |
| Photograph 23.10 GS2 Dry meadows and grassy verges at section Wx22 (Sluice Stream) | 23.37 |
| Photograph 23.11 WD1 (Mixed) Broadleaf Woodland located at Wx20 Gaybrook Stream | 23.37 |
| Photograph 23.12 WL1 Hedgerows located at Wx09 (Oberstown Stream) and Wx10 (Aldrumman Stream) | 23.38 |
| Photograph 23.13 WL2 Treelines at Blakes Cross South | 23.38 |
| Photograph 23.14 WS1 Scrub located at the existing Belcamp substation (this particular area of scrub lies outside the onshore development area) | 23.39 |

23. Biodiversity

23.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents an assessment of likely significant effects from the North Irish Sea Array (NISA) Offshore Wind Farm (hereafter referred to as the ‘proposed development’) on onshore receptors, i.e. all aspects of terrestrial ecology and biodiversity including ornithology that occur landward of the High Water Mark (HWM), as a result of the onshore infrastructure of the proposed development. The assessment, under the heading Biodiversity, considers potential impacts and likely significant effects during the construction, operation, and decommissioning phases on onshore receptors. While this chapter does not assess the potential impacts and likely significant effects as a result of the offshore infrastructure of the proposed development, where an interaction occurs that could result in a likely significant effect on an onshore receptor, this interaction has been considered.

This chapter sets out the methodology followed (Section 23.2), describes the baseline environment (Section 23.3) and summarises the main characteristics of the proposed development which are of relevance to biodiversity (Section 23.4). The evaluation of the potential biodiversity effects of the proposed development are described (23.5). Measures are proposed to mitigate and monitor these effects (Section 23.6) and any residual effects are described (Section 23.7). Transboundary effects are considered (Section 23.8). Cumulative effects are summarised in Section 23.9 and detailed in full in Chapter 38 Cumulative and Inter-Related Effects. The chapter then provides a reference section (Section 23.10). All figures referenced within this chapter are included in Volume 7.

The EIAR also includes the following:

- Detail on the competent experts that have prepared this chapter is provided in Appendix 1.1 Competent Experts of Chapter 1: Introduction.
- Detail on the extensive consultation that has been undertaken with a range of stakeholders during the development of the EIAR is set out in Appendix 1.2.
- A glossary of terminology, abbreviations, and acronyms is provided at the beginning of Volume 2 of the EIAR.

A detailed description of the proposed development including construction, operation and decommissioning is provided in Volume 2, Chapter 6: Description of the Proposed Development – Offshore (hereafter referred to as the ‘Offshore Description Chapter’) and Chapter 7: Description of the Proposed Development – Onshore (hereafter referred to as the ‘Onshore Description Chapter’), and the Construction methodology is described in Volume 2, Chapter 8: Construction Strategy – Offshore (hereafter referred to as the ‘Offshore Construction Chapter’) and Chapter 9: Construction Strategy – Onshore (hereafter referred to as the ‘Onshore Construction Chapter’). This chapter of the EIAR assesses the effects on all aspects of ecology and biodiversity including ornithology that occurs landward of the high-water mark (HWM).

An ecological assessment of the effects of the proposed offshore infrastructure of the proposed development is provided in the following chapters: Volume 3, Chapter 12: Benthic and Intertidal Ecology, Volume 3, Chapter 13: Fish and Shellfish Ecology, Volume 3, Chapter 14: Marine Mammal and Megafauna Ecology, Volume 3, Chapter 15: Offshore Ornithology and Volume 5, Chapter 35: Offshore Bats.

This chapter includes the following appendices which are included in Volume 10 of the EIAR:

- Appendix 23.1 – Breeding birds survey effort
- Appendix 23.2 – Wintering waterbird survey effort
- Appendix 23.3 – Desk study results
- Appendix 23.4 – Non-native invasive species
- Appendix 23.5 – Annex 1 habitat assessment

- Appendix 23.6 – Potential roost features for bats
- Appendix 23.7 – Breeding bird survey results
- Appendix 23.8 – Wintering waterbird survey results
- Appendix 23.9 – Water quality and fisheries assessment for each water crossing
- Appendix 23.10 – Habitat and species management plan
- Appendix 23.11 – Baseline tree survey report

23.2 Methodology

23.2.1 Introduction

The European Commission guidance (EC, 2017) on Environmental Impact Assessment of Projects, Guidance on the preparation of the Environmental Impact Assessment Report explains the concept of biodiversity as; “*Fauna and flora taken individually refer to animal and plant life in a particular zone or time, it involves a somewhat individual perspective, while biodiversity refers to the interactions and variety of, and variability within, species, between species, and between ecosystems; this is, therefore, a much broader concept than simply looking at the impacts on fauna and flora individually.*” This is the concept of biodiversity used in the assessment.

An assessment of the existing biodiversity baseline and potential ecological effects of the onshore infrastructure of the proposed development was completed based on a desktop review of ecological information, and on ecological surveys. The EIAR has been prepared with due regard to the overarching EIA Directive and guidance as detailed in Section 2.2 of Chapter 2 EIA and Methodology for the preparation of an EIAR. The assessment presented in this chapter was also made with reference to the requirements of national and European legislation / guidance as presented in Section 23.2.2.

23.2.2 Legislation and Guidance

23.2.2.1 Legislation

Legislation summarised in this section has been considered in this chapter, in the assessment of the effects on terrestrial ecology and biodiversity occurring landward of the HWM.

European Legislation

EIA Directive 2011/92/EU as amended by Directive 2014/52/EU

Directive 2011/92/EU as amended by Directive 2014/52/EU (together, the EIA Directive) requires projects that are likely to have significant effects on the environment to be subject to an environmental impact assessment prior to development consent being given. Biodiversity (for example flora and fauna) is specifically mentioned in Annex IV of the EIA Directive as one of the aspects of the environment which should be addressed in an EIAR. Further information on the EIA Directive is provided in Chapter 2.

EU Habitats Directive 92/43/EEC

The Habitats Directive provides the basis of protection for Natura 2000 sites, or European site, namely Special Areas of Conservation (SACs). The full title of this Directive is ‘Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora’ (the Habitats Directive). Article 6 of the Habitats Directive requires that any plan or project that may have a significant effect on a Natura 2000 site must be subject to an Appropriate Assessment (AA). An AA is required in order to ascertain the potential impact of a development on the reasons for which the site is designated, and thereby ascertain the potential for adverse impact on the integrity of the site.

The report outlining whether or not a development may adversely affect the integrity of a European site is known as a Natura Impact Statement (NIS).

The Habitats Directive also provides for the protection of species listed under Annex IV wherever they occur. The Annex IV species of relevance in the Irish context and to terrestrial ecology include all bat species, otter, natterjack toad and Kerry slug.

In compliance with the Habitats and Birds Directives the potential impacts associated with the proposed development, how these might affect the European sites' conservation objectives, and the mitigation measures that will be implemented to ensure that adverse effects on site integrity do not arise, are considered and assessed in full detail in the Natura Impact Statement (NIS) prepared by the Developer, which is a standalone document independent of the findings of this EIAR. The conclusion of the NIS assessment was that the proposed development will not adversely affect the integrity of any European site, either alone or in combination with other plans or projects.

EU Birds Directive 2009/147/EC

The Birds Directive establishes a system of general protection for all wild birds throughout the European Union. The full title of this Directive is 'Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds' (the Birds Directive). Annex I of the Birds Directive lists 194 bird species that are rare, vulnerable to habitat changes or in danger of extinction within the European Union. For these species, Member States must conserve their most suitable territories in number and size as Special Protection Areas (SPAs), which are considered to be Natura 2000 sites, or European sites. Similar actions should be taken by Member States regarding migratory species, even if they are not listed in Annex I.

In compliance with the Habitats and Birds Directives the potential impacts associated with the proposed development, how these might affect the European sites' conservation objectives, and the mitigation measures that will be implemented to ensure that adverse effects on site integrity do not arise, are considered and assessed in full detail in the Natura Impact Statement (NIS) prepared by the Developer, which is a standalone document independent of the findings of this EIAR. The conclusion of the NIS assessment was that the proposed development will not adversely affect the integrity of any European site, either alone or in combination with other plans or projects.

Irish Legislation

European Communities (Birds and Natural Habitats) Regulations 2011

The European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011 (as amended) (the Birds and Habitats Regulations), transpose the Habitats and Birds Directives into Irish law. It also contains regulations (49 and 50) that deal with invasive species (those included within the Third Schedule of the Birds and Habitats Regulations). Regulations 49 and 50 prohibit the introduction and dispersal of the invasive species of flora and fauna that are included on the Third Schedule list of these regulations.

The Wildlife Act 1976 (as amended)

The Wildlife Act 1976 (as amended) (the Wildlife Act) gives protection to a wide variety of birds, animals, and plants in Ireland. The Wildlife Act also provides a mechanism to give statutory protection to Natural Heritage Areas (NHAs). The amendment in 2000 of the Wildlife Act extends protection under this legislation to most species, including the majority of fish and aquatic invertebrate species which were excluded from the 1976 Act.

The Planning and Development Act, 2000 (as amended)

The role of an EIAR, in the consideration by the competent authority determining an application under the Planning Act and Development Act, 2000 (as amended) (the Planning Acts), is explained in Volume 2, Chapter 2: EIA and Methodology for the preparation of an EIAR. As a key component of an EIAR, the likely significant effects of a project on biodiversity are part of this consideration.

The Flora (Protection) Order, 2022

The Flora (Protection) Order, 2022 (S.I. 235 of 2022), supersedes orders made in 1980, 1987, 1999 and 2015. Under this order it is illegal to cut, uproot or damage the listed species in any way, or to offer them for sale.

This prohibition extends to the taking or sale of seed. In addition, it is illegal to alter, damage or interfere in any way with their habitats. This protection applies wherever the plants are found and is not confined to sites designated for nature conservation.

23.2.2.2 *Plans and policies*

The following plans, and their policies relevant to biodiversity, were considered in this chapter and the assessment of effects on terrestrial ecology and biodiversity occurring landward of the HWM.

- Fingal Development Plan 2023-2029¹
- Fingal Biodiversity Action Plan 2022-2030²
- Dublin City Development Plan 2022-2028³
- Dublin City Biodiversity Action Plan 2021-2025⁴
- National Biodiversity Action Plan 2023-2030⁵
- All-Ireland Pollinator Plan 2021-2025⁶
- All-Ireland Species Action Plan for Bats (NPWS, 2008)⁷

23.2.2.3 *Guidelines*

The assessment had regard to the following guidance documents. While a number of these documents have been prepared to assess road developments, the linear nature of the onshore infrastructure of the proposed development means it is relevant to consider these documents in the ecological assessment.

- National Roads Authority (NRA) currently known as Transport Infrastructure Ireland (TII) (2006a) Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. National Roads Authority
- NRA (2008) Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. National Roads Authority
- NRA (2009a). Guidelines for the Assessment of Ecological Impacts of National Road Schemes (Rev 2). National Roads Authority, Dublin
- NRA (2009b) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (Rev 2). National Roads Authority
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management (CIEEM)
- EirGrid (2020) Ecology Guidelines for Electricity Transmission Projects: A standard approach to ecological impact assessment of high voltage transmission projects
- EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Report (May 2022). Environmental Protection Agency, Dublin

23.2.2.4 *Information sources*

The following sources of information have informed the ecological assessment:

¹ Fingal County Council (2023) *Fingal Development Plan 2023-2029*. April 2023

² Fingal County Council (2022) *Fingal Biodiversity Action Plan 2022-2030*. Draft for Consultation. Dublin, Fingal County Council.

³ Dublin City Council (2022) *Dublin City Development Plan 2022-2028*. December 2022

⁴ Dublin City Council (2021) *Dublin City Biodiversity Action Plan 2021-2025*. May 2021

⁵ Department of Housing, Local Government and Heritage (2024) *Ireland's 4th National Biodiversity Action Plan*. Draft for Public Consultation.

⁶ National Biodiversity Data Centre (2021) *All-Ireland Pollinator Plan 2021-2025*. March 2021

⁷ National Parks and Wildlife Service, and Environment & Heritage Service (2008) *All-Ireland Species Action Plan: Bats*. April 2008

- Environmental Protection Agency (EPA) Online Maps⁸
- National Parks and Wildlife Services (NPWS) Online Map viewer⁹
- National Biodiversity Data Centre (NBDC) Biodiversity Maps¹⁰
- EPA Catchments Database¹¹
- Irish Vegetation Classification¹²
- Birds of Conservation Concern in Ireland 2020-2026 (Gilbert, *et al.* 2021)¹³
- Irish Wetland Birds Survey^{14,15,16}
- NPWS Irish Wildlife Manuals¹⁷ and Red Lists¹⁸

The following chapters contained within the EIAR have informed the ecological assessment:

- Onshore Description Chapter, Onshore Construction Chapter, Volume 4, Chapter 21: Land, Soils, Geology and Hydrogeology (hereafter referred to as the Land and Soils Chapter), Volume 4, Chapter 22: Water (hereafter referred to as the Water Chapter), Volume 5, Chapter 27: Air Quality (hereafter referred to as the Air Chapter), and Volume 5, Chapter 30: Noise and Vibration (hereafter referred to as the Noise Chapter)
- Offshore Description Chapter, Offshore Construction Chapter, Volume 3, Chapter 12: Benthic and intertidal Ecology, Chapter 13: Fish and Shellfish Ecology, Chapter 14: Marine Mammal and Megafauna Ecology, Chapter 15: Offshore Ornithology and Chapter 35: Offshore Bats.

23.2.3 Study Area

The study area for ecological surveys undertaken for the onshore infrastructure of the proposed development encompassed greenfield lands within the onshore development area (the portion of the proposed development boundary landward of the HWM: see Volume 7 Figure 23.1 to Figure 23.8).

A large proportion of the onshore cable route will be contained within the public road corridor: this is referred to as the inline sections of the cable route. The inline sections have limited ecological value and therefore were not surveyed. Where the onshore cable route deviates from the inline sections, i.e., the public road network, these areas are referred to as the offline sections of the route and where development will occur in greenfield lands. The offline sections occur at seven locations, where due to the nature of the works, ecological features have the potential to be impacted. The onshore infrastructure of the proposed development will occur in greenfield lands at the landfall site, grid facility and Belcamp substation which are included in the ecological study area.

In addition, at two locations the ecological study area extended beyond the onshore development area to adjacent lands at the landfall site and the nearest areas of Malahide Estuary. The ten distinct areas included in the ecology study area, listed north to south, are:

- Landfall site (see Figure 23.1)

⁸ EPA Maps. Available at: <https://gis.epa.ie/EPAMaps/> [Accessed January 2023].

⁹ NPWS Designations Viewer. Available at: <https://dahg.maps.arcgis.com/apps/webappviewer/> [Accessed January 2023]

¹⁰ National Biodiversity Data Centre. Biodiversity Maps. Available at: <https://maps.biodiversityireland.ie/> [Accessed January 2023]

¹¹ EPA Catchments Database. Available at: <https://www.catchments.ie/data/> [Accessed January 2023]

¹² Irish Vegetation Classification. Available at: www.biodiversityireland.ie/ivc [Accessed December 2022]

¹³ Gilbert G, Stanbury A and Lewis L (2021) Birds of Conservation Concern in Ireland 2020 –2026. *Irish Birds* 9: 523–544

¹⁴ Irish Wetland Bird Survey – Map of sites. Available at: <https://bwi.maps.arcgis.com/apps/View/index.html?appid=1043ba01fcb74c78bc75e306eda48d3a> [Accessed January 2023]

¹⁵ Irish Wetland Bird Survey – Species trends by sites. Available at: https://birdwatchireland.ie/app/uploads/2022/04/iwebs_trends_report.html [Accessed January 2023]

¹⁶ Irish Wetland Bird Survey – Site peak counts. Available at: <https://c0amf055.caspio.com/dp/f4db30005dbe20614b404564be88> [Accessed January 2023]

¹⁷ NPWS Irish Wildlife Manuals. Available at: <https://www.npws.ie/publications/irish-wildlife-manuals> [Accessed January 2023]

¹⁸ NPWS Red Lists. Available at: <https://www.npws.ie/publications/red-lists> [Accessed January 2023]

- Grid facility (see Figure 23.1)
- Wx10 (Aldrumman Stream) (see Figure 23.2¹⁹)
- Blakes Cross North including water crossing Wx11 (Ballough Stream) (see Figure 23.2)
- Blakes Cross South including water crossings Wx12 (Deanestown Stream) and Wx13 (Ballyboghill Stream) (see Figure 23.2)
- M1 crossing (see Figure 23.3)
- Malahide Estuary (see Figure 23.3)
- Water crossing Wx20 (Gaybrook Stream) (see Figure 23.3)
- Water crossing Wx22 (Sluice Stream) (see Figure 23.4) and
- Existing 220kv substation at Belcamp (see Figure 23.4)

The study area was extended to cover the zone of influence (ZoI) of the onshore development area, and where appropriate, to cover nearby ecological features to confirm the presence of, for instance, a protected species resting place (e.g. badger sett) which would inform the use by badger of the area within the onshore development area at that location. The ZoI is defined as the area within which ecological features may be affected by changes resulting from the onshore infrastructure of the proposed development, an area which is likely to extend outside of the onshore development e.g. water quality impacts arising from construction can travel a distance downstream from the onshore development area. The sections below on methodology include details on the study area for each ecological feature and survey type, and where it extends beyond the onshore development area, or deviates from the offline sections. See Volume 7 Figure 23.1 to Figure 23.8 for the ecological and aquatic study area.

23.2.4 Data Collection and Collation

To gather all available information on the local ecological environment of the onshore infrastructure of the proposed development, an initial desktop study and consultation process was undertaken. Following, and informed by, the desktop study and consultation process ecological field surveys were undertaken to collect information on the ecological baseline conditions within the onshore development area.

23.2.4.1 Desktop Study

Existing Ecological Records

A search was completed for species records occurring within the study area, in this case the entirety of the proposed development, using the National Biodiversity Data Centre (NBDC) website on 19 October 2023²⁰. Species records from the last 10 years were obtained for approximately 10km around the study area. These records were used to determine which notable or protected species may occur within the study area and wider area to inform survey design and identify potential constraints.

To enhance information on the recorded distribution of bats obtained from the NBDC database, supplementary data was obtained from the database in the form of a habitat suitability map. This map portrays the broad-scale geographic patterns of occurrence and local roosting habitat requirements, thereby providing a comprehensive understanding of the suitability of habitat in the surrounding area for Irish bat species.

¹⁹ This area is labelled on Figure 23.2 as “Wx9 (Oberstown Stream) and Wx10 (Aldrumman Stream)”

²⁰ NBDC maps: <https://maps.biodiversityireland.ie/Map>

Irish Wetland Bird Survey (IWeBS) data was also consulted for wetland and estuary sites located within the desktop study search area²¹. IWeBS peak counts and species trends for wintering waterbirds at the nearest sites were referred to^{22,23}.

A data request was made to Bat Conservation Ireland (BCI) for roost records within 10km of the landfall site.

Given the nature of the works and the types of habitats within the study area, the above records were deemed sufficient to inform this assessment, when supplemented by detailed field surveys, allowing direct observations and records to be made.

Designated Sites

Designated sites are sites of national and international nature conservation importance which are afforded protection as set out in this section. Special Areas of Conservation (SAC) are designated under the Habitats Directive. The legislation provides for the protection of certain habitats (listed on Annex I of the Directive) and/or species (listed on Annex II of the Directive) within SACs. Special Protection Areas (SPAs) are designated under the Birds Directive. This allows for the protection of bird species on Annex I of the Directive, regularly occurring populations of migratory species, and important wetland habitats for birds, including within SPAs. National Heritage Areas (NHAs) are designated under the Wildlife Acts to protect habitats, species or geology of national importance. Many of the NHAs in Ireland overlap with European sites. Although numerous NHA designations are not yet fully in force under this legislation (referred to in the meantime as ‘proposed NHAs’ or pNHAs), pNHAs are protected on a non-statutory basis by local authorities who have regard for them in planning policies and are sites of significance for wildlife and habitats.

Information on areas designated for the protection of ecological features within a minimum of 15km of the onshore development area, as well as any designated sites with a hydrological connection were obtained using NPWS data and maps²⁴ and the EPA map viewer²⁵.

The potential for connectivity with the proposed development was assessed using the available datasets and professional judgement, such as resulting from adjoining watercourses or those in close proximity to the site. Shapefiles of designated areas in the Republic of Ireland, including SPAs, candidate SPAs (cSPAs), SACs, candidate SACs (cSACs), Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs) were downloaded from the NPWS²⁶ website and imported onto Geographical Information Systems (GIS).

The area extending 15km from the proposed development was taken as an arbitrary distance within which the initial desktop search was undertaken. In some cases, the ZoI of a proposed development may be much smaller depending on the ecological feature being considered, or it could extend significantly beyond this distance, for example where there is hydrological connectivity to a designated site via a river network, or for qualifying features, such as mobile species, which range over greater distances than 15km.

Consultation

As part of the assessment, consultation with statutory consultees and relevant stakeholders was undertaken. For ecology these included National Parks and Wildlife Service (NPWS), Inland Fisheries Ireland (IFI) and Bird Watch Ireland (BWI). The Consultation Report, Appendix 1.2 in Volume 8, summarises the observations raised during the stakeholder consultations including the topics discussed and outcomes.

²¹ Irish Wetland Bird Survey – Map of sites. Available at: <https://bwi.maps.arcgis.com/apps/View/index.html?appid=1043ba01fcb74c78bc75e306eda48d3a> [Accessed January 2023]

²² Irish Wetland Bird Survey – Site peak counts. Available at: <https://c0amf055.caspio.com/dp/f4db30005d8e20614b404564be88> [Accessed January 2023]

²³ Irish Wetland Bird Survey – Species trends by sites. Available at: https://birdwatchireland.ie/app/uploads/2022/04/iwebs_trends_report.html [Accessed January 2023]

²⁴ NPWS designated site data: <https://www.npws.ie/maps-and-data/designated-site-data>

²⁵ EPA Map viewer. Available at: <https://gis.epa.ie/EPAMaps/>

²⁶ NPWS designated site data: <https://www.npws.ie/maps-and-data/designated-site-data>

23.2.4.2 Field Surveys

Ecology surveys in relation to the onshore infrastructure of the proposed development were undertaken by suitably qualified and experienced ecologists and followed best practice guidelines for specified habitats and species as outlined in the following sections. Ecological surveys were carried out between June 2021 and August 2023. A summary of the survey types and survey effort completed is provided in Table 23.1.

Table 23.1 Overview of Ecological Surveys undertaken at the Proposed Development

| Survey type | 2021 survey dates | 2022 survey dates | 2023 survey dates | Surveyors ²⁷ |
|--|--|--|--------------------------|----------------------------|
| Extended Phase 1 Surveys | 03/08/2021 04/08/2021 05/08/2021 11/08/2021 12/08/2021 09/09/2021 10/09/2021 | 29/06/2022 30/06/2022 01/07/2022 12/09/2022 13/09/2022 28/09/2022 29/09/2022 | 07/06/2023 08/06/2023 | AC, AH, EC, EH, FM, JK, MM |
| Annex I Habitat Surveys | - | 29/06/2022 30/06/2022 | - | JK |
| Rare Plant Surveys | - | 30/06/2022 13/09/2022 | - | JK |
| Aquatic & Fisheries Assessment and Otter surveys | - | 24/10/2022 25/10/2022 | 12/07/2023 | PQ, FM |
| Breeding Bird Surveys | 08/06/2021 10/06/2021 11/06/2021 14/06/2021 | 11/04/2022 25/04/2022 28/04/2022 15/05/2022 23/05/2022 26/05/2022 | 07/06/2023 08/06/2023 | CS |
| Wintering Waterbird Surveys | 20/10/2021 23/10/2021 29/10/2021 30/10/2021 11/11/2021 17/11/2021 19/11/2021 13/12/2021 14/12/2021 17/12/2021 23/12/2021 28/12/2021 | 11/01/2022 17/01/2022 18/01/2022 25/01/2022 14/02/2022 28/02/2022 10/03/2022 15/03/2022 | - | CS |
| Potential Roost Feature (PRF) Bat Surveys | Belcamp substation: 11/08/2021 12/08/2021 | Belcamp substation: 14/06/2022 | - | AC, OOS, FM, FH, ROC, DM |
| Bat Activity Transects | - | Landfall site & grid facility: 03/08/2022 | - | |
| Static Bat Detector Deployment | Landfall site: 02/09/2021 to 10/09/2021 | Landfall site, Blakes Cross North and South, M1 crossing and Belcamp: | - | |

²⁷ Surveyors Alice Clarke (AC), Aoife Hughes (AH), Emmeline Cosnet (EC), Emma Horgan (EH), Fionn Murphy (FM), Julie Kohlstruck (JK), Maeve Maher-McWilliams (MM), Patrick Quinn (PQ), Ciaran Smyth (CS), Oisín O’Sullivan (OOS), Fred Hintz (FH), Róisín O’Connell (ROC) and David McGarrell (DM)

| Survey type | 2021 survey dates | 2022 survey dates | 2023 survey dates | Surveyors ²⁷ |
|----------------------------------|-------------------|--------------------------|--|-------------------------|
| | | 03/08/2022 to 16/08/2022 | | |
| Emergence/Re-entry Roost Surveys | - | - | 05/07/2023 03/08/2023 24/08/2023 | |

Extended Phase 1

An Extended Phase 1 survey, as specified by CIEEM’s Guide to Ecological Surveys and their Purpose (CIEEM, 2017), includes a habitat survey and encompasses an assessment of the suitability of habitats and features present to support protected or notable fauna. Extended Phase 1 surveys were undertaken within the study area between August 2021 and June 2023, on dates set out in Table 23.1. Extended Phase 1 surveys include surveying for habitats, terrestrial non-native invasive species, presence of protected and/or notable species, habitat suitability for amphibians and reptiles, habitat suitability and field signs for mammals, potential roost features (PRFs) for bats and the presence and suitability for any other terrestrial protected habitats and species, excluding aquatics, birds and bats. Each element of the Extended Phase 1 survey is detailed below. Extended Phase 1 surveys were supplemented by additional surveys where more detailed specialised surveys were required.

Extended Phase 1 surveys were conducted during the optimum time of year, April to September. Refer to Table 23.1 for a list of dates and surveyors.

Habitat and Vegetation surveys

Habitats within the study area, as set out in Section 23.2.2, were mapped between September 2021 and September 2023 (See Table 23.1 above for exact dates and surveyors). Targeted habitat survey visits were made to each of greenfield sections which comprised the ecology study area and are listed in Section 23.2.3. These areas were walked, and ecological features of interest were recorded using ArcGIS Survey123. ArcGIS Survey123 is an application which is used to record geolocated data digitally in the field. During the survey, consideration was given to identifying important or protected habitats, such as Annex I habitats, terrestrial non-native invasive species, and habitats with the potential to support protected species. Habitat surveys and mapping was undertaken following Smith *et al.* (2011), with all habitats classified into recognised communities defined by Fossitt (2000) and cross-referenced to Annex I habitats. Particular attention was paid to searching suitable habitats for rare or protected flora species to determine whether they were present within, or close to, the proposed development. Those species listed on the FPO are afforded legal protection under the Wildlife Act 1976, as amended.

A stretch of coastline at the landfall site was identified in the Fingal Development Plan 2023-2029 as a Fingal Rare Flora Site²⁸. Species associated with these Rare Flora Sites were slender club-rush *Isolepis cernua*, sea wormwood *Seriphidium maritimum* and Ray’s knotgrass *Polygonum oxyspermum*.

Surveys for *Isolepis cernua* and *Seriphidium maritimum* were undertaken on the 30 June 2022 within the optimal survey season for these plants. Surveys for *Polygonum oxyspermum* were undertaken on the 13 September 2022 within the flowering season of this species. For the rare plant survey, a transect was walked along the coastline and particular attention was paid to the preferred habitat type of each species. Photographs and coordinates were taken if a specimen was encountered.

Where a plant community had potential affinity to an Annex I habitat, specialist botany surveys were undertaken. Survey methodology is detailed in the section below.

For the remainder of the route and the inline sections, habitats were mapped using high-quality aerial imagery on ArcGIS Pro with verification of habitats completed by visual inspections made during drive-by surveys.

²⁸ Fingal County Development Plan 2023-2029. Sheet 15 Green Infrastructure Map 2 2023-2029. Available at: <https://www.fingal.ie/sites/default/files/2023-08/Sheet%2015%20Green%20Infrastructure%202023%20-%202029.pdf>

Annex I Habitats

Annex I habitats are habitat types listed in Annex I of the Habitats Directive and which are considered threatened in the EU. A detailed coastal Annex I habitat assessment was undertaken along the coastline at the landfall area (see Figure 23.25). Site visits were made during the optimal survey season (Table 23.1) and Annex I assessments followed the approach outlined in the Irish Wildlife Manuals No. 53 ‘*National survey and assessment of the conservation status of Irish sea cliffs*’ (Barron *et al.* 2011). Three swaths of 20m width were set up at an even distribution along the coastal cliff section where the height requirements for coastal cliffs were met. The profile structure of the cliff was recorded and photographed.

The different vegetation zones of the cliff face were identified within the swath and, given the good accessibility, vegetation surveys could be carried out through direct access to the vegetation communities. Some species of the higher zones were additionally checked using binoculars; however, it was found that all species could be correctly identified from the cliff base. Zones used to distinguish vegetation communities were:

- Coastal grassland on soft cliffs (ungrazed with a variety of species)
- Soft cliff pioneer (newly exposed substrate and slumped soft material, less than 50% vegetation cover) and
- Flush on soft cliff (point feature, uncommon; characterised by *Equisetum spp.* and *Schoenus nigricans*)

Detailed vegetation lists were taken for each zone and the species vegetation cover was noted using the DOMIN scale of cover/abundance (Table 23.2).

Table 23.2 Domin scale in relation to percentage cover

| Percentage cover | Domin |
|----------------------------|-------|
| 91-100 % | 10 |
| 76-90 % | 9 |
| 51-75 % | 8 |
| 34-50 % | 7 |
| 26-33 % | 6 |
| 11-25 % | 5 |
| 4-10 % | 4 |
| <4 % (many individuals) | 3 |
| <4 % (several individuals) | 2 |
| <4 % (few individuals) | 1 |

The swaths were then assessed using the relevant criteria for the respective zone out of the 22 criteria outlined by Barron *et al.* (2011).

Other habitats along the coastline with the potential to correspond to Annex I habitats were assessed according to Irish Wildlife Manual No. 75 Monitoring survey of Annex I sand dune habitats in Ireland (Delaney *et al.*, 2013).

Habitats assessed during these surveys included the Fossitt habitats:

- CB1 Shingle and gravel banks (with the potential to correspond to Annex 1 habitat 1220 Perennial vegetation of stony banks)
- CD1 Embryonic dunes (with the potential to correspond to Annex 1 habitat 2110 Embryonic shifting dunes)
- CS3 Sedimentary sea cliffs (with potential to correspond to Annex I habitat 1230 vegetated sea cliffs of the Atlantic and Baltic coasts)

Transects were walked during the optimal survey season when plants are flowering (Table 23.1) to map the extent of these habitats. Where areas supporting these habitat types were identified and a species list was recorded.

Due to the unstable nature of these habitat types, the assessment is based on the species composition with positive indicator species indicating favourable condition, and negative indicator species indicating unfavourable condition or a disturbance in the integrity of the habitat. Additional assessment criteria for these habitats was undertaken and is in relation to the mobility and integrity of habitats which can be affected by anthropogenic activity including coastal defence buildings, stabilisation works and disturbance by trampling, vehicles etc. Where applicable these activities were recorded during the walkover survey.

The condition of these habitats was assessed using the “Structure and functions assessment sheets for EU Annex I sand dune habitats” (Delaney *et al.*, 2013, see Appendix 23.5).

Terrestrial Mammals

Mammal surveys were conducted during Extended Phase 1 surveys completed between August 2021 and June 2023 using the standard methodologies appropriate for individual mammal species, specifically badger *Meles meles* and other protected mammals, as per NRA (2006a) guidance on the treatment of badger prior to the construction of a road scheme and NRA (2009b) guidance on ecological surveying techniques for protected flora and fauna. A particular focus of these surveys was to identify the presence of signs of badger, including latrines, snuffle holes, prints and/or their resting places/setts. The mammal survey was undertaken within all offline sections. Boundary features (e.g., earth banks, hedgerows or treelines) within 50m of each study area were surveyed for signs of badger in accordance with NRA specifications (Smal, 2008; Smal 1995; Harris *et al.*, 1989). The survey approach entailed a thorough walkover of the study area with particular attention paid to areas likely impacted by the proposed development.

Habitat suitability for protected mammals including Irish hare *Lepus timidus hibernicus*, hedgehog *Erinaceus europaeus*, and pygmy shrew *Sorex minutus* was noted during surveys as signs for these species can be hard to detect.

Otter

Otter *Lutra lutra* surveys were undertaken in conjunction with the aquatic surveys in October 2022 and July 2023 in line with NRA (2008) guidance on the treatment of otter prior to the construction of a road scheme and NRA (2009b) guidance on ecological surveying techniques for protected flora and fauna. Signs of otter were systematically searched for at each of the 25 watercourse crossings and c. 150m up and downstream of each crossing point, where accessible. The coastal landfall site was also surveyed for evidence of otter during surveys undertaken in 2022. Signs could include spraint, footprints, riparian paths, slides and feeding signs. Both banksides of each watercourse were thoroughly checked for any evidence of a resting place or breeding place (a couch or holt).

Amphibians and Reptiles

Amphibian and reptile surveys were undertaken during the Extended Phase 1 surveys completed between August 2021 and June 2023. Ecological features within the study area were examined for their suitability to support breeding herpetofauna, namely common frog *Rana temporaria*, smooth newt *Lissotriton vulgaris* and common lizard *Zootoca vivipara*. Particular attention was given to waterbodies, which is suitable breeding habitat for common frog and breeding smooth newt which require standing water with vegetation for their aquatic young²⁹. Criteria for waterbodies with breeding newt suitability are outlined in the Irish National Smooth Newt Survey Report (Meehan, 2013) and shown below in Table 23.3.

Common lizard can occupy a variety of habitats that offer a suitable basking location (such as rocks, reflective sand, tussock of grass, a log, etc.) and grassland habitat or other vegetative cover which provides refuge and a suitable breeding location.

²⁹ Advice for planning officers and applicants seeking planning permission for land which may impact upon smooth newts. Available at: https://niopa.qub.ac.uk/bitstream/NIOPA/6969/1/standing_advice_10_smooth_newt_final_2017_2_.pdf (Accessed December 2022)

Table 23.3 Conditions needed for suitable breeding newt habitat (Meehan, 2013)

| Criteria | Condition |
|------------|---|
| Water-flow | Very slow-moving or still water (essential) |
| Vegetation | Some aquatic vegetation present |
| Fish | Very few or no fish present |
| Age | Sites over five years in age |
| Size | Sites of a manageable size (essential - no lakes) |

Bats

Potential Roost Features (PRFs)

Features, such as buildings or trees, occurring within the study area were examined for suitability to host roosting bats. These surveys were undertaken during Extended Phase 1 surveys completed between August 2021 and June 2023, with specific PRF surveys undertaken at trees within the existing Belcamp substation area between August 2021 and June 2022. See Table 23.1 for a full list of survey dates. PRF assessment was undertaken according to Bat Conservation Trust (BCT) guidance (Collins, 2016) which is set out in Table 23.4 below, and with regards to Irish Wildlife Manual no. 25 (Kelleher & Marnell, 2006). Updated BCT guidance (Collins, 2023) was published in October 2023 following the completion of bat surveys, however PRF assessment as outlined below remains the same. Individual trees were assigned PRF suitability and mapped using a handheld Global Positioning System (GPS), or ArcGIS surveying application Survey123.

Table 23.4 Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape, to be applied using professional judgement (Collins, 2016)

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

^a For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.

^b Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten et al., 2015). This phenomenon requires some research in the UK but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in large buildings in highly urbanised environments.

^c This system of categorisation aligns with BS 8596:2015 Surveying for bats in trees and woodland (BSI, 2015).

Bat Activity Transects

A bat activity transect survey was undertaken at the landfall site and grid facility. The transect survey was conducted using a handheld Batlogger bat detector on 03 August 2022, during suitable weather conditions, in accordance with BCT Guidelines.

Surveyors walked around the boundaries of each of the fields as shown in Table 23.5, where the highest amount of commuting bat activity would be expected. See Figure 23.9 for the transect route taken.

Table 23.5 Bat activity transect survey effort

| Date | Start time | End time | Sunset | Weather conditions |
|------------|------------|----------|--------|--|
| 03/08/2022 | 21:25 | 22:50 | 21:19 | 2.5m/s wind, 16°C, light drizzle <0.1mm stopping at c. 21:35 |

Static Bat Detector Deployments

Seven static bat detectors were deployed on 03 August 2022 for a minimum of 10 consecutive nights. Their locations and the transect route are illustrated in Figure 23.9 and Figure 23.10. Survey effort is detailed in Table 23.6. Detector WSS040 stopped recording after 10 nights as a result of increased battery drainage while recording high levels of activity.

Table 23.6 Bat static detector survey effort

| Unit number | Map ID | Latitude | Longitude | Detector model | Total recording time in minutes (min) and nights |
|-------------|--------|-----------|-----------|----------------|--|
| WSS061 | D.01 | 53.40909 | -6.20723 | SM4 | 8833min; 12 nights |
| WSS053 | D.02 | 53.41082 | -6.20554 | SM4 | 8833min; 12 nights |
| WSS064 | D.03 | 53.49476 | -6.19699 | SM4 | 8833min; 12 nights |
| WSS046 | D.04 | 53.500437 | -6.19653 | SM-Mini | 8833min; 12 nights |
| WSS067 | D.05 | 53.620777 | -6.20561 | SM-Mini | 8833min; 12 nights |
| WSS040 | D.06 | 53.62417 | -6.19337 | SM4 | 7300min; 10 nights |
| WSS060 | D.07 | 53.62448 | -6.18932 | SM4 | 8833min; 12 nights |

Roost Emergence/Re-entry Surveys

Roost emergence/re-entry surveys were undertaken in July and August 2023 to ascertain the presence of roosting bats using trees that had been assessed as moderate or high PRF suitability. Only trees that are likely to be impacted, i.e. removed or heavily pruned, by the proposed development were considered during these surveys. At trees assessed as moderate PRF suitability two emergence/re-entry surveys were undertaken, while three surveys were undertaken at trees assessed as high PRF suitability, in accordance with BCT guidelines (Collins, 2016). All surveys were separated by a minimum of 14 nights. Roost emergence surveys began 15min before sunset and continued for a minimum of 1.5hr after sunset.

Roost re-entry surveys began a minimum of 1.5hr before sunrise and finished at sunrise. Each survey involved two separate surveyors using a handheld Batlogger bat detector each, with surveyors covering separate trees. In addition, the high PRF tree was covered by an infra-red camera which recorded for the survey periods provided in the table below and footage was subsequently analysed. All roost emergence/re-entry surveys were undertaken during optimal weather conditions and within the correct survey window with at least one survey between May and August for moderate PRFs and at least two within the same period for high PRFs (Collins, 2016). Survey dates, times and conditions are provided in Table 23.7.

Table 23.7 Emergence/re-entry roost survey effort

| Date | Start time | End time | Sunset/sunrise | Weather conditions |
|------------|------------|----------|----------------|--|
| 05/07/2023 | 21:40 | 23:25 | 21:55 | Dry; temperature 15°C; wind speed 3m/s; cloud cover 6oktas |
| 03/08/2023 | 04:12 | 05:44 | 05:44 | Dry; temperature 15°C; wind speed <1m/s |
| 24/08/2023 | 20:15 | 10:05 | 20:32 | Dry; temperature 17°C; wind speed 5m/s; cloud cover 4oktas |

Bat Acoustic Analysis

Analysis of sound recordings on SM4s and SM-minis was undertaken using Kaleidoscope software while BatExplorer software was used for the data collected using the Batloggers.

This analysis aimed to confirm species (or genus for *Myotis* species) and bat activity for each deployment, transect and roost emergence/re-entry survey.

Russ (2012) and Middleton *et al.* (2014) were used to aid in the species identification of bat calls during data analysis. Recordings of Common and Soprano Pipistrelles for which Kaleidoscope determined a match ratio of 100% (meaning every recorded call matched the known species call parameters) were deemed accurate to a degree that did not necessitate manual verification. Nevertheless, all other automatically identified bat species were subjected to manual check. Recordings automatically identified as noise were determined to fall outside of the recording parameters for the survey and were classified as noise.

Bat activity was measured by the number of bat passes recorded. Bat passes are commonly used as a metric for bat activity and determine species presence (Kerbiriou *et al.*, 2019). Therefore, we defined a bat pass as the detection of one or more bat calls from a single species within a 15 second sound file. Recordings in which multiple species (or individuals) were recorded were split into separate bat passes.

For the results of the static bat detector surveys bat activity, based on bat passes per hour was assessed using activity levels as adapted from Kepel *et al.* (2011) and have been attributed levels of activity. The activity levels of the Kepel *et al.* (2011) have been adapted to ‘High’, ‘Medium’, and ‘Low’ activity levels in an Irish context, see Table 23.8.

Table 23.8 Categories for bat activity levels associated with bat passes per hour (bp/h) Adapted from Kepel et al. (2011)

| Attributed bat activity level | <i>Nyctalus leisleri</i> | <i>Pipistrellus</i> species | All bat species |
|-------------------------------|--------------------------|-----------------------------|-----------------|
| Low | 0 to 3.5 | 0 to 3.5 | 0 to 4.0 |
| Medium | 3.6 to 6.5 | 3.6 to 6.5 | 4.1 to 10.0 |
| High | > 6.5 | >6.5 | > 10.0 |

Surveys undertaken to collect data on bats using the offshore development area, for the ecological assessment of the proposed offshore infrastructure of the proposed development, is provided in Chapter 35: Offshore Bats.

Birds

Breeding Birds

Breeding bird surveys aim to provide information on the distribution of breeding birds throughout the onshore development area, highlighting the locations of sensitive species to be flagged as ecological constraints, e.g., breeding amber or red-listed Birds of Conservation Concern in Ireland (BoCCI) 2020-2026³⁰. Amber-listed species are those with unfavourable European status, occur in internationally important numbers or are moderately declining in abundance or range. Amber-listed species may also occur in very small population numbers. Red-listed species are those which are of highest conservation concern where the population is rapidly declining in abundance or range, has experienced a historic rapid decline (without recovery) or are globally threatened.

Breeding bird surveys followed an adapted methodology as described in Gilbert *et al.* (1998). During the 2021 breeding season one visit was made to the study area in June, due to the timing of survey commissioning. In 2022, two visits were made to the study area during the breeding season in months April and May, and in 2023 one visit was made in June. The study area for breeding birds included the following offline sections: the landfall site, grid facility, Blakes Cross North and South, M1 crossing, Malahide Estuary and the existing Belcamp substation. Where safe to do so, point count surveys outside these offline sections and along the onshore cable route were surveyed by stopping along the public roads and recording species observed and heard. Additional small offline sections with low suitability for breeding birds were not covered during the breeding bird surveys.

Surveys commenced from sunrise and were undertaken over the early morning period for a duration of up to six hours. Breeding bird survey guidance advises that surveyors avoid the hour before sunrise (i.e., the dawn to sunrise period) to avoid the peak dawn chorus which would bias the result³¹. Surveys were undertaken in favourable weather conditions, avoiding periods of moderate to strong winds (greater than Beaufort F5), and persistent rain and/or in poor visibility. The surveyor walked a slow pace across the study area sections and mapped all observed and heard birds, noting their activity and habitat type they were using.

Full detail of the survey effort, dates and times are provided in Volume 10, Appendix 23.1.

Wintering Waterbirds

In order to determine density of use by wintering bird populations, and especially to identify any important foraging or roosting sites within sensitive locations, IWeBS style surveys were undertaken at the landfall site, grid facility and at Malahide Estuary. At the landfall site, the study area included Bremore Head and a 1.5km buffer extending inland to the surrounding agricultural fields and encompassing the grid facility site. It extended north to the Delvin River outfall and south to Balbriggan Beach. At the Malahide Estuary, areas surveyed for wintering birds included suitable habitats within 1km of the onshore development area adjacent to the estuary and included estuarine habitats adjacent to the onshore cable route, the Broadmeadow River and suitable inland feeding habitats. For this section of the study area surveys were undertaken from publicly accessible roadways and paths. See Figures 23.1 and 23.3 for a representation of the wintering waterbird study area.

Surveys were undertaken monthly between October 2021 and March 2022, and each study area was visited three to five times during each month. Surveys alternated to coincide with low and high tide cycles. Full detail of the survey effort, dates and times are provided in Appendix 23.2.

During Extended Phase 1 surveys in June 2023, an assessment of wintering bird suitability was taken at inland offline sections which represented grassland habitats for their potential use by inland feeding species such as Light-bellied brent goose.

³⁰ Gilbert G, Stanbury A and Lewis L (2021) *Birds of Conservation Concern in Ireland 2020 –2026*. Irish Birds 9: 523—544

³¹ BTO/JNCC/RSPB Breeding Bird Survey Instructions. Available at: https://www.bto.org/sites/default/files/u16/downloads/forms_instructions/BBS-Instructions-2015-online.pdf_.pdf (Accessed February 2024)

Separate to surveys undertaken and detailed in this EIAR chapter, additional ornithology surveys at the landfall site were completed between January to March, and September to December 2021, and January to February, and September to December 2022. Details of these survey are contained in Volume 3, Chapter 15: Offshore Ornithology for full details. Surveys undertaken to collect data on birds using the offshore development area is provided in Chapter 15: Offshore Ornithology.

Aquatic and Fisheries

Fisheries, including salmonid and lamprey, suitability surveys were carried out in tandem with surveys for otter and terrestrial non-native invasive species and were undertaken at each of the 25 watercourse crossings along the onshore cable route.

Suitability surveys were carried out using best practice guidance from:

- Department of Agriculture Northern Ireland (1995) The Evaluation of habitat for Salmon and Trout (DANI, 1995). Advisory leaflet No. 1, produced for the Northern Ireland Fisheries Division
- Maitland PS (2003). Ecology of the River, Brook, and Sea Lamprey. Conserving Natura 2000 Rivers Ecology Series No. 5. English Nature, Peterborough

The evaluation of habitat for salmon and trout method divides potential salmonid habitat into units and grades depending on the substrate available, water depths and flow velocities. Lamprey also use the same spawning habitat as salmon and so classification is similar with reference to ecology of the river, brook, and sea lamprey.

23.2.5 Survey Limitations

Survey timing was largely within the optimal survey period for flora identification, however, some surveys were undertaken outside the flowering period meaning plants were identified using a vegetative key. As such, late surveys did not impact the classification of habitat types.

During the aquatic and fisheries surveys, which included surveys for otter, land access and obstacles to movement hindered the ability to survey the targeted 150m either side of watercourse crossing points. In these instances, a visual assessment of the 150m up and downstream of the watercourse crossing was made from a distance, and an accurate assessment of habitat suitability made for the respective aquatic feature. In these instances, if habitat was deemed suitable a precautionary approach was taken and the presence of the species was assumed. This approach was only practicable for non-culverted watercourses.

Breeding bird survey visits undertaken in 2021 and 2023 were completed in June only, although this is within the optimal survey window for breeding birds, no early season visits (early April to mid-May) were made. Early season visits were made during the 2022 breeding season surveys, as such a precautionary approach was taken in the impact assessment.

Wintering waterbird surveys did not cover all offline sections of the study area and instead focussed on the sections of the onshore cable route and infrastructure of the proposed development with suitability for wintering waterbirds and the areas which were considered sensitive for wintering waterbirds. These areas included the proposed landfall site, grid facility and Malahide Estuary. In the absence of wintering waterbird surveys at the remaining offline sections of the onshore cable route and infrastructure of the proposed development, a suitability assessment for wintering waterbirds was made based on the habitats present, land use and proximity to intertidal habitats known to be used by wintering waterbirds. As such a precautionary approach was taken in the impact assessment.

Bat activity surveys or emergence/re-entry roost surveys were undertaken at the landfall site and grid facility, and Wx22 (Sluice Stream). For offline sections with good habitat suitability for bats, static detectors were deployed to record bat activity. However, at the following offline sections, static detectors were not deployed due to a high risk of theft or vandalism. These sections included Wx9 (Oberstown Stream) and Wx10 (Aldrumman Stream) and Wx20 (Gaybrook Stream). At these locations, PRF survey results and habitat suitability assessments undertaken during data collection were considered adequate to robustly assess potential impact on the bat population.

Updated BCT guidance (Collins, 2023) was published in October 2023 following the completion of bat surveys, however PRF assessment as outlined in the methodology section above remains the same.

Overall, survey limitations detailed above are not considered to affect the validity or robustness of the impact assessment. In all cases, a precautionary approach has been taken at an appropriate scale, and mitigation measures included to fully protect protected species and habitats.

23.2.6 Impact Assessment Methodology

The ecological impact assessment (EcIA) methodology used in this chapter deviates from other EIAR chapters in that it does not follow the EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Report. The ecological impact assessment follows the guidance document Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal, and Marine published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018). The CIEEM (2018) guidelines are the acknowledged reference on EcIA for ecological practitioners. EcIA can be used for the appraisal of projects of any scale including the ecological component of an EIAR. While the chapter differs from others and does not follow EPA (2022) guidelines, it is subject to the EIA directive, as set out in Chapter 2 EIA and Methodology.

This section outlines the approach used to evaluate the importance of the habitats and species present in the study area and the steps followed for the evaluation and characterisation of potential impacts from the onshore infrastructure of the proposed development.

Identifying Ecological Features within the Zone of Influence

Information obtained during the field surveys identifies ecological features which have the potential to be affected by the proposed development and as such, occur within the Zone of Influence (ZoI) of the proposed development.

The ZoI depends on the type of development taking place, its likely impacts and the presence of ecological connections which enable such impacts to affect sensitive ecological features. The ZoI may extend a great distance (several kilometres) beyond the onshore development area, due to the presence of ecological connections with an ecological feature of interest. Similarly, ecological features that have no ecological connection with the proposed development are not within its ZoI, regardless of their proximity to the proposed development, as no pathway for impacts exists.

Evaluating Ecological Features within the Zone of Influence

Those ecological features which occur within the ZoI such as nature conservation sites, habitats or species, are then evaluated in geographic hierarchy of importance. The categories and criteria used for this evaluation are listed in Table 23.9.

Table 23.9 Geographic frame of reference used to determine ecological value Source: Adapted from CIEEM (2018)

| Importance | Criteria |
|--------------------------|--|
| International Importance | <p>‘European Sites’ including Special Areas of Conservation (SACs), Site of Community Importance (SCIs), or Special Protection Area (SPAs).</p> <p>Proposed Special Area of Conservation (pSAC) or proposed Special Protection Area (pSPA).</p> <p>Site that fulfils the criteria for designation as a ‘European Site’ (see Annex III of the Habitats Directive, as amended).</p> <p>Features essential to maintaining the coherence of the Natura 2000 Network.</p> <p>Site containing ‘best examples’ of the habitat types listed in Annex I of the Habitats Directive.</p> <p>Resident or regularly occurring populations (assessed to be important at the national level) of the following:</p> <p>Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or</p> <p>Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.</p> <p>Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).</p> <p>World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).</p> <p>Biosphere Reserve (UNESCO Man & The Biosphere Programme).</p> |

| Importance | Criteria |
|---------------------------------|--|
| | <p>Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).</p> <p>Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).</p> <p>Biogenetic Reserve under the Council of Europe.</p> <p>European Diploma Site under the Council of Europe.</p> <p>Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).</p> |
| National Importance | <p>Sites, habitats and species populations of importance in a national context.</p> <p>Site designated or proposed as a Natural Heritage Area (NHA) in Ireland.</p> <p>National or statutory Nature Reserve.</p> <p>Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA), Refuge for Fauna and Flora protected under the Wildlife Act, and/or a National Park.</p> <p>Site containing 'viable areas'³² of habitat types listed in Annex I of the Habitats Directive.</p> <p>Resident or regularly occurring populations (assessed to be important at the national level in Ireland) of the following:</p> <p>Species protected under the Wildlife Acts; and/or</p> <p>Species listed on the relevant Red Data list.</p> <p>Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.</p> |
| County / Regional Importance | <p>Area of Special Amenity.</p> <p>Area subject to a Tree Preservation Order.</p> <p>Area of High Amenity, or equivalent, designated under the County Development Plan.</p> <p>Resident or regularly occurring populations (assessed to be important at the County level) of the following:</p> <p>Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive</p> <p>Species of animal and plants listed in Annex II and/or IV of the Habitats Directive</p> <p>Species protected under the Wildlife Acts Ireland); and/or</p> <p>Species listed on the relevant Red Data list.</p> <p>County important populations of species, or viable areas of semi-natural habitats, or natural heritage features identified in the National or Local BAP, if this has been prepared.</p> <p>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.</p> <p>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.</p> <p>Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.</p> |
| Local Importance (Higher Value) | <p>Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared.</p> <p>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.</p> <p>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.</p> |
| Local Importance (Lower Value) | <p>Sites containing small areas of semi-natural habitat that are of some local importance for wildlife.</p> |

³² A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

| Importance | Criteria |
|------------|---|
| | Sites or features containing non-native species that are of some importance in maintaining habitat links. |

The status of a species as requiring protection at an international level does not necessarily impose an international conservation value on any single example of that species found at the site. Approaches to attributing nature conservation value to species have been previously developed for some species groups such as birds and bats. The approach to attributing nature conservation value to bat populations and foraging habitats is adapted from Wray *et al.* (2010). Bird species conservation status is attributed by the Birds of Conservation Concern in Ireland (BoCCI) list (Gilbert *et al.*, 2021).

Only Important Ecological Features (i.e., those features evaluated as being of Local Importance (Higher Value) or greater) within the ZoI are assessed with respect to potential impact.

Identification and Characterisation of Impacts

When describing ecological impacts and effects, reference is made to the following characteristics as described in CIEEM (2018) guidance.

- **Positive or negative:** positive and negative impacts and effects should be determined according to whether the change is in accordance with nature conservation objectives and policy. A positive change improves the quality of the environment e.g. by increasing species diversity, extending habitat or improving water quality. This may also include halting or slowing an existing decline in the quality of the environment. A negative change reduces the quality of the environment e.g. destruction of habitat, removal of foraging habitat, habitat fragmentation, pollution.
- **Extent:** The extent is the spatial or geographical area over which the impact/effect may occur under a suitably representative range of conditions (e.g. noise transmission under water).
- **Magnitude:** Magnitude refers to size, amount, intensity and volume. It should be quantified if possible and expressed in absolute or relative terms e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population.
- **Duration:** Duration should be defined in relation to ecological characteristics (such as the lifecycle of a species) as well as human timeframes. For example, five years, which might seem short-term in the human context or that of other long-lived species, would span at least five generations of some invertebrate species. The duration of an activity may differ from the duration of the resulting effect caused by the activity. For example, if short-term construction activities cause disturbance to birds during their breeding period, there may be long-term implications from failure to reproduce that season. Impacts and effects may be described as short, medium or long-term and permanent or temporary. These will need to be defined in months/years.
- **Frequency and timing:** The number of times an activity occurs will influence the resulting effect. For example, a single person walking a dog will have very limited impact on nearby waders using wetland habitat, but numerous walkers will subject the waders to frequent disturbance and could affect feeding success, leading to displacement of the birds and knock-on effects on their ability to survive. The timing of an activity or change may result in an impact if it coincides with critical life-stages or seasons e.g. bird nesting season.
- **Reversibility:** An irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation. In some cases, the same activity can cause both reversible and irreversible effects.

However, the assessment only needs to describe those characteristics relevant to understanding the ecological effect and determining the significance; and as such does not need to incorporate all stated characteristics (CIEEM, 2018).

Significant Effects on Important Ecological Features

For the purpose of EcIA, a significant effect is an effect that either supports or undermines biodiversity conservation objectives for those ecological features which have been identified as being an important feature of the site i.e., Important Ecological Features. Conservation objectives may be specific (e.g., for a designated site) or broader at a plan level (e.g., national/local nature conservation policy). As such effects can be considered significant in a wide range of geographic scales from international to local. Consequently, ‘significant’ effects are qualified with reference to the appropriate geographic scale (CIEEM, 2018).

Assessment of Residual Impacts and Effects

After characterising the potential impacts of the development and assessing the potential effects of these impacts on the Important Ecological Features, avoidance or mitigation measures are proposed to avoid and/or mitigate the identified ecological effects. Once measures to avoid and mitigate ecological effects have been finalised, assessment of the residual impacts and effects is undertaken to determine the significance of their effects on the Important Ecological Features.

Assessment of Cumulative Impacts and Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location (CIEEM, 2018). Different types of actions can cause cumulative impacts and effects. As such, these types of impacts may be characterised as:

- Additive/incremental – in which multiple activities/projects (each with potentially insignificant effects) add together to contribute to a significant effect due to their proximity in time and space (CIEEM, 2018)
- Associated/connected – a development activity ‘enables’ another development activity, e.g., phased development, as part of separate planning applications. Associated developments may include different aspects of the project which may be authorised under different consent processes. It is important to assess impacts of the ‘project’ as a whole and not ignore impacts that fall under a separate consent process (CIEEM, 2018)
- The cumulative effects assessment is presented in Volume 6, Chapter 38: Cumulative and Inter-related Effects

23.3 Baseline Environment

Baseline conditions represent a summary of the existing environment (landward of the HWM) within the onshore development area before the commencement of works.

23.3.1 Description of the Site

The proposed development boundary, within which the onshore development area is located, will include onshore infrastructure within County Dublin (Fingal and Dublin City Council administrative areas). The onshore aspects of the proposed development, as addressed in this chapter, are described in the Onshore Description Chapter and displayed on Figures 7.1 through 7.4. Habitats within the onshore development area, i.e. site, (landward of the HWM) are represented by those typically found in agricultural, sub-urban to urban, coastal, and estuarine environments. The onshore development area is dominated by the existing road network and existing built infrastructure. Outside the hardstanding areas of the onshore development area, arable agricultural lands and hedgerow field boundaries, built structures and hardstanding in urban areas, coastal habitats at the landfall, and watercourses and riparian corridors are present. Part of the onshore cable route also runs alongside – but does not intersect with - estuarine habitats close to Malahide Estuary.

As stated in the Water Chapter, the overall hydrology of the proposed development lies within the Nanny-Delvin (HA 08) and Liffey and Dublin Bay (HA 09) Catchments, and within the following sub-catchments Palmerstown_SC_010, Ballough [Stream]_SC_010, Broadmeadow_SC_010 and Mayne_SC_010. There are 25 watercourse crossings along the onshore cable route. The 2016-2021 WFD status of the water bodies within the onshore development area show that the watercourses along the onshore cable route and grid facility have ‘poor’ WFD status apart from one stream named Ballough Stream_010 which has ‘moderate’ status. All watercourses crossed by the proposed development flow into the Northwestern Irish Sea (HA 08).

The Land and Soils Chapter notes that the hydrogeological and geological conditions of the onshore aspects of the proposed development can be described in the following way: the bedrock geology of the region is predominantly underlain by Lower Carboniferous limestones, Silurian sedimentary rocks and Ordovician Volcanics. The aquifers (groundwater bearing bodies) within the area of the proposed development have been classified by Geological Society of Ireland (GSI) as Locally Important Aquifer and Poor Aquifer. The regional groundwater bodies (GWB) occurring within the proposed development are Dublin GWB, Swords GWB, Lusk-Bog of the Ring GWB, Balrothery GWB and Balbriggan GWB. The WFD status for the groundwater bodies within the onshore aspects of the proposed development is ‘good’ and some of the GWBs in the area are currently under ‘review’ regarding the risk of not maintaining that status.

Additionally, the Land and Soils Chapter notes that the regional groundwater vulnerability varies significantly across the onshore aspects of the proposed development, ranging from areas of extreme vulnerability, which correspond to areas of bedrock outcrop, to low vulnerability where there are thicker deposits of moderate to low permeability subsoil. In general, the majority of the area is underlain by low vulnerability with areas of higher and extreme vulnerability present in areas of higher ground. Aquifer vulnerability of a groundwater body is the term used to describe the intrinsic geological and hydrogeological characteristics which determines the ease with which a groundwater body may be contaminated by human activities, an important consideration when considering ecological impacts.

23.3.2 Desk Study Results

Existing Ecological Records

Records of protected species noted in the vicinity of the onshore development area were obtained from the NBDC database. Details of all protected and endangered species recorded within 10km of the onshore development area are summarised in Appendix 23.3. Likewise, existing terrestrial non-native invasive species records from within 10km of the onshore development area have been provided in Appendix 23.3.

A BCI data search was undertaken that provided locations of roosts, transect records and ad-hoc observations of bat species within 10km of the landfall site. The indicative locations of the roosts are provided in Appendix 23.3. These roost sites are not exclusive and a buffer has been indicated to protect the exact location of the sites. Six of roosts have been recorded within a 10km search area from the coastline at Balbriggan. The species observed at the roosts include: Brown Long-eared Bat (*Plecotus auratus*); Leisler’s Bat (*Nyctalus leisleri*); and Common Pipistrelle (*Pipistrellus pipistrellus*).

Designated Sites

There is a number of international and national sites designated for nature conservation in the environs of the onshore development area. A number of these have been identified as having ecological connectivity to the onshore aspects of the proposed development. Where there are potential ecological links, hydrological connectivity with the proposed development is the main reason. The spatial relationships and potential connectivity between areas designated for nature conservation and the proposed development are described in the following sections.

European Sites

In Ireland, European designated sites are termed Special Areas of Conservation (SACs), Special Protection Areas (SPAs), candidate SACs (cSACs) and candidate SPAs (cSPAs). SACs and candidate sites are designated under the Habitats Directive and are intended to give protection to a suite of habitats and species listed on Annex I and Annex II of the Directive. SPAs and candidate sites are designated under the Birds Directive and provide protection to birds listed on Annex I of the Birds Directive, as well as populations of migratory species regularly occurring at a site.

European designated sites occurring within 15km of the onshore infrastructure of the proposed development are provided on Figures 23.11 to 23.14. No European sites at a distance greater than 15km to the onshore infrastructure of the proposed development were identified as having hydrological connectivity, or connectivity through any other means. Further details of European sites identified with connectivity to the proposed development, including their qualifying features of interest, are provided in Table 23.10 below.

Connectivity between the onshore infrastructure of the proposed development and a designated site can occur over land, through hydrological or hydrogeological connectivity, or through mobile qualifying feature species using lands outside of the designation. Hydrological and hydrogeological connectivity with designated sites has been defined in the Land and Soils and Water Chapters and has informed the table below.

Table 23.10 Summary of European designated sites occurring within 15km of the onshore development area, and those with identified connectivity to the onshore development area.

| Site name and code | Summary of Qualifying Features ³³ | Closest distance to the onshore infrastructure | Connectivity with the onshore infrastructure of the proposed development? |
|--------------------------------------|---|---|---|
| Special Areas of Conservation (SACs) | | | |
| Malahide Estuary SAC [000205] | <p>Mudflats and sandflats not covered by seawater at low tide [1140]</p> <p>Salicornia and other annuals colonising mud and sand [1310]</p> <p>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]</p> <p>Mediterranean salt meadows (<i>Juncetalia maritima</i>) [1410]</p> <p>Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]</p> <p>Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]</p> | Immediately adjacent to the onshore development area. | Yes. The onshore cable route of the proposed development is immediately adjacent to the SAC for c. 2.3km along the Estuary Road and is hydrologically connected to the SAC. Seven of the proposed watercourse crossings are upstream of, and have hydrological connectivity to, the European site. Due to the close proximity of the onshore cable route to the estuary along Estuary Road, there is, albeit limited, potential for hydrogeological connectivity and groundwater discharge to the SAC. In addition, given the close proximity of the SAC, there is potential for dust to reach the European site. |
| Rogerstown Estuary SAC [000208] | <p>Estuaries [1130]</p> <p>Mudflats and sandflats not covered by seawater at low tide [1310]</p> <p>Salicornia and other annuals colonising mud and sand [1310]</p> <p>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]</p> <p>Mediterranean salt meadows (<i>Juncetalia maritima</i>) [1410]</p> <p>Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]</p> <p>Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]</p> | Immediately adjacent to the onshore development area. | Yes. The onshore infrastructure of the proposed development is immediately adjacent to the SAC for c. 50m along the R132 and is hydrologically connected to the SAC. Six of the proposed Onshore Cable Route watercourse crossings are upstream of, and have hydrological connectivity to, the European site. In this case, there is no potential for hydrogeological connectivity and groundwater discharge to the SAC due to the difference in levels between the road corridor and the SAC and absence of groundwater interactions. Due to existing vegetation and road infrastructure separating the proposed works and the SAC, there is no potential for dust to reach the European site. |

³³ Qualifying features of a SAC are called Qualifying Interests (QIs), and qualifying features of a SPA are called Special Conservation Interests (SCIs).

| Site name and code | Summary of Qualifying Features ³³ | Closest distance to the onshore infrastructure | Connectivity with the onshore infrastructure of the proposed development? |
|---|---|---|---|
| Baldoyle Bay SAC [000199] | Mudflats and sandflats not covered by seawater at low tide [1310] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritima</i>) [1410] | c. 0.9km east of the onshore development area. | Yes. The onshore infrastructure of the proposed development is hydrologically connected to the SAC. Five of the proposed development watercourse crossings are upstream of and have hydrological connectivity to the SAC. |
| North Dublin Bay SAC [000206] | Mudflats and sandflats not covered by seawater at low tide [1310] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritima</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] Petalwort (<i>Petalophyllum ralfsii</i>) [1395] | c. 2.0km southeast of the onshore development area. | No. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SAC. |
| Howth Head SAC [000202] | Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030] | c. 5.1km southeast of the onshore development area. | No. The qualifying interests (QIs) of the SAC occur above the high-tide mark. There is no terrestrial, or other, connectivity between the onshore infrastructure of the proposed development and the SAC. |
| Rockabill to Dalkey Island SAC [003000] | Reefs [1170] Harbour Porpoise (<i>Phocoena 23.23</i> approx. 23.23) [1351] | c. 5.5km east of the onshore development area. | No. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SAC. |
| Ireland's Eye SAC [002193] | Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] | c. 5.8km east of the onshore development area. | No. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SAC. |
| South Dublin Bay SAC [000210] | Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Embryonic shifting dunes [2110] | c. 6.4km south of the onshore development area. | No. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SAC. |
| Boyne Coast and Estuary SAC [001957] | Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Embryonic shifting dunes [2110] | c. 8.9km northwest of the onshore development area. | No. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SAC. |

| Site name and code | Summary of Qualifying Features ³³ | Closest distance to the onshore infrastructure | Connectivity with the onshore infrastructure of the proposed development? |
|---|---|---|---|
| | Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] | | |
| Lambay Island SAC [000204] | Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Harbour Porpoise (<i>Phocoena phocoena</i>) [1351] Grey Seal (<i>Halichoerus grypus</i>) [1364] Harbour Seal (<i>Phoca vitulina</i>) [1365] | c. 10.2km northeast of the onshore development area. | No. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SAC. |
| River Boyne and River Blackwater SAC [002299] | Alkaline fens [7230] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0] River Lamprey (<i>Lampetra fluviatilis</i>) [1099] Salmon (<i>Salmo salar</i>) [1106] Otter (<i>Lutra lutra</i>) [1355] | c. 12.7km northwest of the onshore development area. | No. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SAC. |
| Special Protection Areas (SPAs) | | | |
| North-west Irish Sea cSPA [004236] | Common Scoter (<i>Melanitta nigra</i>) [A065] Red-throated Diver (<i>Gavia stellata</i>) [A001] Great Northern Diver (<i>Gavia immer</i>) [A003] Fulmar (<i>Fulmarus glacialis</i>) [A009] Manx Shearwater (<i>Puffinus puffinus</i>) [A013] Shag (<i>Phalacrocorax aristotelis</i>) [A018] Cormorant (<i>Phalacrocorax carbo</i>) [A017] Little Gull (<i>Larus minutus</i>) [A177] Kittiwake (<i>Rissa tridactyla</i>) [A188] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Common Gull (<i>Larus canus</i>) [A182] Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183] Herring Gull (<i>Larus argentatus</i>) [A184] Great Black-backed Gull (<i>Larus marinus</i>) [A187] Little Tern (<i>Sterna albifrons</i>) [A195] Roseate Tern (<i>Sterna dougallii</i>) [A192] Common Tern (<i>Sterna hirundo</i>) [A193] Arctic Tern (<i>Sterna paradisaea</i>) [A194] Puffin (<i>Fratercula arctica</i>) [A204] Razorbill (<i>Alca torda</i>) [A200] Guillemot (<i>Uria aalge</i>) [A199] | Immediately adjacent to the onshore development area. | Yes. The onshore infrastructure of the proposed development is immediately adjacent and is hydrologically connected to the European site. All of the watercourse crossings are upstream of, and have hydrological connectivity to, the cSPA. In addition, mobile special conservation interest (SCI) species may use lands within or adjacent to the onshore infrastructure of the proposed development. In addition, given the close proximity of the SAC, there is potential for dust to reach the European site. |

| Site name and code | Summary of Qualifying Features ³³ | Closest distance to the onshore infrastructure | Connectivity with the onshore infrastructure of the proposed development? |
|---------------------------------|--|--|--|
| Malahide Estuary SPA [004025] | <p>Great Crested Grebe (<i>Podiceps cristatus</i>) [A005]</p> <p>Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046]</p> <p>Shelduck (<i>Tadorna tadorna</i>) [A048]</p> <p>Pintail (<i>Anas acuta</i>) [A054]</p> <p>Goldeneye (<i>Bucephala clangula</i>) [A067]</p> <p>Red-breasted Merganser (<i>Mergus serrator</i>) [A069]</p> <p>Oystercatcher (<i>Haematopus ostralegus</i>) [A130]</p> <p>Golden Plover (<i>Pluvialis apricaria</i>) [A140]</p> <p>Grey Plover (<i>Pluvialis squatarola</i>) [A141]</p> <p>Knot (<i>Calidris canutus</i>) [A143]</p> <p>Dunlin (<i>Calidris alpina</i>) [A149]</p> <p>Black-tailed Godwit (<i>Limosa limosa</i>) [A156]</p> <p>Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157]</p> <p>Redshank (<i>Tringa tetanus</i>) [A162]</p> <p>Wetland and Waterbirds [A999]</p> | c. 0.5m east of the onshore development area. | Yes. The onshore infrastructure of the proposed development is immediately adjacent to the SPA for c. 2.3km along the Estuary Road and is hydrologically connected to the SPA. Seven of the watercourse crossings are upstream of and have hydrological connectivity to the SPA. Due to the close proximity of the proposed development to the estuary, there is, albeit limited, potential for hydrogeological connectivity and groundwater discharge to the SPA. Similarly, given the close proximity, there is potential for dust to reach the European site. In addition, mobile SCI species may use lands within or adjacent to the onshore infrastructure of the proposed development. |
| Rogerstown Estuary SPA [004015] | <p>Greylag Goose (<i>Anser anser</i>) [A043]</p> <p>Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046]</p> <p>Shelduck (<i>Tadorna tadorna</i>) [A048]</p> <p>Shoveler (<i>Anas clypeata</i>) [A056]</p> <p>Oystercatcher (<i>Haematopus ostralegus</i>) [A130]</p> <p>Ringed Plover (<i>Charadrius hiaticula</i>) [A137]</p> <p>Grey Plover (<i>Pluvialis squatarola</i>) [A141]</p> <p>Knot (<i>Calidris canutus</i>) [A143]</p> <p>Dunlin (<i>Calidris alpina</i>) [A149]</p> <p>Black-tailed Godwit (<i>Limosa limosa</i>) [A156]</p> <p>Redshank (<i>Tringa tetanus</i>) [A162]</p> <p>Wetland and Waterbirds [A999]</p> | c. 0.8km east of the onshore development area. | Yes. The onshore infrastructure of the proposed development is hydrologically connected to the SPA. Six of the proposed development watercourse crossings are upstream of and have hydrological connectivity to the SPA. In addition, mobile SCI species may use lands within or adjacent to the onshore infrastructure of the proposed development. |
| Baldoyle Bay SPA [004016] | <p>Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046]</p> <p>Shelduck (<i>Tadorna tadorna</i>) [A048]</p> <p>Ringed Plover (<i>Charadrius hiaticula</i>) [A137]</p> <p>Golden Plover (<i>Pluvialis apricaria</i>) [A140]</p> <p>Grey Plover (<i>Pluvialis squatarola</i>) [A141]</p> <p>Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157]</p> <p>Wetland and Waterbirds [A999]</p> | c. 0.9km east of the onshore development area. | Yes. The onshore infrastructure of the proposed development is hydrologically connected to the SPA. Five of the proposed development watercourse crossings are upstream of and have hydrological connectivity to the SPA. In addition, mobile SCI species may use lands within the onshore infrastructure of the proposed development. |

| Site name and code | Summary of Qualifying Features ³³ | Closest distance to the onshore infrastructure | Connectivity with the onshore infrastructure of the proposed development? |
|---|--|---|---|
| North Bull Island SPA [004006] | Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Shelduck (<i>Tadorna tadorna</i>) [A048] Teal (<i>Anas crecca</i>) [A052] Pintail (<i>Anas acuta</i>) [A054] Shoveler (<i>Anas clypeata</i>) [A056] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Dunlin (<i>Calidris alpina</i>) [A149] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Curlew (<i>Numenius arquata</i>) [A156] Redshank (<i>Tringa tetanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Wetland and Waterbirds [A999] | c. 2.0km southeast of the onshore development area. | Yes. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SPA. However, mobile SCI species associated with the SPA may use lands within or adjacent to the onshore infrastructure of the proposed development. For example, golden plover are known to move significant distances of up to 12km between fields during the winter period ³⁴ . While goose foraging range from night roosts during the winter period can be up to 20km and 25km ³⁵ . |
| River Nanny Estuary and Shore SPA [004158] | Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Herring Gull (<i>Larus argentatus</i>) [A184] Wetland and Waterbirds [A999] | c. 3.0km north of the onshore development area. | Yes. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SPA. However, mobile SCI species associated with the SPA may use lands within or adjacent to the onshore infrastructure of the proposed development. For example, golden plover are known to move significant distances of up to 12km between fields during the winter period. |
| South Dublin and River Tolka Estuary SPA [004024] | Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Dunlin (<i>Calidris alpina</i>) [A149] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Redshank (<i>Tringa tetanus</i>) [A162] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Roseate Tern (<i>Sterna dougallii</i>) [A192] Common Tern (<i>Sterna hirundo</i>) [A193] Arctic Tern (<i>Sterna paradisaea</i>) [A194] Wetland and Waterbirds [A999] | c. 4.4km south of the onshore development area. | Yes. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SPA. However, mobile SCI species associated with this SPA may use lands within or adjacent to the onshore infrastructure of the proposed development. For example, goose foraging range from night roosts during the winter period can be up to 20km and 25km. |

³⁴ Gillings, S. and Fuller, R.J. (1999) Winter ecology of golden plovers and lapwings: A review and consideration of extensive survey methods. British Trust of Ornithology (BTO) Research Report No. 224.

³⁵ Scottish Natural Heritage (SNH) Guidance: Assessing connectivity with Special Protection Areas (SPAs). Version 3, June 2016.

| Site name and code | Summary of Qualifying Features ³³ | Closest distance to the onshore infrastructure | Connectivity with the onshore infrastructure of the proposed development? |
|-------------------------------|---|--|---|
| Ireland's Eye SPA [004117] | Cormorant (<i>Phalacrocorax carbo</i>) [A017] Herring Gull (<i>Larus argentatus</i>) [A184] Kittiwake (<i>Rissa tridactyla</i>) [A188] Guillemot (<i>Uria aalge</i>) [A199] Razorbill (<i>Alca torda</i>) [A200] | c. 5.6km east of the onshore development area. | No. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and the breeding seabird colonies for which the SPA is designated. |
| Skerries Islands SPA [004122] | Cormorant (<i>Phalacrocorax carbo</i>) [A017] Shag (<i>Phalacrocorax aristotelis</i>) [A018] Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Purple Sandpiper (<i>Calidris maritima</i>) [A148] Turnstone (<i>Arenaria interpres</i>) [A169] Herring Gull (<i>Larus argentatus</i>) [A184] | c. 6.0km east of the onshore development area. | Yes. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SPA. However, mobile SCI species associated with the SPA may use lands within or adjacent to the onshore infrastructure of the proposed development. |
| Howth Head Coast SPA [004113] | Kittiwake (<i>Rissa tridactyla</i>) [A188] | c. 7.1km east of the onshore development area. | No. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and the breeding seabird colonies for which the SPA is designated. |
| Rockabill SPA [004014] | Purple Sandpiper (<i>Calidris maritima</i>) [A148] Roseate Tern (<i>Sterna dougallii</i>) [A192] Common Tern (<i>Sterna hirundo</i>) [A193] Arctic Tern (<i>Sterna paradisaea</i>) [A194] | c. 8.3km east of the onshore development area. | Yes. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SPA. However, mobile SCI species associated with the SPA may use lands within or adjacent to the onshore infrastructure of the proposed development. |
| Lambay Island SPA [004069] | Fulmar (<i>Fulmarus glacialis</i>) [A009] Cormorant (<i>Phalacrocorax carbo</i>) [A017] Shag (<i>Phalacrocorax aristotelis</i>) [A018] Greylag Goose (23.27pprox answer) [A043] Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183] Herring Gull (<i>Larus argentatus</i>) [A184] Kittiwake (<i>Rissa tridactyla</i>) [A188] Guillemot (<i>Uria aalge</i>) [A199] Razorbill (<i>Alca torda</i>) [A200] Puffin (<i>Fratercula arctica</i>) [A204] | c. 10.2km east of the onshore development area. | Yes. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SPA. However, mobile SCI species associated with the SPA may use lands within or adjacent to the onshore infrastructure of the proposed development. |
| Boyne Estuary SPA [004080] | Shelduck (<i>Tadorna tadorna</i>) [A048] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Lapwing (<i>Vanellus vanellus</i>) [A142] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Redshank (<i>Tringa tetanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169] Little Tern (<i>Sterna albifrons</i>) [A195] Wetland and Waterbirds [A999] | c. 10.8km northwest of the onshore development area. | Yes. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and SPA. However, mobile SCI species associated with the SPA may use lands within or adjacent to the onshore infrastructure of the proposed development. |

| Site name and code | Summary of Qualifying Features ³³ | Closest distance to the onshore infrastructure | Connectivity with the onshore infrastructure of the proposed development? |
|-----------------------------|--|--|--|
| Dalkey Islands SPA [004172] | Roseate Tern (<i>Sterna dougallii</i>) [A192] Common Tern (<i>Sterna hirundo</i>) [A193] Arctic Tern (<i>Sterna paradisaea</i>) [A194] | c. 13.9km southeast of the onshore development area. | No. There is no hydrological, or other, connectivity between the onshore infrastructure of the proposed development and the breeding seabird colonies for which the SPA is designated. |

National Sites

In Ireland, National Heritage Areas (NHAs) are designated under the Wildlife Amendment Act (2000) as areas considered important for the habitats present or areas which support plants and animals whose habitat needs protection. Proposed National Heritage Areas (pNHAs) are recognised on a non-statutory basis but have not been statutorily proposed or designated. They are of ecological value for their habitats or species.

Nationally designated sites within 15km of the onshore development area are provided on Figures 23.15 and 23.16. No nationally designated sites at a distance greater than 15km to the onshore development area were identified as having hydrological connectivity, or connectivity through any other means. Further details on these are provided in Table 23.11.

As above for European designated sites, connectivity between the onshore infrastructure of the proposed development and a designated site can occur over land, through hydrological or hydrogeological connectivity, or through mobile species using lands outside of the designated site. Hydrological and hydrogeological connectivity with designated sites has been defined in the Land and Soils and Water Chapters and has informed the table below.

Table 23.11 Summary of nationally designated areas within 15km of the onshore infrastructure of the onshore development area, and those with identified connectivity to the onshore development area.

| Site name and code | Summary of qualifying features | Closest distance to the onshore infrastructure (m) | Hydrological/Ecological connectivity with the onshore infrastructure of the proposed development? |
|--|---|---|---|
| National Heritage Areas (NHAs) | | | |
| Skerries Island NHA [001218] | Waterbirds | c. 6.0km east of the onshore development area. | Yes. There is no terrestrial or hydrological connectivity between the onshore infrastructure of the proposed development and the NHA. However, mobile wintering waterbirds associated with the NHA may use lands within or adjacent to the onshore development area. Wintering cormorant, shag, purple sandpiper and turnstone were recorded at the proposed landfall area. |
| Proposed National Heritage Areas (pNHAs) | | | |
| Malahide Estuary pNHA [000205] | Mudflats & sandflats Atlantic & Mediterranean salt meadows Dunes Wetland & Waterbirds | Immediately adjacent to the onshore development area. | Yes. There is a direct terrestrial and downstream hydrological connectivity with this pNHA. The onshore infrastructure of the proposed development is immediately adjacent to the pNHA for c. 2.3km along the Estuary Road. In addition, mobile species may use lands within or adjacent to the onshore development area. |
| Rogerstown Estuary pNHA [000208] | Estuaries Mudflats & sandflats Atlantic & Mediterranean salt meadows Dunes Wetland & Waterbirds | Immediately adjacent to the onshore development area. | Yes. There is a direct terrestrial and downstream hydrological connectivity with this pNHA. The onshore infrastructure of the proposed development is immediately adjacent to the pNHA for c. 50m along the R132. In addition, mobile species may use lands within or adjacent to the onshore development area. |

| Site name and code | Summary of qualifying features | Closest distance to the onshore infrastructure (m) | Hydrological/Ecological connectivity with the onshore infrastructure of the proposed development? |
|----------------------------------|---|---|---|
| Knock Lake pNHA [001203] | Aquatic vegetation Otter Waterbirds | c. 0.2km west of the onshore development area. | Yes. There is a hydrological connection with this pNHA. In addition, mobile species may use lands within or adjacent to the onshore development area. |
| Bog Of The Ring pNHA [001204] | Peatland | c. 0.3km west of the onshore development area. | No. The pNHA is separated from the onshore infrastructure of the proposed development by the Bracken River watercourse. The underlying bedrock in this area is a Locally Important aquifer which typically has relatively short pathways and the groundwater flow tends to follow the topography. The groundwater flow in the region is toward the north and groundwater will discharge into the closest surface water features (e.g. MATT_010) where there is a connection between the groundwater and the river. However, the aquifer is confined in this area by thick subsoil deposits (low vulnerability) and the MATT_010 is unlikely to be in connection with the groundwater at this stretch of the watercourse. Furthermore, the watercourse is unlikely to be losing water back into the pNHA and the flow is more likely to be discharging from the pNHA into the river. Therefore, there is no hydrological or hydrogeological connection with this pNHA. |
| Sluice River Marsh pNHA [001763] | Intact freshwater marsh Wetland birds | c. 0.3km east of the onshore development area. | Yes. There is a hydrological and hydrogeological connection with this pNHA. In addition, mobile species may use lands within or adjacent to the onshore development area. |
| Feltrim Hill pNHA [001208] | Carboniferous-era knoll reef Quarry | c. 0.6km west of the onshore development area. | No. There is no hydrological or hydrogeological connection with this pNHA. |
| Baldoyle Bay pNHA [000199] | Mudflats & sandflats Atlantic & Mediterranean salt meadows Wetland & waterbirds | c. 0.9km east of the onshore development area. | Yes. There is a downstream hydrological connection with this pNHA. In addition, mobile species may use lands within or adjacent to the onshore development area. |
| North Dublin Bay pNHA [000206] | Mudflats & Sandflats Annual vegetation of mud, sand & drift line Atlantic and Mediterranean salt meadows Fixed & shifting dunes Petalwort Wetland & Waterbirds | c. 2.0km southeast of the onshore development area. | Yes. There is no terrestrial or hydrological connectivity with this pNHA. However, mobile species may use lands within or adjacent to the onshore development area. |
| Santry Demesne pNHA [000178] | Woodland Hairy St John's wort (Hypericum hirsutum) | c. 2.2km southwest of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. |
| Howth Head pNHA [000202] | Vegetated sea cliffs European dry heaths Kittiwake | c. 4.5km southeast of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. Mobile species are not considered to use lands within or adjacent to the onshore development area. |

| Site name and code | Summary of qualifying features | Closest distance to the onshore infrastructure (m) | Hydrological/Ecological connectivity with the onshore infrastructure of the proposed development? |
|---|--|---|---|
| Laytown Dunes/Nanny Estuary pNHA [000554] | Wetland & Waterbirds | c. 4.8km southeast of the onshore development area. | Yes. There is no terrestrial or hydrological connectivity with this pNHA. However, mobile species may use lands within or adjacent to the onshore development area. |
| Portraine Shore pNHA [001215] | Rocky bedrock shore Important geological site Coastal & marine vegetation Waterbirds | c. 4.8km east of the onshore development area. | Yes. There is no terrestrial or hydrological connectivity with this pNHA. However, mobile species may use lands within or adjacent to the onshore development area. |
| Ireland's Eye pNHA [000203] | Stony banks & sea cliffs vegetation Waterbirds | c. 5.8km east of the onshore development area. | Yes. There is no terrestrial or hydrological connectivity with this pNHA. However, mobile species may use lands within or adjacent to the onshore development area. |
| Royal Canal pNHA [002103] | Linear habitats supporting diversity of species Opposite-leaved Pondweed (<i>Groenlandia densa</i>) Tassel Stonewort (<i>Tolypella intricata</i>) Otter | c. 6.2km southwest of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. Mobile species are not considered to use lands within or adjacent to the onshore development area. |
| South Dublin Bay pNHA [000210] | Mudflats Annual vegetation of mud, sand & drift lines Shifting dunes Wetland & Waterbirds | c. 6.4km south of the onshore development area. | Yes. There is no terrestrial or hydrological connectivity with this pNHA. However, mobile species may use lands within or adjacent to the onshore development area. |
| Dolphins, Dublin Docks pNHA [000201] | Breeding common tern and Arctic tern | c. 6.6km southwest of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. Mobile species are not considered to use lands within or adjacent to the onshore development area. |
| Loughshinny Coast pNHA [002000] | Green winged Orchid (<i>Orchis morio</i>) Curlew Oystercatcher | c. 7.2km east of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. Mobile species are not considered to use lands within or adjacent to the onshore development area. |
| Grand Canal pNHA [002104] | Linear habitats supporting diversity of species Aquatic flora Opposite-leaved Pondweed Smooth newt (<i>Lissotriton vulgaris</i>) Otter | c. 7.3km southwest of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. Mobile species are not considered to use lands within or adjacent to the onshore development area. |
| Cromwell's Bush Fen pNHA [001576] | Diversity of wetland habitats Wetland waders Frogbit (<i>Hydrocharis morsus-ranae</i>) | c. 8.4km west of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. Mobile species are not considered to use lands within or adjacent to the onshore development area. |
| Boyne Coast and Estuary pNHA [001957] | Mudflats & sandflats Atlantic & Mediterranean salt meadows Waterbirds | c. 8.9km northwest of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. Mobile species are not considered to use lands within or adjacent to the onshore development area. |

| Site name and code | Summary of qualifying features | Closest distance to the onshore infrastructure (m) | Hydrological/Ecological connectivity with the onshore infrastructure of the proposed development? |
|---|--|--|---|
| Boosterstown Marsh pNHA [001205] | Waterbirds Kingfisher Wetlands | c. 9.9km east of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. Mobile species are not considered to use lands within or adjacent to the onshore development area. |
| Lambay Island pNHA [000204] | Reefs Vegetated sea cliffs Grey Seal Harbour Seal Waterbirds | c. 10.2km east of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. Mobile species are not considered to use lands within or adjacent to the onshore development area. |
| Liffey Valley pNHA [000128] | Diversity of terrestrial & aquatic habitats Rare & threatened plant species. Salmon (<i>Salmo salar</i>) | c. 11.3km southwest of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. Mobile species are not considered to use lands within or adjacent to the onshore development area. |
| Rockabill Island pNHA [000207] | Reefs Harbour Porpoise Waterbirds | c. 11.6km east of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. Mobile species are not considered to use lands within or adjacent to the onshore development area. |
| Dalkey Coastal Zone and Killiney Hill pNHA [001206] | Marine collecting area Coastal heath & mixed woodland Kestrel Waterbirds | c. 12.km southeast of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. Mobile species are not considered to use lands within or adjacent to the onshore development area. |
| Duleek Commons pNHA [001578] | Wetlands Wetland flora | c. 14.5km northwest of the onshore development area. | No. There is no terrestrial or hydrological connectivity with this pNHA. |

23.3.3 Field Survey Results

23.3.3.1 Extended Phase 1

All habitats identified within the onshore development area are described in the following sections, using the standard classification codes as per Fossitt (2000). The distribution of habitats is presented in Figure 23.17 to Figure 23.25 and summarised in Table 23.12.

BC1 Arable crops

This habitat refers to agricultural land used for the production of cereals. Here the dominant cereal is wheat *Triticum aestivum*. The majority of this habitat type is located at the landfall site and grid facility locations although it also occurs at several other offshore sections of the onshore cable route. In total, 53.71ha of arable crops fall within the onshore development area. This typically mono-crop habitat type provides limited biodiversity value; therefore, the ecological evaluation has been assessed as local importance (lower value).



Photograph 23.1 BC1 Arable crops at the proposed grid facility location

BL3 Buildings and artificial surfaces

As the proposed development has been designed to stay largely within the road corridor, buildings and artificial surfaces is the dominant habitat type across the onshore cable route. It is largely composed of regional roads (for example the R132 and R107) as well as a small section of railway located at the landfall site. Buildings and artificial surfaces are of limited to no biodiversity value and has been assigned an ecological value of local importance (lower value).

CB1 Shingle and gravel banks

This category includes coastal areas where shingle (cobbles and pebbles) and gravel have accumulated to form elevated ridges or banks above the high tide mark (Fossitt 2000). The shingle and gravel banks habitat is restricted to a linear stretch of coastline at the landfall site (0.12ha). Species included are scurvygrass *Cochlearia anglica*, silverweed *Potentilla anserina*, sea beet *Beta vulgaris subsp. maritima*, sea mayweed *Tripleurospermum maritimum*, sea sandwort *Honckenya peploides*, lyme grass *Leymus arenarius*, curly dock *Rumex crispus*. This habitat type has affinity to the Annex I habitat perennial vegetation of stony banks (1220) and supports at least six of the eleven indicator species outlined in the Annex I condition assessment (Delaney *et al.* 2013) as such the ecological evaluation of this habitat type has been assessed as National importance. See Figure 23.25 for mapped Annex I habitats.

Affinity to EU Annex I Habitats: Perennial vegetation of stony banks (1220)



Photograph 23.2 CB1 Shingle and gravel banks at the landfall site

CD1 Embryonic dunes

Embryonic, or shifting dunes are unstable low hills or mounds of sand that occur on the upper extreme of the littoral zone, or seashore, between the high tide mark and marram dunes, if present. They represent the initial stages of sand dune formation. Two embryonic dunes were identified along the coast at the southernmost extent of the landfall site (0.01ha). Species included lyme grass *L. arenarius* and sand couch *Elytrigia juncea*.

The short distance between the HWM and the soft cliff habitat lead to very narrow stretches of this habitat which graded directly into the coastal cliff pioneer vegetation with species including bittersweet *Solanum dulcamara*, *Tripleurospermum spp.*, sea sandwort *H. peploides*, sea beet *B. vulgaris subsp. maritima*, spear thistle *Cirsium vulgare*, cleavers *Galium aparine*, marram grass *Ammophila arenaria*, false oat-grass *Arrhenatherum elatius*, red fescue *Festuca rubra*, couch grass *Elymus repens*, creeping cinquefoil *Potentilla reptans*, *Brassica gen.*, ribwort plantain *Plantago lanceolata*, *Heracleum gen.*, *Taraxacum spp.*, perennial sow thistle *Sonchus arvensis*. Embryonic dunes have affinity to the Annex I habitat embryonic shifting dunes (2110), however the present habitat does not represent a very characteristic or extensive example of the Annex I habitat. As such the ecological evaluation of this habitat type has been assessed as Regional/County importance. See Figure 23.25 for mapped Annex I habitats.

Affinity to EU Annex I Habitats: embryonic shifting dunes (2110)



Photograph 23.3 CD1 Embryonic dunes at the landfall site

CS3 Sedimentary Sea cliffs

Areas of sedimentary cliffs have been identified along a 378m long coastline stretch, making this the prevalent coastal habitat in the section. Species included sea beet *B. vulgaris subsp. maritima*, red fescue *F. rubra*, false oat-grass *A. elatius*, silverweed *P. anserina*, wild carrot *Daucus carota*, Lady's bedstraw *Galium verum*, bramble *Rubus fruticosus agg.*, *Cirsium spp.*, creeping cinquefoil *P. reptans*, scurvygrass *C. anglica*, *Rumex spp.*, nettle *Urtica dioica*, meadow vetchling *Lathyrus pratensis*, *Tripleurospermum spp.*

This habitat type corresponds to the annexed habitat, 'vegetated sea cliffs of the Atlantic and Baltic coasts (1230)', and as such the ecological evaluation of this habitat type has been assessed as National importance. See Figure 23.25 for mapped Annex I habitats.

Affinity to EU Annex I Habitats: vegetated sea cliffs of the Atlantic and Baltic coasts (1230)



Photograph 23.4 CD3 Sedimentary Sea cliffs at the landfall site

ED3 Recolonising bare ground

This category refers to disturbed areas where bare earth and colonising vegetation is present. This habitat type occurs at two small and discrete locations along the onshore development area accounting for a total of 0.02ha. Species included coltsfoot *Tussilago farfara*, wild teasel *Dipsacus fullonum*, hoary willowherb *Epilobium parviflorum*, bramble *R. fruticosus* agg., dandelion *Taraxacum officinale* agg., field horsetail *Equisetum arvense*, couch grass *Elymus repens*, perennial ryegrass *Lolium perenne*, Yorkshire fog *Holcus lanatus*, creeping buttercup *Ranunculus repens*, *Rumex* spp, *Polygonum* spp, spear thistle *C. arvense*, *Sonchus arvense*. Habitat types, bare ground and recolonising bare ground, is of limited biodiversity value and of local importance (lower value).

FW2 Lowland depositing river

Twenty-five lowland depositing rivers intersect the onshore development area. These watercourses play a key role in connectivity throughout the landscape. Some have a high degree of naturalness and provide essential habitat for aquatic and terrestrial life. For example, at Blakes Cross South, the Deanestown Stream (Wx12) forms natural meanders as it enters the Rogerstown Estuary which is designated a SAC and SPA, see Figure 23.20. This habitat was noted for a degree of plant diversity and for its semi-natural habitat characteristics.

As such it is valued as having regional to local importance (higher value). Plant species included Fool's-water-cress *Apium nodiflorum*, Reed canary grass *Phalaris arundinacea*, yellow iris *Iris pseudacorus*, *Potamogeton* spp., bramble *R. fruticosus* agg., common figwort *Scrophularia nodosa*, *Calystegia* spp., nettle *U. dioica*, *Rosa canina*, *Rumex* spp., hogweed *Heracleum sphondylium*, hawthorn *Crataegus monogyna*, false oat-grass *A. elatius*, common ragwort *Senecio jacobaea*, and *Salix* spp.



Photograph 23.5 FW2 Lowland depositing river located at Blakes Cross South

FW4 Drainage ditches

Drainage ditches were often located along field boundaries within the study area. There is considerable variation in this habitat across the onshore development areas some ditches were dry, some wet, some are connected to watercourses, some vegetated, some unvegetated, and some have a high degree of naturalness. There is also significant variation in the structure of the ditches in terms of depth, width, and steepness of associated banks. Overall, drainage ditches are categorized as local importance (higher value) as they act as ecological corridors within the landscape.



Photograph 23.6 FW4 Drainage ditch located at Blakes Cross South

GA1 Improved agricultural grassland

This category includes all highly modified grasslands which are intensively managed for agriculture. Non-native grasses are dominant with poor overall diversity. This is the dominant habitat type across the onshore development area and surrounding area. 11.30ha of the habitat is located within the onshore development area. Species included perennial rye grass *L. perenne*, *Fescue spp.*, *Poa spp.*, white clover *Trifolium repens*, creeping buttercup *R. repens*. Improved agricultural grassland is of limited biodiversity value and of local importance (lower value).



Photograph 23.7 GA1 Improved agricultural grassland at Blakes Cross North

GS4 Wet grassland/ GM1 Marsh

This habitat type was identified at Blakes Cross South along the margins of the Deanestown Stream (Wx12), see Figure 23.20. Access was restricted due to walls, the watercourse and dense vegetation. Species lists and distribution were surveyed from various vantage points using binoculars. The habitat supported a dominant layer of broadleaved herbs including wild angelica *Angelica sylvestris*, yellow iris *I. pseudacorus*, nettle *U. dioica*, *Epilobium spp.*, *Calystegia spp.*, *Rumex spp.*, meadow buttercup *Ranunculus acris*, ragwort *S. jacobaea*, white clover *T. repens* among grasses such as Yorkshire fog *H. lanatus*. Woody species present included bramble *R. fruticosus agg.*, ivy *Hedera helix*, hawthorn *C. monogyna*, *Salix spp.*, ash *F. excelsior*, elder *Sambucus nigra*, and sycamore *Acer pseudoplatanus* (which is classified as a medium risk non-native invasive species). It is assumed that the area supports GS4 and GM1 grading into each other, however, given the difficulty accessing the area a detailed conclusion of proportions cannot be drawn. Overall, this habitat type has been categorized as local importance (higher value) because of its semi-natural characteristics, limited occurrence in the wider area and species diversity.



Photograph 23.8 GS Semi-natural grassland at Blakes Cross South specifically Wx12 (Deanestown Stream)

GS1 Dry calcareous and neutral grassland

Dry grassland is less intensively managed than the more widespread improved agricultural grasslands (GA1). As such the habitat displays a greater diversity of broadleaved herbs and was noted to be relatively species rich. This habitat was only recorded at one location at the existing Belcamp substation (1.34ha), see Figure 23.24. Grazing is a characteristic feature of these grasslands and indeed horses were observed grazing at this location. Species include perennial rye grass *L. perenne*, Yorkshire fog *H. lanatus*, rough meadow grass *Poa trivialis*, red fescue *F. rubra*, cock's-foot *Dactylis glomerata*, bramble *R. fruticosus* agg., red clover *Trifolium pratense*, nettle *U. dioica*, ribwort plantain *P. lanceolata*, creeping buttercup *R. repens*, self-heal *Prunella vulgaris*, ragwort *S. jacobaea*, common mouse-ear chickweed *Cerastium fontanum*, creeping thistle *Cirsium arvensis*, creeping cinquefoil *P. reptans*, silverweed *P. anserina*, broadleaf plantain *Plantago major*, bush vetch *Vicia sepium*, germander speedwell *Veronica chamaedrys*, red bartsia *Odontites vernus*, *Rumex* spp, dandelion *Taraxacum officinale* agg., *Centaureum* spp. Given the species richness of dry grassland in this location, this habitat type has been valued as local importance (higher value).



Photograph 23.9 GS1 Dry calcareous and neutral grassland west of the existing Belcamp substation

GS2 Dry meadows and grassy verges

This habitat type is abundant across the onshore development areas it is often present alongside road margins (5.11ha). It is also used to categorise some agricultural fields which receive little to no agricultural inputs and the field margins of arable crops found along the coast. Often the grassland sward has gone rank with tall growing or scrambling herb species also present. Species included Yorkshire fog *H. lanatus*, false oat-grass *A. elatius*, cock's-foot *D. glomerata*, *Taraxacum* spp., ragwort *S. jacobaea*, bramble *Rubus fruticosus* agg., white clover *T. repens*, *Leontodon* spp., dog rose *Rosa canina*, , hogweed *H. sphondylium*, , *Rumex* spp, creeping thistle *C. arvensis*, bush vetch *V. sepium*, *Calystegia* spp., *Erigeron* spp, redshank *Persicaria maculosa* ash *F. excelsior* and saplings of sycamore *A. pseudoplatanus*.

It is of biodiversity value due to the unmanaged nature, variety of species present and extent of this habitat type in particular at the Wx22 (Sluice Stream), see Figure 23.23, therefore it has been valued as local importance (higher value).



Photograph 23.10 GS2 Dry meadows and grassy verges at section Wx22 (Sluice Stream)

WD1 (Mixed) broadleaved woodland

This habitat type occurs at two offline locations and totals an area of 0.24ha. At the Wx22 (Sluice Stream), a mature belt of woodland surrounds agricultural land and is considered to be of ecological value. At Wx20 (Gaybrook Stream), woodland occurs in an urban setting. The latter includes canopy cover dominated by the non-native species sycamore *A. pseudoplatanus*, and beech *Fagus sylvatica*. Other tree and shrub species included alder *Alnus glutinosa*, elm *Ulmus spp.*, ash *F.exelsior*, lime *Tilia cordata* (rare), hawthorn *C. monogyna*, blackthorn *Prunus spinosa*, and elder *S. nigra*. The ground flora was composed of bramble *R. fruticosus* agg, nettle *U. dioica*, ivy *Hedera helix*, *Calystigia spp.*, giant hogweed *Heracleum mantegazzianum*, hogweed *H. sphondylium*, cow parsley *Anthriscus sylvestris*, self-heal *Prunella vulgaris*, primrose *Primula vulgaris*, *Rumex spp.*, ribwort plantain *P. lanceolata*, creeping buttercup *R. repens*, *Veronica spp.*, cleavers *G. aparine*, wood burdock *Arctium nemorosum*, green Alkanet *Pentaglottis sempervirens*, herb robert *Geranium robertianum*, wood avens *Geum urbanum*, and Hart's-tongue fern *Asplenium scolopendrium*.

Considering the ecological value of the habitat occurring at the Wx22 (Sluice Stream), see Figure 23.23, overall, this habitat type has been assigned local importance (higher value).



Photograph 23.11 WD1 (Mixed) Broadleaf Woodland located at Wx20 Gaybrook Stream

WL1 Hedgerows

A hedgerow is a linear strip of shrubs and trees. They are widespread along the margins of the regional roads associated with the onshore development area (for example the R132 and the R107). A high proportion of these hedgerows were intensively managed, such as topped hawthorn hedges. Native species in hedges included species such as bramble *R. fruticosus* agg., hogweed *H. sphondylium*, cleavers *G. aparine*, nettle *U. dioica*, ivy *H. Hibernica*, ash *F. excelsior*, silver birch *Betula pendula*, hornbeam *Carpinus betulus*, *Populus* spp., elder *S. nigra*, *Epilobium* spp., *Ulmus* spp. Non-native invasive species such as sycamore *A. pseudoplatanus* or common snowberry *Symphoricarpos albus* (which is a non-native species with a low-risk impact) often occurred in hedgerows and, particularly in urban areas, hedgerows were often exclusively made from ornamental species such as cherry laurel *Prunus laurocerasus* (which is a high impact invasive species) and leyland cypress *Cupressus x leylandii*. Hedgerows including naturalised species are essential in maintaining links and ecological corridors between features of higher ecological value and are of local importance (higher value).



Photograph 23.12 WL1 Hedgerows located at Wx09 (Oberstown Stream) and and Wx10 (Aldrumman Stream)

WL2 Treelines

A treeline is defined as a row of trees less than 5m in height. They are widespread and evenly distributed along the onshore development area often bordering regional roads and field margins (for example the R132). Species included eared willow *Salix aurita*, ash *F. excelsior*, ivy *H. helix*, bramble *R. fruticosus* agg., Japanese rose *Rosa rugosa*, elder *S. nigra*, hawthorn *C. monogyna*, *Rumex* spp., *Epilobium* spp., spear thistle *C. vulgare* and European aspen *Populus tremula*. Treelines in conjunction with hedgerows including naturalised species are essential in maintaining links and ecological corridors between features of higher ecological value and are of local importance (higher value).



Photograph 23.13 WL2 Treelines at Blakes Cross South

WS1 Scrub

This habitat type requires at least 50% cover of shrubs with stunted trees and climbing species. Along the proposed onshore cable route this habitat type is often associated with overgrown hedgerows which have encroached into roadside verges or agricultural fields and totals an area of 0.55ha. A high proportion of this habitat is located along the Deanestown Stream (Wx12), see Figure 23.20, which runs into the Rogerstown Estuary, designated a SAC and SPA. Species included *Ulmus spp.*, sycamore *A.pseudoplatanus*, bramble *R. fruticosus agg.*, ash *F. excelsior*, dog rose *Rosa canina*, blackthorn *Prunus spinosa*, hawthorn *C. monogyna*, *Anisantha spp.*, ivy *Hedera helix*, elder *S. nigra*, cleavers *G. aparine*, and false oat-grass *A. elatius*. It is of limited biodiversity value with local importance (lower value).



Photograph 23.14 WS1 Scrub located at the existing Belcamp substation (this particular area of scrub lies outside the onshore development area)

WS2 Immature woodland

The distribution of this habitat type within the onshore development area is localized to the margins of the M1, specifically to the northwest of the M1 crossing section (0.99ha) where there is an offline section of the onshore cable route. Immature woodland is of limited biodiversity value and of local importance (lower value). Also see the Baseline Tree Survey Report (John Morris Arboricultural Consultancy, 2023), which was prepared for the proposed development, in Appendix 23.11.

An overview of all habitat types noted throughout the onshore development area is included in Table 23.12 below.

Table 23.12 Overview of habitats within the Study Area

| Habitat (Fossitt 2000) | EU Annex I Affiliations | Area/length | Ecological Evaluation | Important Ecological Feature? Yes/No |
|---------------------------------------|---|-------------|--------------------------------|--------------------------------------|
| BC1 Arable crops | No | 53.71ha | Local importance (lower value) | No |
| BL3 Buildings and artificial surfaces | No | N/A | Local importance (lower value) | No |
| CB1 Shingle and gravel banks | Perennial vegetation of stony banks (1220) | 0.12ha | National importance | Yes |
| CD1 Embryonic dunes | Embryonic shifting dunes (2210) | 0.01ha | Regional/County importance | Yes |
| CS3 Sedimentary sea cliffs | Vegetated sea cliffs of the Atlantic and Baltic coasts (1230) | 378m | National importance | Yes |
| ED3 Recolonising bare ground | No | 0.02ha | Local importance (lower value) | No |

| Habitat (Fossitt 2000) | EU Annex I Affiliations | Area/length | Ecological Evaluation | Important Ecological Feature? Yes/No |
|--|-------------------------|------------------------------|---|--------------------------------------|
| FW2 Lowland depositing river | No | 25 no. watercourse crossings | Local importance (higher value) to Regional/County importance | Yes |
| FW4 Drainage ditches | No | 1309.30m | Local importance (higher value) | Yes |
| GA1 Improved agricultural grassland | No | 11.29ha | Local importance (lower value) | No |
| GS4 Wet grassland/GM1 Marsh | No | 0.67ha | Local importance (higher value) | Yes |
| GS1 Dry calcareous and neutral grassland | No | 1.34ha | Local importance (higher value) | Yes |
| GS2 Dry meadows and grassy verges | No | 5.11ha | Local importance (higher value) | Yes |
| WD1 (Mixed) broadleaved woodland | No | 0.24ha | Local importance (higher value) | Yes |
| WL1 Hedgerows | No | 6034.34m | Local importance (higher value) | Yes |
| WL2 Treelines | No | 829.13m | Local importance (higher value) | Yes |
| WS1 Scrub | No | 0.55ha | Local importance (lower value) | No |
| WS2 Immature woodland | No | 0.99ha | Local importance (lower value) | No |

Terrestrial Non-native Invasive species

Terrestrial non-native invasive species, not listed on the Third Schedule of the Birds and Habitats Regulations, and occurring within the onshore development area, included High impact species cherry laurel *P. laurocerasus*, Medium impact species butterfly bush *Buddleja davidii*, Rock Cotoneaster *Cotoneaster horizontalis* and Himalayan honeysuckle *Leycesteria pprox.*, and Low impact species montbretia *Crococsmia X crocosmiiflora*, snowberry *Symphoricarpos albus*, and winter heliotrope *Petasites fragrans*³⁶.

One terrestrial non-native invasive plant species, Himalayan balsam *Impatiens glandulifera*, listed on the Third Schedule of the Birds and Habitats Regulations was recorded close to but not within the onshore development area at two locations. One stand of Himalayan balsam is located north of the landfall site c. 167m from the onshore development area and a second stand is located at Blakes Cross North c. 47m east of the onshore development area and east of the R132. Both of these stands are outside the onshore development area.

See Appendix 23.4 for the location (provided as x and y coordinates) of each of these species. The location of Himalayan balsam is shown on Figure 23.17 and Figure 23.19.

Annex 1 Habitats

Vegetated sea cliffs of the Atlantic and Baltic coasts (1230)

At the landfall site (ca. 680m of coastline) within the onshore development area a stretch of 378m was identified as Fossitt habitat CS3 ‘Sedimentary Sea cliffs’, meeting the height requirements of 3m or more. Three swaths were established along this habitat to facilitate a habitat condition assessment for the Annex I habitat ‘Vegetated Sea cliffs of the Atlantic and Baltic coasts’ (1230) affiliated with this Fossitt habitat type.

³⁶ O’Flynn, C., Kelly, J. and Lysaght, L. (2014). Ireland’s invasive and non-native species – trends in introductions. National Biodiversity Data Centre Series No. 2. Ireland

Out of the 22 criteria outlined in the guidance (Barron et al. 2011) seven criteria applied to the soft cliff type present within the onshore development area. Swath No. 1 had one fail in the assessment for a track that went up the cliff face but seemed not to impact the integrity of the cliff habitat. Swath No. 2 had one fail for the 50% coverage of bramble *R. fruticosus* agg. in the coastal grassland zone that exceeded the criterium of <5% coverage for a pass. Other than that, all criteri were passed, and Swath No. 3 had no fails. All zones within the assessed swath had several positive indicator species and no negative indicator species were recorded. The detailed Annex I Assessment sheets and Quadrat Sheets are provided in Appendix 23.5. The ecological value of this habitat has been valued as of National importance. See Figure 23.25 for mapped Annex I habitats.

Embryonic shifting dunes (2210)

Small patches of Fossitt habitat CD1 ‘Embryonic dunes’ which correspond to embryonic shifting dunes were noted along the landfall area. Given the short distance between the high-water mark and the base of the sea cliffs, this habitat type graded directly into coastal cliff species. Though the positive indicators were present (sand couch *Elytrigia juncea* and lyme grass *Leymus arenarius*), negative indicators such as false oat-grass *A. elatius* and *Cirsium* spp. frequently graded into this habitat. Annex I habitats, depending on their condition, would typically be valued at National importance, however, given the geographic setting of the habitat grading into coastal cliff and the invading negative indicator species, the habitat is not a characteristic example of the Annex I habitat Embryonic shifting dunes (2110). As such, the ecological value of this habitat has been valued as Regional/County importance. See Figure 23.25 for mapped Annex I habitats.

Perennial vegetation of stony banks (1220)

The Fossitt habitat CB1 Shingle and gravel banks supported a range of characteristic species of the Annex I habitat Perennial vegetation of stony banks (1220). Six of the eleven indicator species (namely sea beet *B.vulgaris subsp. maritima*, sea sandwort *H. peploides*, lyme grass *L. arenarius*, curly dock *R. crispus*, scurvygrass *C. officinalis* and silverweed *P. anserina*) outlined in the Annex I condition assessment (Delaney et al. 2013) were identified within this habitat type and no negative indicator species were recorded. As such the habitat was recorded as a characteristic example of the Annex I habitat Perennial vegetation of stony banks (1220). The ecological value of this habitat has been valued as of National importance.

See Figure 23.25 for mapped Annex I habitats.

Details on Annex I habitats occurring below the HWM are provided in Volume 3, Chapter 12: Benthic and intertidal Ecology.

Terrestrial Mammals

Overall, there was limited protected mammal activity recorded across the study area. Two badger *Meles meles* setts were recorded in total, see Figure 23.26. One was located at Blakes Cross South, over 50m from the onshore development area in suitable habitat. This sett is considered to be a main sett and has at least four entrances, and in September 2022 fresh spoil heaps were noted. The agricultural habitat and network of treelines and hedgerows in the area surrounding the sett provides good quality habitat for badger. In addition, the Deanestown Stream (Wx12) and Ballyboghill Stream (Wx13) are in close proximity to the sett and provide ecological corridors and semi-natural habitats suitable for badger foraging. A second sett was located near the existing Belcamp substation, over 150m from the onshore development area, in suitable habitat. This sett has one entrance, and in September 2022 the sett appeared to be relatively inactive as leaf litter had collected in the entrance. However, on a precautionary basis this sett is considered to be active. In addition, to the identified setts, badger feeding sign observations were scattered throughout the study area. Considering the occurrence of badger setts and suitable habitat within the onshore development area, badger have been valued as local (higher).

Pygmy shrew *Sorex minutus* was recorded incidentally, during the 2022 breeding bird surveys, calling from grassland habitat at the landfall site. Habitat suitability for pygmy shrew is present throughout the onshore development area.

While other protected mammals across the study area were not recorded due to lack of presence or evidence in the field, habitat suitability for protected small mammals including hedgehog *Erinaceus europaeus* and Irish hare *Lepus timidus hibernicus* was noted. Therefore, other protected small mammals have been valued as local (higher) ecological importance due to suitable habitat occurring within the study area.

Otter

Signs of otter *Lutra lutra* were not recorded at any of the 25 watercourse crossing points or at the coastal landfall site during specific otter surveys. However, given the wide distribution of otter and number of watercourses that traverse the onshore development area and the coastal habitat at the landfall site, it has been assumed that otter could utilise aquatic habitats within the study area. As such, and taking a precautionary approach, otter have been valued as local (higher) ecological importance.

Amphibians and Reptiles

Suitable habitat for amphibians was recorded within the onshore development area in features such as wet drainage ditches or watercourses. Neither smooth newt *Lissotriton vulgaris* nor common frog *Rana temporaria* were identified within these features, however due to the presence of suitable habitat within the onshore development area, and taking a precautionary approach, amphibians have been valued as local (higher) ecological importance.

Suitable reptile habitat within the onshore development area is represented by grassland habitat which provides refuge and cover for reptiles, a suitable breeding location, and also open habitat for basking. While observations of reptiles were not recorded during surveys, records for common lizard *Zootoca vivipara* were returned from the desk study. As such, reptiles have been valued as local (higher) ecological importance.

Bats

Potential Roost Features (PRFs)

A total of 43 PRFs were recorded within, or in close proximity to, the onshore aspects of the onshore development area. See Appendix 23.6 for details of the survey methodology and Figures 23.44 to Figure 23.51 for locations of PRFs across the study area.

All PRFs identified were in trees. No buildings occurred within the study area that held suitable PRFs. Thirty-five PRFs were assessed as having low suitability which could be used by individual roosting bats opportunistically. A further seven PRFs were assessed as having moderate suitability which could be used by bats but are unlikely to support a roost of high conservation status. One tree with a high PRF was identified which could hold large numbers of bats and support a maternity roost or other roost of high conservation status. Considering the suitability of PRFs within the onshore development area and surrounding wider area which represents similar habitats, roosting potential for bats occurring within the onshore development area has been valued as local (higher) ecological importance.

Bat Activity Transects

One bat activity transect was undertaken at the landfall site and grid facility. Bats recorded during the transect included a Leisler's bat *Nyctalus leisleri* recorded along a hedgerow in the southeast section of the transect. A foraging soprano pipistrelle *Pipistrellus pygmaeus* at c. 3m height was also recorded at this location. Two common pipistrelles *Pipistrellus pipistrellus* and a soprano pipistrelle were recorded foraging along a treeline separating two arable crop fields in the eastern side of the transect, which represents the central area of the landfall site. The common pipistrelles would also engage in flight looping out from the treeline above the arable crop field. Along a tree lined track in the central area of the landfall site, an estimated two soprano pipistrelles and three common pipistrelles were recorded foraging continuously between 2m and 15m from the ground. During this time, they generated 19 and 75 passes respectively. Two Leisler's bat passes were also identified retrospectively from the data during this time but were not heard by the surveyors due to the high numbers of pipistrelle calls. A single soprano pipistrelle was recorded along the hedgerow at the grid facility location. These data are presented graphically in Figure 23.52 while a summary of total passes is presented in Table 23.13.

Table 23.13 Total bat passes recorded during the transect survey undertaken on 3 August 2022 at the Landfall and Grid facility locations

| Species | Bat Passes (n) | Earliest pass (hh:mm) |
|---|----------------|-----------------------|
| Leislars bat (<i>Nyctalus leisleri</i>) | 5 | 21:47 |
| Common pipistrelle (<i>Pipistrellus pipistrellus</i>) | 85 | 22:00 |
| Soprano pipistrelle (<i>Pipistrellus pygmaeus</i>) | 46 | 22:00 |

Static Bat Detector Deployments

Results from the activity level assessment adapted from Kepel *et al.* (2011), assessed three locations were classed as having high species aggregate activity. These locations were D.02 at the existing Belcamp substation, D.05 at the grid facility, and D.06 at the landfall site (Table 23.14). Notably, the landfall site, which included a hedgerow in arable fields, exhibited activity orders of magnitude higher than the other high activity locations, with a recording of 76.59 bp/h compared to an average of 19.77 bp/h (Table 23.14). Areas with medium species aggregate activity were D.03 at Blakes Cross, and D.07 at the landfall, while both D.01 and D.04 had low species aggregate activity (Table 23.14).

The common pipistrelle exhibited high activity at D.02 in the existing Belcamp substation, as well as at D.05 in the grid facility. Furthermore, D.06 at the landfall site showed high activity for both the common pipistrelle and the soprano pipistrelle. Specifically, the soprano pipistrelle displayed high activity exclusively at D.06. Notably, the presence of pipistrelles significantly contributed to the overall high species aggregate activity observed across all locations.

On the other hand, Leisler’s bat demonstrated high activity at D.02 and medium activity at both D.03 and D.06. As for *Myotis* sp., low activity levels were observed at all locations.

Table 23.14 Bat activity recorded by static detectors during the deployment

| Map ID | Location | Leisler’s bat bp/h | Common pipistrelle bp/h | Soprano pipistrelle bp/h | <i>Myotis</i> sp bp/h | Brown long-eared bat bp/h | Total pass bp/h |
|--------|--------------------|--------------------|-------------------------|--------------------------|-----------------------|---------------------------|-----------------|
| D.01 | Belcamp substation | 1.49 | 1.31 | 0.22 | 0.01 | 0.00 | 3.04 |
| D.02 | Belcamp substation | 9.90 | 17.58 | 1.57 | 0.05 | 0.01 | 29.11 |
| D.03 | Blakes Cross | 4.36 | 1.78 | 1.99 | 0.05 | 0.01 | 8.19 |
| D.04 | Blakes Cross | 0.00 | 0.00 | 1.31 | 0.00 | 0.00 | 1.31 |
| D.05 | Grid facility | 1.37 | 13.31 | 2.98 | 0.03 | 0.00 | 17.68 |
| D.06 | Landfall site | 5.52 | 32.28 | 38.73 | 0.05 | 0.01 | 76.59 |
| D.07 | Landfall site | 2.26 | 2.57 | 0.48 | 0.00 | 0.00 | 5.30 |

Habitat suitability for foraging and commuting bats within the onshore development areas varies considerably at different locations and is dependent on the habitats present. Where hedgerows, treelines, agricultural fields, watercourses and woodland occur the habitat suitability in general is assessed as being moderate to high, in more urban settings the habitat suitability is more typical of lower suitability.

Overall, when considering bat activity recorded and habitat suitability for foraging and commuting bats traversed by the onshore infrastructure of the onshore development area, an ecological value of local (higher) ecological importance has been assigned.

Birds

Breeding Birds

Breeding bird surveys were undertaken for the onshore development area in 2021 and 2022, with update surveys in 2023. In total, nine red and 28 amber-listed species of Birds of Conservation Concern in Ireland (BoCCI) 2020-2026³⁷ were recorded across the onshore development area.

Amber-listed species are those with unfavourable European status, are moderately declining in abundance or range or occur in very small population numbers. Red-listed species are those which are of highest conservation concern where the population is rapidly declining in abundance or range, has experienced a historic rapid decline (without recovery) or are globally threatened. In general terms, the breeding bird assemblage is typical of habitats that occur within the onshore development area and across agricultural, urban, coastal and estuarine environments.

Of red-listed species recorded, meadow pipit and yellowhammer, breed within or immediately adjacent to the onshore development area (see Table 23.15 for more detail). Breeding territories of meadow pipit within the onshore development area are largely concentrated in fields at the landfall site and the grid facility but do occur in grassland habitat adjacent to the Malahide Estuary and at the existing Belcamp substation. In relation to amber-listed species, the following are considered to breed within or immediately adjacent to the onshore development area; kingfisher, goldcrest, greenfinch, house martin, house sparrow, linnet, sand martin, skylark, starling, swallow, tree sparrow, willow warbler, mallard and shelduck. A kingfisher territory has been identified along the Broadmeadow River, upstream from Malahide Estuary. Mallard and shelduck have been recorded breeding immediately adjacent to the onshore development area at the landfall site and the Malahide Estuary. For the remainder of the amber-listed species mentioned above, they are considered to breed in hedgerow, treeline, scrub, grassland or buildings within the onshore development area (see Table 23.15 for more detail).

Table 23.15 describes in detail each amber and red-listed species that occur within the onshore development area numbers they occur in, their distribution and their breeding status. Figures 23.27 to Figure 23.35 show a representation of red and amber-listed breeding birds recorded across the study area. For a full list of species recorded across the onshore development area including green-listed birds, which are not considered threatened or of conservation concern, see Appendix 23.7.

Table 23.15 Species recorded and their breeding status within the onshore development area during the breeding bird surveys across 2021, 2022 and 2023

| Species | BTO codes ³⁸ | BoCCI 2020-2026 ³⁹ | Species recorded within the onshore development area | Breeding status within the onshore development area |
|--------------|-------------------------|-------------------------------|---|--|
| Grey wagtail | GL | Red Br. | Two birds recorded perched along the onshore cable route during the breeding bird surveys. | No breeding behaviour or nests identified during the surveys. Likely breeding along fast-flowing streams in the wider area. |
| Meadow pipit | MP | Red Br. | Singing males recorded throughout the majority of the onshore development area with the greatest densities at the landfall and grid facility. | Yes. Ground-nesting species breeding throughout most of the onshore development areawithin grassland and arable habitats. |
| Yellowhammer | Y. | Red Br. | Singing males were recorded throughout the majority of the onshore development area with the greatest densities at the landfall site, grid facility and Blakes Cross North. | Yes. Breeding yellowhammers are present throughout the majority of the onshore development area, breeding within hedgerows and ditches of arable fields. |
| Kestrel | K. | Red Br. | One breeding season record of a male hunting at the landfall and grid facility site. | No breeding/territorial behaviour noted within the onshore development area. Likely breeding in the wider area. |

³⁷ Gilbert G, Stanbury A and Lewis L (2021) *Birds of Conservation Concern in Ireland 2020 –2026*. Irish Birds 9: 523–544

³⁸ BTO codes as displayed on breeding bird Figures 23.27 – 23.35

³⁹ Br. denotes the species is listed for its breeding population; Win. Denotes the species is listed for its wintering population; * denotes the species is listed in Annex I of the EU Birds Directive

| Species | BTO codes ³⁸ | BoCCI 2020-2026 ³⁹ | Species recorded within the onshore development area | Breeding status within the onshore development area |
|--------------------------|-------------------------|---------------------------------|---|--|
| Swift | SI | Red ^{Br.} | Recorded foraging/flying throughout much of the onshore development area. | No nest sites identified within the onshore development area. Closest reported nest sites: Balbriggan, Skerries and Malahide ⁴⁰ |
| Lapwing | L. | Red ^{Br. & Win.} | Small numbers of adult birds present at Malahide Estuary during the breeding season. | No breeding/territorial birds recorded within the onshore development area. Likely breeding in open farmland in the wider area. |
| Oystercatcher | OC | * Red ^{Br. & Win.} | Small numbers of adult birds present at the landfall and grid facility, and Malahide Estuary during the breeding season. | No breeding/territorial birds recorded within the onshore development area. Breeding along coastline in the wider area. |
| Redshank | RK | * Red ^{Br. & Win.} | One bird recorded at the landfall site in April 2022. | No recent breeding records in Dublin (Balmer <i>et al.</i> , 2013). |
| Black-tailed godwit | BW | * Red ^{Win} | Flock recorded on Malahide Estuary mudflats in May 2022. | No, black-tailed godwit are a rare and sporadic breeder in Ireland, mainly a winter visitor. Flock recorded likely non-breeding birds. |
| Common tern | CN | * Amber ^{Br.} | Recorded on two occasions at the landfall and grid facility site during the breeding bird surveys. | No nest sites recorded within the onshore development area. Closest known breeding colonies at Rockabill Island, Dublin Bay. |
| Black-headed gull | BH | Amber ^{Br. & Win.} | Small numbers recorded on the mud flats at Malahide Estuary during the breeding season. | No, mostly breed on islands on inland lakes. |
| Common gull | CM | Amber ^{Br. & Win.} | One observation of a small flock at the landfall and grid facility site during summer 2021. | No breeding colonies identified within the onshore development area. Closest known breeding colonies at located on Lambay Island. |
| Herring gull | HG | Amber ^{Br. & Win.} | Recorded throughout the entirety of the onshore development area with largest numbers at the landfall and grid facility site. | No nest sites identified within the onshore development area, though likely breeding on rooftops of buildings along the route. Largest breeding colony in Ireland is on Lambay Island. |
| Lesser black-backed gull | LB | Amber ^{Br. & Win.} | Recorded throughout the onshore development area. | No nest sites identified within the onshore development area. Known to breed along the coast and islands between Balbriggan and Dublin Bay. Small numbers breed on rooftops in towns and cities. |
| Kingfisher | KF | * Amber ^{Br.} | Recorded on a number of occasions along a stretch of the Broadmeadow River between the M1 and R132 in both the breeding and non-breeding seasons. | Yes. Kingfishers are a largely sedentary and territorial species. The cable route therefore crosses over a kingfisher territory in this location. |
| Goldcrest | GC | Amber ^{Br.} | Birds recorded singing throughout the onshore development area during summer 2021 and 2022. | Yes. Breeding in treelines, hedgerows and gardens throughout the onshore development area. |
| Greenfinch | GR | Amber ^{Br.} | Several birds heard singing, in particular at the landfall and grid facility site and Belcamp substation. A pair and a juvenile were recorded foraging at Malahide Estuary. | Yes. Breeding in treelines, hedgerows, parks and gardens along the proposed development. |
| House martin | HM | Amber ^{Br.} | Recorded throughout the onshore development area. | Yes. No nest sites pinned down during surveys, but likely nesting in eaves of buildings along the proposed development. |

⁴⁰ Birdwatch Ireland Online Swift Story Map: Nest Site Records (2012 -2022). Available at: <https://bwi.maps.arcgis.com/apps/MapJournal/index.html?appid=81ddc38cfcde40ffab699be638ee5b20>

| Species | BTO codes ³⁸ | BoCCI 2020-2026 ³⁹ | Species recorded within the onshore development area | Breeding status within the onshore development area |
|---------------------|-------------------------|-------------------------------|---|--|
| House sparrow | HS | Amber ^{Br.} | Recorded frequently throughout the onshore development area. | Yes. Nest site identified in a shed at Blake's Cross and female provisioning noted at Belcamp. |
| Linnet | LI | Amber ^{Br.} | Recorded frequently throughout the onshore development area | Yes. Singing males, breeding pairs and nest building behaviour recorded. Likely breeding within hedgerows and scrub throughout the onshore development area. |
| Sand martin | SM | Amber ^{Br.} | Recorded flying over Malahide Estuary and at landfall site. | No. Likely breeding in sandbanks in the wider area, some identified outside the study area at Loughshinny. |
| Skylark | S. | Amber ^{Br.} | Recorded singing in fields onshore development area. | Yes. Ground nesting species breeding within grassland habitats. |
| Starling | SG | Amber ^{Br.} | Recorded frequently throughout onshore development area. | Yes. Several family groups with juveniles and provisioning behaviour noted within onshore development area. Nesting in holes/crevices of buildings and trees. |
| Swallow | SL | Amber ^{Br.} | Recorded frequently throughout onshore development area | Yes. Recorded entering multiple sheds, stables and barns along the proposed development. |
| Tree sparrow | TS | Amber ^{Br.} | Recorded on three occasions within the fields at the landfall and grid facility site. | Yes. Noted to be nesting with house sparrows in house at the landfall and grid facility site. |
| Willow warbler | WW | Amber ^{Br.} | Recorded frequently throughout proposed development. | Yes. Breeding within treelines and hedgerows throughout onshore development area. |
| Gannet | GX | Amber ^{Br.} | One record of a bird flying offshore at the landfall and grid facility site. | No. Breeding on offshore islands in the wider area. Closest known breeding colonies are Lambay Island and Ireland's eye. |
| Shag | SA | Amber ^{Br.} | Three birds recorded perched on rocks at the landfall and grid facility site. | No suitable breeding habitat within the onshore development area. Closest known breeding colonies are Skerries Islands, Lambay Island, Ireland's Eye and Howth Head. |
| Mute swan | MS | Amber ^{Br.} & Win. | Recorded at Malahide Estuary and a small waterbody at Balrothery. | No. Breeding adjacent to the onshore development area at Malahide Estuary and Wavin (Knock) Lake, Balrothery. |
| Cormorant | CA | Amber ^{Br.} & Win. | Recorded mainly flying over the proposed development and perched on rocks offshore. | No. Closest known colonies are located at Skerries Islands, Lambay Island, Ireland's Eye. Cormorant can breed inland in trees along rivers, however no juveniles or nesting behaviour was noted during the surveys. Unlikely to be breeding within the onshore development area. |
| Gadwall | GA | Amber ^{Br.} & Win. | Recorded on two occasions at Malahide Estuary. | No suitable breeding habitat within the onshore development area. |
| Great crested grebe | GG | Amber ^{Br.} & Win. | One bird recorded swimming at Malahide Estuary. | No suitable breeding habitat within the onshore development area. |
| Mallard | MA | Amber ^{Br.} & Win. | Recorded mainly at Malahide Estuary and at the landfall site, with small numbers recorded on rivers where the proposed development crosses. | Yes. Breeding adjacent to the onshore development area at the Broadmeadow River west of the M1 bridge at Malahide Estuary, and at the landfall site. |
| Shelduck | SU | Amber ^{Br.} & Win. | Small numbers of adults recorded at Malahide Estuary. | Yes. Breeding adjacent to the onshore development area at Malahide Estuary (NPWS, 2013). |

| Species | BTO codes ³⁸ | BoCCI 2020-2026 ³⁹ | Species recorded within the onshore development area | Breeding status within the onshore development area |
|---------|-------------------------|-------------------------------|--|---|
| Teal | T. | Amber ^{Br.} & Win. | A single male recorded on two occasions at Malahide Estuary. | No breeding pairs observed during surveys. |

Considering the density of red-listed species at the landfall site and throughout the onshore development area, along with the assemblage of amber-listed species recorded as breeding throughout the onshore development area, breeding birds have been valued as being of local (higher) to Regional/County ecological importance.

Wintering Waterbirds

Wintering waterbird surveys were undertaken for the onshore development area at the landfall site and at Malahide Estuary during the 2021-2022 winter season. In total, 18 red and 25 amber-listed species of Birds of Conservation Concern in Ireland (BoCCI) 2020-2026⁴¹ were recorded at the landfall site and Malahide Estuary study area.

In general terms, the wintering waterbird assemblage is typical of estuarine and coastal habitats that occur within, or immediately adjacent to, the onshore infrastructure of the proposed development.

Of the species recorded, 31 are listed as a special conservation interest (SCI) of European sites that have been identified with potential connectivity to the onshore development area. To provide ecological importance context, those species occurring in numbers greater than 1% of the international population are considered to occur in internationally important numbers within the study area. Likewise, those species occurring in numbers greater than 1% of the national population are considered to occur in nationally important numbers within the study area. No species was recorded occurring in numbers greater than 1% of the international population (see Table 23.16 for more detail on these figures). Six species were recorded occurred in numbers greater than 1% of the national population. These are golden plover *Pluvialis apricaria*, common scoter *Melanitta nigra*, light-bellied brent goose *Branta bernicla hrota*, great crested grebe *Podiceps cristatus*, great northern diver *Gavia immer* and red-throated diver *Gavia stellata*. Cormorant *Phalacrocorax carbo* was recorded in numbers of 0.95% of the national population. All other species recorded occurred in numbers lower than 1% of the national population and therefore lower than 1% of the international population, and were assigned an appropriate level of ecological importance.

Table 23.16 describes in detail each amber and red-listed species recorded during surveys and that occur within or in close proximity to the onshore development area, peak numbers they occur in and their distribution at the landfall site and Malahide Estuary. Figures 23.36 to 23.43 show a representation of red and amber-listed wintering waterbirds recorded across the onshore wintering waterbird study area. For a full list of species recorded, including green-listed birds, and monthly peak counts at the landfall site and Malahide Estuary, see Appendix 23.8.

⁴¹ Gilbert G, Stanbury A and Lewis L (2021) *Birds of Conservation Concern in Ireland 2020 –2026*. Irish Birds 9: 523–544

Table 23.16 Peak count and distribution of wintering waterbirds recorded during high and low-tide count surveys at the proposed landfall and grid facility, and Malahide Estuary during winter 2021-22

| Common name | BTO codes ⁴² | BoCCI 2020-2026 ⁴³ | SCI of nearby European sites ⁴⁴ | Peak count at landfall & grid facility | Peak count at Malahide Estuary | 1% of national population ^{45,46,47} | 1% of international population ^{48,40,41} | Occurrence in relation to the onshore infrastructure of the proposed development |
|---------------------|-------------------------|-------------------------------|--|--|--------------------------------|---|--|--|
| Kittiwake | KI | Red Br. | Yes | 2 | 0 | 247 pairs | 0 | Small numbers recorded flying off Gormanston Beach north of the landfall site and north of the Delvin River. |
| Razorbill | RA | Red Br. | Yes | 10 | 0 | 336 pairs | 0 | Small numbers recorded off the coast of Bremore Point at the landfall site. |
| Bar-tailed godwit | BA | * Red Win. | Yes | 3 | 38 | 150 | 1200 | Three birds recorded foraging at Bremore Point beach at the landfall site, and a flock of 38 birds recorded foraging at Malahide Estuary. |
| Black-tailed godwit | BW | Red Win. | Yes | 7 | 156 | 190 | 610 | Small numbers recorded flying off Gormanston Beach north of the landfall site, and north of the Delvin River. Flocks recorded foraging at roosting at Malahide Estuary. |
| Curlew | CU | Red Br. & Win. | Yes | 156 | 33 | 350 | 8400 | Flocks recorded foraging in fields at the grid facility and landfall site, and at Malahide Estuary. A maximum of 91 curlew were recorded roosting/feeding in arable fields at the landfall site. |
| Dunlin | DN | * Red Br. & Win. | Yes | 259 | 241 | 570 | 13300 | Flocks observed on rocks at Bremore Bay Beach close to the landfall site and foraging/roosting at Malahide Estuary. |
| Golden plover | GP | * Red Br. & Win. | Yes | 281 | 1000 | 920 | 9300 | Foraging within fields at the landfall site, and foraging/roosting at Malahide Estuary and |

⁴² BTO codes as displayed on wintering waterbird Figures 23.36 – 23.43

⁴³ Br. denotes the species is listed for its breeding population; Win. Denotes the species is listed for its wintering population; * denotes the species is listed in Annex I of the EU Birds Directive

⁴⁴ Nearby European sites are considered to be those occurring within 20km of the onshore development area, and are: North-west Irish Sea cSPA, Malahide Estuary SPA, Rogerstown Estuary SPA, Baldoyle SPA, North Bull Island SPA, River Nanny Estuary and Shore SPA, South Dublin and River Tolka Estuary SPA, Skerries Islands SPA, Rockabill SPA, Lambay Island SPA and Boyne Estuary SPA. Howth Head Coast SPA, Ireland's Eye SPA and Dalkey Islands SPA have been excluded from this list as they are designated for breeding seabird colonies and not wintering waterbird populations.

⁴⁵ To provide ecological importance context, species occurring in numbers greater than 1% of the national population are considered to occur in nationally important numbers within the study area.

⁴⁶ Cummins, S., Lauder, C., Lauder, A. & Tierney, T. D. (2019) The Status of Ireland's Breeding Seabirds: Birds Directive Article 12 Reporting 2013 – 2018. Irish Wildlife Manuals, No. 114. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland

⁴⁷ Lewis, L. J., Burke, B., Fitzgerald, N., Tierney, T. D. & Kelly, S. (2019) Irish Wetland Bird Survey: Waterbird Status and Distribution 2009/10-2015/16. Irish Wildlife Manuals, No. 106. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland

⁴⁸ To provide ecological importance context, those species occurring in numbers greater than 1% of the international population are considered to occur in internationally important numbers within the study area.

| Common name | BTO codes ⁴² | BoCCI 2020-2026 ⁴³ | SCI of nearby European sites ⁴⁴ | Peak count at landfall & grid facility | Peak count at Malahide Estuary | 1% of national population ^{45,46,47} | 1% of international population ^{48,40,41} | Occurrence in relation to the onshore infrastructure of the proposed development |
|------------------|-------------------------|-------------------------------|--|--|--------------------------------|---|--|--|
| | | | | | | | | surrounding fields. Golden plover were recorded roosting/feeding in arable fields at the landfall site in numbers ranging between 17 and 58. |
| Grey plover | GV | Red Win. | Yes | 27 | 2 | 30 | 2500 | Flocks recorded foraging/roosting on rocks at Bremore Bay Beach close to the landfall site. Two birds seen roosting at Malahide Estuary. |
| Knot | KN | Red Win. | Yes | 5 | - | 280 | 4500 | Small numbers recorded roosting at Bremore Bay Beach south of the landfall site. No birds observed at Malahide Estuary. |
| Lapwing | L. | Red Br. & Win. | No | 61 | 148 | 850 | 72300 | Recorded foraging in fields at the landfall site and during high/low tide counts at Malahide Estuary. Lapwing were recorded roosting/feeding in arable fields at the landfall site in numbers of up to 60 birds. |
| Oystercatcher | OC | Red Br. & Win. | Yes | 151 | 106 | 690 | 8200 | Widespread and numerous along the coastline at the landfall site and at Malahide Estuary. |
| Purple sandpiper | PS | Red Win. | Yes | 11 | - | 20 | 710 | Recorded at Bremore Bay Beach close to the landfall site. |
| Redshank | RK | Red Br. & Win. | Yes | 60 | 99 | 300 | 3900 | Widespread and numerous along coastline at landfall site and at Malahide Estuary. Three recorded in an arable field at the landfall site on one occasion. |
| Snipe | SN | Red Br. & Win. | No | 1 | - | - | 5700 | One observation at Knocknagin Beach, north of the landfall site but south of the Delvin River. |
| Common scoter | CX | Red Br. & Win. | Yes | 1660 | - | 110 | 7500 | Large flocks recorded loafing off the coast of the landfall site. |
| Eider | E. | Red Br. & Win. | No | 2 | - | 55 | 9800 | Two birds seen swimming offshore at Tankardstown Beach south of the onshore development area in March 2022. |
| Goldeneye | GN | Red Win. | Yes | - | 26 | - | 11400 | Recorded within the outer Malahide Estuary during high-tide surveys. |
| Scaup (Greater) | SP | Red Win. | No | - | 1 | 25 | 3100 | Two birds recorded within the outer Malahide Estuary. |

| Common name | BTO codes ⁴² | BoCCI 2020-2026 ⁴³ | SCI of nearby European sites ⁴⁴ | Peak count at landfall & grid facility | Peak count at Malahide Estuary | 1% of national population ^{45,46,47} | 1% of international population ^{48,40,41} | Occurrence in relation to the onshore infrastructure of the proposed development |
|--------------------------|-------------------------|-------------------------------|--|--|--------------------------------|---|--|--|
| Black-headed gull | BH | Amber Br. & Win. | Yes | 275 | 1510 | 78 pairs | 20000 | Widespread and numerous along the coastline and in arable fields at the landfall site and at Malahide Estuary. |
| Common gull | CM | Amber Br. & Win. | Yes | 197 | 224 | 19 pairs | 16400 | Widespread and numerous along coastline at the landfall site and at Malahide Estuary. Small numbers, up to 8, were recorded in arable fields at the landfall site. |
| Herring gull | HG | Amber Br. & Win. | Yes | 644 | 317 | 103 pairs | 10200 | Widespread and numerous along coastline at the landfall site and at Malahide Estuary. Up to 80 herring gull were recorded in arable fields at the landfall site. |
| Lesser black-backed gull | LB | Amber Br. & Win. | Yes | 11 | 11 | 71 pairs | - | Small flocks recorded at Gormanstown Beach, north of the landfall site and north of the Delvin River. Recorded within the inner Malahide Estuary. |
| Mediterranean gull | MU | * Amber Br. | No | 66 | - | - | - | Flocks recorded within fields and along the coast at the landfall site. |
| Kingfisher | KF | * Amber Br. | No | - | 2 | - | 37100 | Recorded on a number of occasions along this stretch of the Broadmeadow River, inland of the Malahide Estuary, during the breeding and non-breeding seasons. |
| Guillemot (Common) | GU | Amber Br. | Yes | 14 | - | 1773 pairs | - | Recorded swimming off the coast of the landfall site. |
| Gannet | GX | Amber Br. | No | 1 | - | 479 pairs | - | One observation of a bird swimming off the coast at the landfall site. |
| Shag | SA | Amber Br. | Yes | 45 | - | - | - | Birds present on rocks adjacent to the landfall site. |
| Brent goose | BG | Amber Win. | Yes | 131 | 1560 | 360 | 400 | Widespread and numerous along coastline at the landfall site and at Malahide Estuary. Numbers of up to 79 were recorded in arable fields at the landfall site. |
| Mute swan | MU | Amber Br. & Win. | No | - | 70 | 100 | 2500 | Widespread and numerous within the inner Malahide Estuary. |

| Common name | BTO codes ⁴² | BoCCI 2020-2026 ⁴³ | SCI of nearby European sites ⁴⁴ | Peak count at landfall & grid facility | Peak count at Malahide Estuary | 1% of national population ^{45,46,47} | 1% of international population ^{48,40,41} | Occurrence in relation to the onshore infrastructure of the proposed development |
|------------------------|-------------------------|-------------------------------|--|--|--------------------------------|---|--|---|
| Whooper swan | WS | * Amber Br. & Win. | No | - | 2 | 150 | 340 | Two birds seen swimming within the inner Malahide Estuary. |
| Ringed plover | RP | Amber Br. | Yes | 80 | - | 120 | - | Flocks observed on rocks at Bremore Bay Beach close to the landfall site. No flocks observed at Malahide Estuary. |
| Turnstone | TT | Amber Win. | Yes | 56 | 16 | 95 | - | Widespread and numerous along coastline at the landfall site and at Malahide Estuary. |
| Cormorant | CA | Amber Br. & Win. | Yes | 105 | 44 | 110 | 1200 | Widespread and numerous along coastline at the landfall site and at Malahide Estuary. |
| Gadwall | GA | Amber Br. & Win. | No | - | 2 | 20 | 1200 | Two birds observed swimming within the inner Malahide Estuary during the high-tide surveys. |
| Great crested grebe | GG | Amber Br. & Win. | No | 40 | 39 | 30 | 6300 | Recorded swimming off the coast of the landfall site and within the outer Malahide Estuary. |
| Mallard | MA | Amber Br. & Win. | No | 7 | 39 | 290 | 45000 | Small numbers recorded at Gormanston Beach, north of the landfall site and north of the Delvin River. Widespread and numerous at Malahide Estuary. |
| Great northern diver | ND | * Wintering | Yes | 6 | 38 | 20 | 50 | Recorded swimming off the coast of the landfall site. |
| Red-throated diver | RH | * Amber Br. & Win. | Yes | 35 | - | 20 | 3000 | Recorded swimming off the coast of the landfall site. |
| Red-breasted merganser | RM | Amber Br. & Win. | Yes | 1 | - | 25 | 860 | One bird recorded swimming off the coast of the landfall site. Larger numbers recorded within the inner and outer Malahide Estuary. |
| Shelduck | SU | Amber Br. & Win. | Yes | 1 | 9 | 120 | 3000 | One bird recorded flying out to sea at the landfall site and small numbers recorded within the inner Malahide Estuary. |
| Teal | T. | Amber Br. & Win. | Yes | 17 | 96 | 340 | 5000 | Three birds recorded swimming at Gormanston Beach, north of the landfall site and north of the Delvin River. Widespread and numerous within the inner Malahide Estuary. |

| Common name | BTO codes ⁴² | BoCCI 2020-2026 ⁴³ | SCI of nearby European sites ⁴⁴ | Peak count at landfall & grid facility | Peak count at Malahide Estuary | 1% of national population ^{45,46,47} | 1% of international population ^{48,40,41} | Occurrence in relation to the onshore infrastructure of the proposed development |
|-------------|-------------------------|-------------------------------|--|--|--------------------------------|---|--|--|
| Tufted duck | TU | Amber Br. & Win. | No | - | 1 | 270 | 8900 | One female recorded within the inner Malahide Estuary. |

When considering the landfall site and the Malahide Estuary, and assemblage of red, amber and SCI species, wintering waterbirds have been valued as being of Regional/County to National ecological importance given that species occurred in numbers which represent these geographical areas.

Details of birds using the offshore development area, which also includes the intertidal zone at the landfall site, are provided in Volume 3, Chapter 15: Offshore Ornithology.

Aquatic and Fisheries

There are a total of 25 watercourses to be crossed with the installation of the onshore cable route. Each of these have been visited and assessed for fisheries suitability. The watercourse crossings present a variety of concrete culverts, small streams, some inundated with instream vegetation with little flow, to more substantial lowland depositing rivers.

Desktop data from the EPA and IFI for each river, along with the fisheries suitability assessment is presented in Table 23.17. For streams where the Q value has not been assessed and where they occur in urban environments, the status is likely to be poor. Similarly, the ecological status of fish is not monitored by IFI for several of the watercourses crossed by the proposed development. This is likely due to their size and lack of fisheries suitability.

From the Water Chapter, only a few water quality monitoring locations are found on the streams adjacent to the onshore cable route where ratings are established, i.e., Mayne (Q3), Sluice River (Q3-Q4), Gaybrook, Meadowbrook (Q3-Q4), Turvey (Q3), and Ballough Stream (Q3-Q4). The majority of these are moderately polluted to slightly polluted which indicates that the overall water quality is unsatisfactory.

Table 23.17 Review of water quality within the Study Area (Source: Catchments.ie)

| Crossing | Stream Name / WFD Name | Lat, Long | IFI WFD Fish Monitoring⁴⁹ Status & Assemblage | Q-value Status (2016-2021) | WFD Risk Score | Salmonid Suitability |
|-----------------|---|----------------------|---|-----------------------------------|-----------------------|--|
| 1 | Bremore Stream / Matt_010 | 53.61514, -6.19107 | Not monitored | Not assessed / Poor | At risk | No stream visible. Possibly culverted |
| 2 | Bracken (Matt) River / Matt_010 | 53.60364, -6.18646 | Not monitored | Not assessed / Poor | At risk | Yes, substrate available and good flows. |
| 3 | Knock Stream / Matt_010 | 53.58334, -6.19539 | Not monitored | Not assessed / Poor | At risk | No, choked with vegetation. No passage. |
| 4 | Balrothery Stream / Matt_010 | 53.57752, -6.20143 | Not monitored | Not assessed / Poor | At risk | No, subterranean flow and no substrate |
| 5 | Balrickard Stream / Matt_010 | 53.56375, -6.20998 | Not monitored | Not assessed / Poor | At risk | No passage |
| 6 | Rowans Big Stream | 53.562488, -6.209828 | Not monitored | Not assessed / Poor | At risk | Not viable. |
| 7 | Rowans Little Stream | 53.561208, -6.210099 | Not monitored | Not assessed / Poor | At risk | Not viable. |
| 8 | Courtough Stream / Ballough Stream_010 | 53.54808, -6.20729 | Not monitored | Moderate (downstream) | At risk | No water present |
| 9 | Obserstown Stream / Ballough Stream_010 | 53.53922, -6.20030 | Not monitored | Moderate (downstream) | At risk | Yes, substrate available and suitable flow |

⁴⁹ Water Framework Directive: Fish Ecological Status Map Viewer. Available at: [Water Framework Directive Fish Ecological Status 2008-2021 | Water Framework Directive Fish Ecological Status 2008-2021 | Inland Fisheries Ireland Data Hub \(arcgis.com\)](#) (Accessed December 2022)

| Crossing | Stream Name / WFD Name | Lat, Long | IFI WFD Fish Monitoring ⁴⁹ Status & Assemblage | Q-value Status (2016-2021) | WFD Risk Score | Salmonid Suitability |
|----------|---------------------------------------|----------------------|---|----------------------------|----------------|--|
| 10 | Aldruman Stream / Ballough Stream_010 | 53.53695, -6.19849 | Not monitored | Moderate (downstream) | At risk | No flow |
| 11 | Ballough Stream / Ballough Stream_020 | 53.50901, -6.19605 | Not monitored | Moderate (downstream) | At risk | Yes, close proximity to estuary |
| 12 | Deanestown Stream / Ballyboghil_010 | 53.49933, -6.19425 | Not monitored | Poor | At risk | Yes. No visual on substrate, but appears to have potential suitability |
| 13 | Ballyboghil Stream / Ballyboghil_010 | 53.49876, -6.19433 | Not monitored | Poor (upstream) | At risk | Yes, due to proximity to estuary |
| 14 | Turvey Stream / Turvey_010 | 53.4944, -6.19517 | Not monitored | Poor (upstream) | At risk | No available substrate, no flow and choked with vegetation |
| 15 | Staffordstown Stream / Turvey_010 | 53.47575, -6.20782 | Not monitored | Poor | At risk | No, very low flow |
| 16 | Broadmeadow River / Broadmeadow_040 | 53.47097, -6.21177 | In monitoring year 2017, the status upstream was Poor. Fish recorded were: Minnow Stone loach, European eel, Brown trout ($\geq 1+, 0+$) | Moderate (upstream) | At risk | Yes, suitable substrate and flows – high potential |
| 17 | Ward River / Ward_040 | 53.47021, -6.21257 | In monitoring year 2017, the status upstream was Good to Moderate. Fish recorded were: Minnow, Brown trout ($\geq 1+, 0+$), Sea-trout | Moderate (upstream) | At risk | Yes, suitable substrate and flows – high potential |
| 18 | Seapoint Stream / Gaybrook_010 | 53.463879, -6.202588 | Not monitored | Poor | At risk | |
| 19 | Greenfields Stream / Gaybrook_010 | 53.46322, -6.19996 | Not monitored | Poor | At risk | No, concrete pipe discharge point |
| 20 | Gaybrook Stream / Gaybrook_010 | 53.44824, -6.18000 | Not monitored | Poor | Under review | No, subterranean flow |
| 21 | Hazlebrook Stream / Sluice_010 | 53.44008, -6.17665 | Not monitored | Poor | Under review | No, subterranean flow |
| 22 | Sluice Stream / Sluice_010 | 53.42769, -6.17768 | In monitoring year 2016, the status downstream was Poor. | Poor | Under review | Yes, good substrate and flows |

| Crossing | Stream Name / WFD Name | Lat, Long | IFI WFD Fish Monitoring ⁴⁹ Status & Assemblage | Q-value Status (2016-2021) | WFD Risk Score | Salmonid Suitability |
|----------|---------------------------|--------------------|---|----------------------------|----------------|---|
| | | | Fish recorded were: 3-spined stickleback, Brown trout (0+), European eel, Flounder | | | |
| 23A | Cuckoo Stream / Mayne_010 | 53.41197, -6.17983 | In monitoring year 2016, the status upstream was Bad. Fish recorded were: European eel, 3-spined stickleback | Poor (downstream) | At risk | No, substrate mixed but urban |
| 23B | Cuckoo Stream / Mayne_010 | 53.41086, -6.16247 | As above | As above | As above | No, urban environment |
| 23C | Cuckoo Stream / Mayne_010 | 53.40968, -6.16112 | As above | As above | As above | No, urban environment |
| 24A | Mayne Stream / Mayne_010 | 53.40701, -6.17787 | In monitoring year 2016, the status downstream was Poor to Bad. Fish recorded were: European eel | Poor (downstream) | At risk | No potential, but substrate mixed |
| 24B | Mayne Stream / Mayne_010 | 53.40918, -6.16359 | As above | As above | As above | Yes, good substrate available however other areas have fine sediments |
| 24C | Mayne Stream / Mayne_010 | 53.40887, -6.16146 | As above | As above | As above | Yes, good substrate available however other areas have fine sediments |
| 25 | Mayne Stream / Mayne_010 | 53.4086, -6.20646 | In monitoring year 2016, the status downstream was Poor to Bad. Fish recorded were: European eel | Poor | At risk | No, substrate loaded with sediment and heavily vegetated |

Each watercourse, described in Table 23.17 has been assigned an ecological value at the crossing point based on the aquatic features present and fisheries suitability. For watercourses that have poor Q values, are at risk of not achieving the WFD status and have no fisheries suitability, an ecological value of local (lower) has been assigned. These include: Wx01 Bremore Stream, Wx03 Knock Stream, Wx04 Balrothery Stream, Wx05 Balrickard Stream, Wx06 Rowans Big Stream, Wx07 Rowans Little Stream, Wx08 Courtlough Stream, Wx10 Aldrumman Stream, Wx14 Turvey Stream, Wx15 Staffordstown Stream, Wx18 Seapoint Stream, Wx19 Greenfields Stream, Wx20 Gaybrook Stream and Wx21 Hazelbrook Stream. From the Water Chapter, site specific water quality monitoring was conducted at six proposed watercourse crossing locations where EPA data was not available at all or inadequate/obsolete.

These were the Balrickard Stream, Oberstown Stream, Aldrumman Stream, Staffordstown Stream, Seapoint Stream and Gaybrook Stream. The results were as expected for the type of background environment in the area. For all of the watercourses, the dissolved oxygen (DO) level is generally good (above 6.5-8mg/l). However, the Balrickard Stream has consistently showed DO levels less than 6mg/l, once falling to just 4.3mg/l. Refer to the Water Chapter for full results.

It should be noted that eight of the 25 watercourses are hydrologically connected to downstream European sites, and as such have been carried forward into the impact assessment as Important Ecological Features due to downstream estuary habitat.

Where watercourses were assessed as having poor fisheries suitability but are known or were observed to support European eel, an ecological value of local (higher) was assigned. These watercourse crossings were Wx23A-C Cuckoo Stream and Wx24A Mayne River and Wx25 Mayne River. All three of these watercourses are connected to downstream European sites.

Watercourses that were assessed as being viable for fisheries were, and/or are known to support fish populations, were assessed as having an ecological value of County/regional. The ten watercourse crossings are Wx02 Bracken River, Wx09 Oberstown Stream, Wx11 Ballough Stream, Wx12 Deanestown Stream, Wx13 Ballyboghill Stream, Wx16 Broadmeadow River, Wx17 Ward River, Wx22 Sluice Stream, Wx24B Mayne River and Wx24C Mayne River. All of these are connected to downstream European sites. For full details, including photographs of crossing points, see Appendix 23.9.

Details of marine fisheries and shellfish using the offshore development area are provided in Volume 3, Chapter 13: Fish and Shellfish Ecology.

23.3.4 Summary of Important Ecological Features

Table 23.18 summarises Important Ecological Features that have been identified as at risk of potentially significant effects via a source-pathway-receptor link and resulting from the onshore infrastructure of the proposed development. Important Ecological Features are valued as local importance (higher) or above per the criteria set out in Table 23.18.

Table 23.18 Valuation of Important Ecological Features in relation to the onshore infrastructure of the proposed development

| Feature | Highest Evaluation / Importance | Important Ecological Feature (IEF)? |
|--|---------------------------------|-------------------------------------|
| Designated Sites | | |
| European sites (SACs/SPAs) | International | Yes |
| National sites (NHAs/pNHAs) | National | Yes |
| Habitats | | |
| BC1 Arable crops | Local importance (lower value) | No |
| BL3 Buildings and artificial surfaces | Local importance (lower value) | No |
| CB1 Shingle and gravel banks | National importance | Yes |
| CD1 Embryonic dunes | Regional/County importance | Yes |
| CS3 Sedimentary Sea cliffs | National importance | Yes |
| ED3 Recolonising bare ground | Local importance (lower value) | No |
| FW2 Lowland depositing river | Regional/County importance | Yes |
| FW4 Drainage ditches | Local importance (higher value) | Yes |
| GA1 Improved agricultural grassland | Local importance (lower value) | No |
| GS4 Wet grassland/GM1 Marsh | Local importance (higher value) | Yes |
| GS1 Dry calcareous and neutral grassland | Local importance (higher value) | Yes |
| GS2 Dry meadows and grassy verges | Local importance (higher value) | Yes |
| WD1 (Mixed) broadleaved woodland | Local importance (lower value) | No |
| WL1 Hedgerows | Local importance (higher value) | Yes |

| Feature | Highest Evaluation / Importance | Important Ecological Feature (IEF)? |
|---|--|-------------------------------------|
| WL2 Treelines | Local importance (higher value) | Yes |
| WS1 Scrub | Local importance (lower value) | No |
| WS2 Immature woodland | Local importance (lower value) | No |
| Perennial vegetation of stony banks (1220) | National importance | Yes |
| Embryonic shifting dunes (2210) | Regional/County importance | Yes |
| Vegetated sea cliffs of the Atlantic and Baltic coasts (1230) | National importance | Yes |
| Mammals | | |
| Badger | Local importance (higher value) | Yes |
| Small mammals (pygmy shrew, hedgehog, Irish hare) | Local importance (higher value) | Yes |
| Otter | Local importance (higher value) | Yes |
| Amphibians & reptiles | | |
| Smooth newt & common frog | Local importance (higher value) | Yes |
| Common lizard | Local importance (higher value) | Yes |
| Bats | | |
| Foraging/commuting bats | Local importance (higher value) | Yes |
| Roosting bats | Local importance (higher value) | Yes |
| Birds | | |
| Breeding birds | Regional/County importance | Yes |
| Wintering waterbirds | Regional/County to National importance | Yes |
| Aquatic & Fisheries | | |
| Aquatic & fish species | Regional/County importance | Yes |

23.4 Characteristics of the Proposed Development

A description of the onshore infrastructure of the proposed development is provided in the Onshore Description Chapter and construction activities are described in the Onshore Construction Chapter. The key infrastructure features of the onshore infrastructure of the proposed development that are relevant to ecology and are assessed in this chapter are the landfall, the grid facility, the onshore cable at distinct offline locations along the onshore cable route and adjacent to the Malahide Estuary, and at the existing substation at Belcamp where the onshore cable route terminates.

The offshore infrastructure elements which have potential to interact with onshore receptors, i.e. Important Ecological Features, include near-shore works at the landfall site which comprise the HDD exit location in the sub-tidal area. A summary of these works is provided in this section. A description of the offshore infrastructure of the proposed development is provided in the Offshore Description Chapter and construction activities are described in the Offshore Construction Chapter.

Activities that have the greatest potential to impact Important Ecological Features include works that involve vegetation clearance, temporary or permanent habitat loss, habitat trampling, exposed soils, groundworks, excavations, piling and HDD, rock-breaking, 24 hour working and associated artificial lighting, works resulting in increased noise, works near watercourses or in-stream works, storage of materials (inert or otherwise) and machinery and welfare facilities. While this list is not exhaustive, all works associated with the onshore infrastructure of the proposed development, and that have potential to impact on biodiversity, have been considered in this chapter.

23.4.1 Landfall Site

The landfall site is displayed on Figure 7.2. Made up of arable fields and intersecting hedgerows, the landfall site will accommodate three temporary HDD contractor compounds – one larger compound where the offshore export cables come to shore and two smaller compounds as part of a cable crossing underneath the Dublin to Belfast railway line. Onshore export cables will be laid in trenches from the landfall HDD contractor compound to the railway HDD entry contractor compound and from the railway HDD exit contractor compound to the grid facility, with the cables under the railway being constructed by HDD. The landfall site will also feature the temporary Bremore cable contractor compound adjacent to the R132.

At the landfall site, vegetation clearance and habitat removal during construction will occur under the working footprint of the development activities which includes the landfall site HDD contractor compound (c. 6,000m²), HDD contractor compounds measuring c. 1,500m² either side of the Dublin-Belfast railway crossing, the onshore export cable, and permanent wayleaves. At the landfall site, where the onshore export cable passes through hedgerows or treelines, the width will be narrowed to approximately 17m. In all cases where the corridor intersects a hedgerow or treeline, a proportion will be replanted with similar species and an 8m exclusion zone over the cable itself will be replanted shallow rooted species only. All other habitats that will be temporarily lost during construction at the landfall site will be reinstated and current land uses will resume. There will be no habitat removal at the coastline as the offshore export cables will be brought on land via HDD under the coastal habitats.

As described in the Onshore Construction Chapter, it is expected that construction works at the landfall site will take approximately 12-13 months to complete. The actual offshore export cable landfall HDD drilling and duct pull-back will take up to eight weeks per HDD - working 24 hours a day - for each cable. The railway HDD drilling and duct pull-back will take up to three weeks for each cable, working 24 hours a day for each circuit. These activities may take place consecutively or in parallel at certain times.

Two cable transition joint bays (TJBs) will be located at the landfall site and will be accessed via a manhole cover. There will be no permanent above ground infrastructure at the landfall site. Operational maintenance works will involve an annual inspection at the cable TJBs. These works will involve personnel accessing the cables at the joint bay via the manhole cover by means of the link box and communication chambers. In the event of a fault, the cable will be pulled and replaced via the joint bay. While there will be an increased presence of machinery and personnel, maintenance works will not be intrusive or involve any excavation. In addition, emergency repair works may be required at any time and would involve a similar process and include artificial lighting if emergency works occur at night.

23.4.2 Grid Facility

The grid facility site is shown on Figure 7.2 and will be the site of two new substations with associated permanent above ground infrastructure (buildings, electrical equipment and associated site infrastructure) covering approximately 3.5 ha (35,000 m²). Between the R132 and the grid facility there will be permanent access tracks and a temporary contractor compound.

At the grid facility, vegetation clearance and habitat removal during construction will occur under the working footprint of the development which includes the grid facility infrastructure measuring 35,000 m², a temporary contractor compound, and surrounding landscape and biodiversity planting which will occupy the remainder of the lands available at the grid facility site.

The construction and commissioning of the grid facility will likely last approximately 24 months with certain activities taking place in parallel.

The operation of the grid facility will be unmanned and it will be operated remotely. It is expected that vehicles and personnel will attend the facility every four weeks for an inspection, as required on an ad-hoc basis, and for annual maintenance. The lighting plan at the grid facility will align with EirGrid specification.⁵⁰ LED lighting will be used and will provide sufficient illumination to allow safe pedestrian travel around the grid facility grounds. External artificial lighting will be switched off during the hours of darkness with the exception of that required for emergency repairs to outdoor equipment.

⁵⁰ EirGrid (2022) Document Reference: OFS-SSS-418-R1: Functional Specification Electrical & Mechanical Services for Transmission System Control Buildings and Compounds

Motion sensor technology will be implemented to control lighting at access doors and security gates within the grid facility. Outdoor lighting will not be less than 2 lux of horizontal illumination at ground level within the facility.

23.4.3 Onshore Cable Route

The onshore cable route will run approximately 33-35km from the grid facility to the existing substation at Belcamp. The route is shown on Figure 7.3. For the majority, the route is within public roads, with seven locations where the route deviates offline from the road to cross watercourses or major roads. At these locations, where conditions require, the cable route will be constructed with HDD to negotiate watercourses or major roads. The offline sections include:

- Wx10 (Aldrumman Stream)
- Blakes Cross North including water crossing Wx11 (Ballough Stream)
- Blakes Cross South including water crossings Wx12 (Deanestown Stream) and Wx13 (Ballyboghill Stream)
- M1 crossing
- Water crossing Wx20 (Gaybrook Stream)
- Water crossing Wx22 (Sluice Stream) and
- The substation at Belcamp

At the offline sections of the onshore cable route, habitat removal during construction will involve the working corridor, HDD contractor compounds measuring c. 1,500m² at the M1 crossing and at offline watercourse crossings where HDD will be used. The proposed development includes the construction of three primary contractor compounds to support the construction works: the grid facility contractor compound which will support the construction of the grid facility and two cable contractor compounds (the Bremore cable contractor compound and the Blakes Cross cable contractor compound) which will support the construction of the cable routes. These compounds will be between approximately 9,500m² and 12,500m² in area. The working corridor for offline sections of the onshore cable route will be 18m in width – but may be up to 30m in places - to allow for the excavation of the trench, storage of topsoil and subsoil arisings plus a temporary haul road for the movement of the excavation equipment and general installation vehicles for the delivery of materials such as ducting, protective covers and bedding. Where the onshore cable route passes through hedgerows or treelines, the width will be narrowed to approximately 11m. In all cases where the corridor intersects a hedgerow or treeline, the removed habitat will be replanted with the exclusion of an 8m gap above the cable route itself which will not be replanted. All other habitats that will be temporarily lost during construction of the onshore cable route will be reinstated and current land uses will resume.

The onshore cable route runs adjacent to the Malahide Estuary for c. 2.3km along the Estuary Road. Works at this location will include road breaking out, cable trenching and backfilling, installation of joint bays, road resurfacing, HDD works and two watercourse crossings. No offline works occur at this location, however given the close proximity of the works, within 20-50m in most parts, to the estuary, it is considered a sensitive location for ecology. Works along the Estuary Road will last approximately 2 months, taking into account the length of onshore cable route adjacent the estuary (approximately 2.3km), and more than one works areas, these localised impacts would be likely to last 2 months.

Connection to the existing substation at Belcamp facility will include construction of a joint bay adjacent to the facility and the connection point, and cables jointed accordingly.

The construction of the onshore cable route from the grid facility and onto the existing grid connection at Belcamp substation will last approximately 24 months, with some activities, at different locations, taking place in parallel.

Operational maintenance of the onshore cables will comprise an inspection, typically once every year, by means of the link boxes and communication chambers located at the joint bays. Maintenance/repairs of cables will be required on an ad-hoc basis in the event of a cable fault occurring. In the event of a fault, the cable will be pulled and replaced via the joint bay.

While there will be an increased presence of machinery and personnel, operational maintenance works will not cause intrusive works or involve any excavation. In addition, emergency repair works may be required at any time and would involve a similar process and include artificial lighting if emergency works occur at night.

23.4.4 Offshore Infrastructure

While this chapter focuses on impacts and potential effects which arise from the onshore infrastructure of the proposed development, the offshore infrastructure has been considered where there is potential for impacts to arise and cause effects to onshore receptors, i.e. Important Ecological Features, that occur landward of the HWM. A description of the offshore infrastructure of the proposed development is provided in Volume 2, Chapter 6: Offshore Description Chapter and construction activities are described in Volume 2, Chapter 8: Offshore Construction Chapter. Mainly such offshore aspects of the proposed development include near-shore works at the landfall site and pertain to works associated with the export offshore cable coming onshore. These works will involve the HDD exit in the sub-tidal area, associated lighting at this location, works undertaken from any near-shore vessel, and works offshore at the HDD exit producing increased noise. It is envisaged that the HDD bore would extend to a point at a suitable distance offshore, usually several hundred metres considering geological features, water depths, mechanical properties of cables and ducts. Confirmation of the precise location of the HDD exit in the sub-tidal area requires the completion of a planned geotechnical survey of the landfall site, and subsequent design. Thus, the distance of the bore and the HDD exit location will be confirmed prior to the commencement of works.

23.5 Potential Effects

Section 23.2.6 sets out the criteria and approach to the ecological impact assessment that follows CIEEM (2018) guidelines. Likely significant effects have been assessed for Important Ecological Features only, as listed in Table 23.18. An impact is considered to be ecologically significant if it is predicted to affect the integrity or conservation status of an Important Ecological Feature at a specified geographical scale. All impacts are described in the absence of mitigation.

23.5.1 Do-Nothing Scenario

Under the do-nothing scenario, it is likely that the baseline conditions of the proposed development would continue to exist as they are under the current land uses and continue to provide suitable habitat for Important Ecological Features.

23.5.2 Construction Phase

Construction phase impacts occurring at a magnitude that are expected to result in likely significant effects on Important Ecological Features include:

- Temporary and permanent habitat loss and fragmentation
- Degradation of habitats arising from dust deposition
- Water quality impacts arising from surface water run-off containing sediments and/or an accidental pollution spill
- Water quality impacts arising from hydrogeological connectivity
- Temporary creation of a barrier to movement at watercourse crossings
- Disturbance and displacement of fauna
- Loss of nesting/roosting sites
- Spread of non-native invasive species and
- Temporary lighting impacts from construction compounds

23.5.2.1 Designated Sites

Potential source-pathway-receptor links of connectivity have been identified between the onshore infrastructure of the proposed development and European and national designated sites, see Table 23.10 and Table 23.11, respectively.

In relation to the onshore infrastructure of the proposed development, potential impacts to European sites and national sites (in the absence of mitigation) largely arise from the construction phase and include potential construction related hydrological impacts resulting in habitat degradation or impacts on species that rely on these habitats, and construction related disturbance and displacement impacts affecting species usage of roosting and/or feeding areas.

Where European sites are considered, this chapter summarises the assessments made on the site in relation to the onshore development, with the full site assessment considering the onshore and offshore infrastructure on the site contained in the Natura Impact Statement (NIS) for the proposed development.

European sites

A total of fourteen European sites, three SACs and eleven SPAs, have been identified as having connectivity to the onshore development area, see Table 23.10. These include Malahide Estuary SAC, Rogerstown Estuary SAC, Baldoyle Bay SAC, North-West Irish Sea cSPA, Malahide Estuary SPA, Rogerstown Estuary SPA, Baldoyle Bay SPA, North Bull Island SPA, River Nanny Estuary and Shore SPA, South Dublin Bay and River Tolka Estuary SPA, Skerries Islands SPA, Rockabill SPA, Lambay Island SPA and Boyne Estuary SPA.

European sites adjacent to the onshore development area include Malahide Estuary SAC, Rogerstown Estuary SAC, North-West Irish Sea cSPA and Malahide Estuary SPA. While these sites are adjacent to the onshore development area there is no overlap with any European site boundary with the onshore development area. There is overlap with European sites and the offshore development area, addressed in the offshore chapters Benthic and Intertidal Ecology, Fish and Shellfish Ecology, Marine Mammal and Megafauna Ecology, and Offshore Ornithology. Additional European sites that occur downstream of the onshore development area are Rogerstown Estuary SPA, Baldoyle Bay SAC and Baldoyle Bay SPA. The remaining seven European sites, all SPAs, are connected to the onshore development area via the potential for mobile SCI species associated with the SPAs to use lands within or adjacent to the onshore development area.

The assessment of European sites in relation to the offshore development area is considered in relevant chapters in Volume 3, Chapter 12: Benthic and Intertidal Ecology, Chapter 13: Fish and Shellfish Ecology, Chapter 14: Marine Mammal and Megafauna Ecology, and Chapter 15: Offshore Ornithology. Also see the proposed development Natura Impact Statement.

Water quality impacts arising from surface water run-off and/or hydrogeological connectivity

For sites adjacent to or downstream of the onshore development area, there is potential for indirect impacts to result in a likely significant effect on these European sites, and their QIs and SCIs, through construction phase impacts. Downstream water quality impacts affecting these European sites could arise from watercourse crossings involving in-stream or near-stream works, and the increase of suspended solids/pollutants in the surface water run-off. Such impacts may result in the degradation of downstream intertidal habitats for which Malahide Estuary SAC, Rogerstown Estuary SAC and Baldoyle Bay SAC are designated and, collectively, include: estuaries, mudflats and sandflats not covered by seawater at low tide, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows and Mediterranean salt meadows.

Downstream water quality impacts can cause potential adverse effects to fauna if come into direct contact with suspended solids/pollutants, or may adversely impact habitat for which fauna (in these cases wintering waterbirds) rely on for roosting and/or feeding. Collectively, wintering waterbirds for which Malahide Estuary SPA, Rogerstown Estuary SPA and Baldoyle Bay SPA are designated include: great crested grebe, light-bellied brent goose, graylag goose, shelduck, shoveler, pintail, goldeneye, red-breasted merganser, oystercatcher, ringed plover, golden plover, grey plover, knot, dunlin, black-tailed godwit, bar-tailed godwit and redshank.

The North-West Irish Sea cSPA is designated for seabirds which rely on the coastal and marine habitats within the designation, some of which were recorded at the landfall site and included: black-headed gull, common gull, common scoter, cormorant, great northern diver, common guillemot, herring gull, kittiwake, lesser black-backed gull, razorbill, red-throated diver and shag.

In any of these cases downstream water quality impacts are likely to result in a minor effect due to the scale of works, prevailing best practice standards during construction works, and the dilution potential in watercourses, estuarine and marine environments, as described in the Water chapter and in Volume 3: Chapter 11 Marine Water and Sediment Quality. However, in the absence of mitigation, negative, temporary to short-term (i.e. during the period of suspended solids/pollutants in the surface water run-off), reversible likely significant effects are predicted at a local geographical scale on hydrologically connected European sites which are Malahide Estuary SAC, Rogerstown Estuary SAC, Baldoyle Bay SAC, Malahide Estuary SPA, Rogerstown Estuary SPA, Baldoyle Bay SPA and North-West Irish Sea cSPA.

In addition, due to the close proximity of the onshore cable route to Malahide Estuary SAC and SPA, there is, albeit limited, potential for hydrogeological connectivity and groundwater discharge to the European sites. As groundwater flow is slow, the infiltration capacity of the soil will limit how much of an accidental spill can enter the ground. Groundwater contamination plumes develop over years of sustained release (e.g. from unlined landfills or brownfield sites). In this scenario, the only potential for effects is as a result of a significant accidental spill. However, contamination of the SAC or SPA, as outlined above via surface waters travelling over-ground remains a risk. There are no other locations where hydrogeological connectivity has been identified with a European site.

Significance of effect: In the absence of mitigation, negative, temporary to short-term (i.e. during the period of suspended solids/pollutants in the surface water run-off), reversible likely significant effects are predicted at a local geographical scale on hydrologically and/or hydrogeologically connected European sites which are Malahide Estuary SAC, Rogerstown Estuary SAC, Baldoyle Bay SAC, Malahide Estuary SPA, Rogerstown Estuary SPA, Baldoyle Bay SPA and North-West Irish Sea cSPA.

Degradation of habitats arising from dust deposition

Typically, dust impacts are localised and dust deposition does not extend further than 100m from the source, however under dry and windy weather conditions dust can travel a significant distance and deposit on habitats a distance greater than 100m from the source. For those sites immediately adjacent to significant works occurring within the onshore development area, Malahide Estuary SAC, Malahide Estuary SPA and North-West Irish Sea cSPA, dust impacts may arise, however these are expected to be minor and temporary due to the small area of bare ground and storage of materials in any one location along the proposed onshore cable route. Due to existing vegetation that separates Rogerstown Estuary SAC and the onshore development area, potential dust impacts have been ruled out for this site. As such, in the absence of mitigation, dust impacts are expected to result in a negative, temporary, reversible likely significant effect at a local geographical scale on Malahide Estuary SAC, Malahide Estuary SPA and North-West Irish Sea cSPA.

Significance of effect: In the absence of mitigation, negative, temporary, reversible likely significant effects arising from dust impacts are predicted at a local geographical scale on Malahide Estuary SAC, Malahide Estuary SPA and North-West Irish Sea cSPA.

Disturbance and displacement of fauna

SPAs including, Malahide Estuary SPA, Rogerstown Estuary SPA, Baldoyle Bay SPA and North-West Irish Sea cSPA, and all remaining SPAs that have been included in the assessment, North Bull Island SPA, River Nanny Estuary and Shore SPA, South Dublin Bay and River Tolka Estuary SPA, Skerries Islands SPA, Rockabill SPA, Lambay Island SPA and Boyne Estuary SPA, are connected to the onshore development area through the potential for mobile SCIs associated with these sites to utilise habitats within or adjacent to the onshore development area.

Mobile SCIs, in these cases wintering waterbirds, can travel a great distance from their associated site, for example, golden plover are known to move significant distances of up to 12km between fields during the winter period⁵¹, while goose foraging range from night roosts during the winter period can be up to 20km and 25km⁵². As such SCIs travelling to and utilising habitats, in particular, at the landfall site and at Malahide Estuary, where the onshore cable route is adjacent to the estuary for c. 2.3km, are at risk to disturbance and displacement effects arising from the construction of the onshore infrastructure. At these locations, it is not expected that disturbance and displacement effects will extend beyond a distance of c. 300m from construction works, as noise levels associated with general construction activities would attenuate close to background levels at that distance (Cutts *et al.*, 2009).

SCI species occurring at the landfall site in numbers representing 1% of the national population were common scoter, great crested grebe, great northern diver, red-throated diver and cormorant, which was recorded in numbers of 0.95% of the national population. These species are listed as SCIs of Malahide Estuary SPA, North-West Irish Sea cSPA, Skerries Islands SPA and Lambay Island SPA. All other SCIs recorded at the landfall site occurred in numbers below 1% of the national population and are listed as SCIs of the following SPAs Malahide Estuary SPA, Rogerstown Estuary SPA, Baldoyle Bay SPA, North-West Irish Sea cSPA, North Bull Island SPA, River Nanny Estuary and Shore SPA, South Dublin Bay and River Tolka Estuary SPA, Skerries Islands SPA, Rockabill SPA, Lambay Island SPA and Boyne Estuary SPA.

It is expected that construction works at the landfall site will take approximately 10 months to complete and will involve works set out in Section 23.4. It is possible that SCIs may initially be disturbed by the works within their line-of sight at the landfall site and are expected to be temporarily displaced during periods of the most disturbing and intrusive construction activity. 24 hour working at the landfall site will result in lighting impacts which may cause disturbance to roosting SCIs using the adjacent coastline habitats. In addition, SCIs occurring offshore at the landfall site have potential to be impacted by near-shore works at the HDD exit pit which will be located several hundred metres offshore. At the HDD exit pit, 24-hour working could result in a disturbance and displacement effect as a result of artificial lighting, noise impacts and the presence of construction vessels and machinery.

SCI species occurring at Malahide Estuary in numbers representing 1% of the national population included golden plover, light-bellied brent goose, great crested grebe and great northern diver. These species are listed SCIs of Malahide Estuary SPA, Rogerstown Estuary SPA, Baldoyle Bay SPA, North Bull Island SPA, River Nanny Estuary and Shore SPA, South Dublin Bay and River Tolka Estuary SPA, Skerries Islands SPA, Boyne Estuary SPA and North-West Irish Sea cSPA. All other SCIs recorded at Malahide Estuary occurred in numbers below 1% of the national population and are listed SCIs of the following SPAs Malahide Estuary SPA, Rogerstown Estuary SPA, Baldoyle Bay SPA, North-West Irish Sea cSPA, North Bull Island SPA, River Nanny Estuary and Shore SPA, South Dublin Bay and River Tolka Estuary SPA, Skerries Islands SPA, Lambay Island SPA and Boyne Estuary SPA.

At Malahide Estuary, the inline construction works will be adjacent to the estuary within the busy Estuary Road and will be separated from the estuary by a grass strip c. 20-50m wide, which also serves as a regularly used public footpath. Considering this, it is expected that the disturbance events will be limited to the noisiest and most visible operations (such as cutting and breaking of tarmac). It is likely that road closures will be in place along the Estuary Road to facilitate the scheduling of works which will lower the existing baseline noise levels, to which SCIs using the estuary and surrounding habitats are habituated.

In the absence of mitigation and considering SCIs occurring at the landfall site and Malahide Estuary, disturbance impacts arising from unmitigated noise impacts, visual disturbance or lighting impacts associated with the onshore development area are expected to result in a negative, temporary to short-term (i.e. for the period of the construction activity), reversible likely significant effect at a local geographical scale. No longer-term impacts arising from unnecessary energy expenditure are predicted at the landfall site due to the relatively limited scale of works at this location and availability of alternative feeding and roosting habitat nearby. For SCIs using Malahide Estuary, no longer-term impacts are predicted as disturbance impacts at this location are considered to be lower due to the existing baseline level of disturbance.

⁵¹ Gillings, S. and Fuller, R.J. (1999) Winter ecology of golden plovers and lapwings: A review and consideration of extensive survey methods. British Trust of Ornithology (BTO) Research Report No. 224.

⁵² Scottish Natural Heritage (SNH) Guidance: Assessing connectivity with Special Protection Areas (SPAs). Version 3, June 2016.

Inland feeding sites for light-bellied brent geese associated with County Dublin SPAs, and occurring away from any SPA site, are located c. 160m southwest of the proposed onshore works area at playing pitches in Belcamp Park. At this location light-bellied brent geese are screened from the works within the road corridor by existing mature vegetation. Light-bellied brent geese are considered sensitive to noise levels of 120-125dB decibels (dB) emanating from a distance of up to 300m (Cutts *et al.*, 2013). No such level of noise will emanate from the works area as demonstrated from the noise levels provided in the above paragraphs.

Significance of effect: Disturbance and displacement impacts on SCIs arising from unmitigated noise impacts, visual disturbance or lighting impacts associated with the onshore and offshore infrastructure of the proposed development are expected to result in a negative, temporary to short-term (i.e. for the period of the construction activity), reversible likely significant effect at a local geographical scale on the European sites Malahide Estuary SPA, Rogerstown Estuary SPA, Baldoyle Bay SPA, North-West Irish Sea cSPA, North Bull Island SPA, River Nanny Estuary and Shore SPA, South Dublin Bay and River Tolka Estuary SPA, Skerries Islands SPA, Rockabill SPA, Lambay Island SPA and Boyne Estuary SPA.

National sites

A total of eleven nationally designated sites, one NHA and ten pNHAs, have been identified as having connectivity to the onshore infrastructure of the proposed development, see Table 23.11. These include Skerries Island NHA, Malahide Estuary pNHA, Rogerstown Estuary pNHA, Knock Lake pNHA, Sluice River Marsh pNHA, Baldoyle Bay pNHA, North Dublin Bay pNHA, Laytown Dunes/Nanny Estuary pNHA, Portraine Shore pNHA, Ireland's Eye pNHA, South Dublin Bay pNHA.

Water quality impacts arising from surface water run-off and/or hydrogeological connectivity

National sites adjacent to the onshore infrastructure of the proposed development include Malahide Estuary pNHA and Rogerstown Estuary pNHA. National sites occurring within close proximity and downstream of the onshore infrastructure of the proposed development include Knock Lake pNHA, Sluice River Marsh pNHA and Baldoyle Bay pNHA. In the absence of mitigation, there is potential for indirect impacts to result in a likely significant effect on these nationally designated sites and their features of interest through construction phase impacts including water quality impacts, dust impacts and/or disturbance and displacement impacts to associated fauna. Downstream water quality impacts affecting these national sites could arise from watercourse crossings involving in-stream or near-stream works and the increase of suspended solids/pollutants in the surface water run-off. Such impacts may result in the degradation of habitats, cause adverse impacts to fauna if come into direct contact with suspended solids/pollutants, or may adversely impact habitat for which fauna (e.g. wintering waterbirds) rely on for roosting and/or feeding. In any of these cases downstream water quality impacts are likely to result in a minor effect due to the scale of works, prevailing best practice standards, and the dilution potential in watercourses, as described in the Water chapter. However, in the absence of mitigation, negative, temporary to short-term (i.e. during the period of suspended solids/pollutants in the surface water run-off), reversible likely significant effects are predicted at a local geographical scale on hydrologically connected national sites.

In addition, due to the close proximity of the onshore cable route to Malahide Estuary pNHA, there is, albeit limited, potential for hydrogeological connectivity and groundwater discharge to the pNHA. As groundwater flow is slow, the infiltration capacity of the soil will limit how much of an accidental spill can enter the ground. Groundwater contamination plumes develop over years of sustained release (e.g. from unlined landfills or brownfield sites). In this scenario, the only potential for effects is as a result of a significant accidental spill. However, contamination of the pNHA, as outlined above via surface waters travelling over-ground remains a risk. There are no other locations where hydrogeological connectivity has been identified.

Significance of effect: In the absence of mitigation, negative, temporary to short-term (i.e. during the period of suspended solids/pollutants in the surface water run-off), reversible likely significant effects arising from water quality impacts are predicted at a local geographical scale on hydrologically connected national sites, which include: Malahide Estuary pNHA, Rogerstown Estuary pNHA, Knock Lake pNHA, Sluice River Marsh pNHA and Baldoyle Bay pNHA.

Degradation of habitats arising from dust deposition

Typically, dust impacts are localised and dust deposition does not extend further than 100m from the source, however under dry and windy weather conditions dust can travel a significant distance and deposit on habitats a distance greater than 100m from the source. For those sites immediately adjacent to the onshore infrastructure of the proposed development, Malahide Estuary pNHA and Rogerstown Estuary pNHA, dust impacts may arise, however these are expected to be minor and temporary due to the small area of bare ground and storage of materials in any one location along the proposed onshore cable route. As such, in the absence of mitigation, negative, temporary, reversible likely significant effects are predicted at a local geographical scale on national sites immediately adjacent to the proposed development.

Significance of effect: In the absence of mitigation, negative, temporary, reversible likely significant effects arising from dust impacts are predicted at a local geographical scale on immediately adjacent national sites, which include: Malahide Estuary pNHA and Rogerstown Estuary pNHA.

Disturbance and displacement of fauna

See the above assessment under European sites. For the sites listed above, and for the remainder of the sites which are not hydrologically connected to, or are not immediately adjacent, to the onshore infrastructure of the proposed development, which include Skerries Island NHA, North Dublin Bay pNHA, Laytown Dunes/Nanny Estuary pNHA, Portraine Shore pNHA, Ireland's Eye pNHA and South Dublin Bay pNHA, disturbance and displacement impacts to associated fauna may arise. These impacts relate to wintering waterbirds that use inland, coastal or intertidal habitats outside of the national site and in close proximity to the onshore infrastructure of the proposed development. Disturbance and displacement impacts can arise from an increased presence of machinery, construction personnel, noise impacts, lighting impacts and the overall construction works. While it is not expected that disturbance impacts affecting wintering waterbirds will extend beyond a distance of c. 300m, as noise levels associated with general construction activities would attenuate close to background levels at that distance (Cutts *et al.*, 2009), waterbirds occurring within the 300m ZoI would potentially be displaced from the area during works. Numbers of wintering waterbirds occurred in numbers of up to national importance (i.e. in numbers greater than 1% of the national population) were golden plover, common scoter, light-bellied brent goose, great crested grebe, great northern diver and red-throated diver. Considering this, disturbance impacts arising from unmitigated noise impacts, visual disturbance or lighting impacts associated with the proposed development are expected to result in a negative, temporary to short-term (i.e. for the period of the construction activity), reversible likely significant effect at a local geographical scale.

Significance of effect: In the absence of mitigation, negative, temporary to short-term (i.e. for the period of the construction activity), reversible likely significant effects arising from disturbance and displacement impacts on fauna of national sites are predicted at a local geographical scale on national sites which include: Malahide Estuary pNHA, Rogerstown Estuary pNHA, Baldoyle Bay pNHA, Skerries Island NHA, North Dublin Bay pNHA, Laytown Dunes/Nanny Estuary pNHA, Portraine Shore pNHA, Ireland's Eye pNHA and South Dublin Bay pNHA.

23.5.2.2 Habitats

Of the approximately 33-35km onshore cable route, c. 29km of the route will occur within the existing hardstanding and infrastructure of public roads. 6km, and c. 17%, of the route occurs at the offline sections. As such the impact assessment for habitats addresses impacts on features identified as Important Ecological Features within the ten sections of the ecology study area, see Section 23.2.3 and Figures 23.1 to 23.4.

At these offline sections, the majority of habitats occurring within the onshore development area are arable fields and agricultural grassland which are habitats that have been evaluated as local (lower) ecological importance and therefore are not brought forward to the impact assessment stage. All arable and agricultural habitats that will be reinstated and current land uses will resume following the construction phase.

Habitats that have been identified as Important Ecological Features either for their species richness, semi-natural characteristics, and/or limited occurrence and distribution at a geographical scale, are listed below. The Fossitt classification for the habitat type is provided in brackets.

- Sedimentary Sea cliffs (CS3)
- Shingle and gravel banks (CB1)
- Embryonic dunes (CD1)
- Lowland depositing river (FW2)
- Drainage ditches (FW4)
- Wet grassland (GS4)/Marsh (GM1)
- Dry calcareous and neutral grassland (GS1)
- Dry meadows and grassy verges (GS2)
- Hedgerows (WL1) and
- Treelines (WL2)

Also see Chapter 12: Benthic and Intertidal Ecology for the impact assessment of habitats occurring in the offshore development area.

Sedimentary sea cliffs, shingle and gravel banks, and embryonic dunes

Coastal habitats, sedimentary sea cliffs, shingle and gravel banks, and embryonic dunes, are located along the coastline at the landfall site. The method of construction to bring the offshore export cables from offshore to onshore will be Horizontal Directional Drilling (HDD). This method will drill under the coastal habitats and avoid any direct impact. On the landward side, an HDD compound will facilitate the HDD rig. The HDD rig will be located no closer than 50m from the nearest point of either, shingle and gravel banks or embryonic dune habitat. As such, there will be no direct habitat loss of sedimentary sea cliffs, shingle and gravel banks, and embryonic dunes and no likely significant effects are predicted as a result of HDD activities.

Dust impacts have the potential to negatively affect habitats occurring in close proximity to, or adjacent to, any construction works, in particular, that involve vegetation removal and storage of materials. Dust impacts can cause degradation of habitat condition and effect long-term integrity of the habitat if impacts persist over time. While sedimentary sea cliffs, shingle and gravel banks, and embryonic dunes occur within 50m of the nearest works at the landfall site and have the potential to be exposed to effects arising from dust impacts, they are not located on the same ground level as the works. Sedimentary sea cliffs occur on a slope which descends towards the sea and away from the source of dust, and shingle and gravel banks, and embryonic dunes occur on the shoreline c. 4-6m below the landfall site. As such, these coastal habitats are shielded from dust impacts and therefore dust impacts are not considered to result in an impact of any discernible magnitude.

Significance of effect: There will be no likely significant effect at any geographical scale on sedimentary sea cliffs, shingle and gravel banks, and/or embryonic dunes as a result of the proposed development.

Lowland depositing rivers

In total there are 25 watercourse crossings along the onshore cable route. Each of these watercourses have been individually classified as lowland depositing rivers of different ecological values based on their overall condition, flow, vegetation and substrate. There are four watercourse crossing methods proposed which are in-road open cut, inline HDD, offline open cut and offline HDD. Watercourse crossings that will involve in-stream works include offline open-cut method which intersects the watercourse with an 11m wide working corridor. In-stream works would temporarily divert the water by pumping it overground, to create a dry works area for the open-cut and redirect the flow back into the stream channel downstream of the dry-works area. Creating a dry works area will result in temporary habitat loss, it can temporarily alter the watercourse substrate structure until natural process regain its previous condition and can cause habitat degradation downstream due to water quality impacts through siltation and the suspension of sediments on re-wetting.

Given the size and flow of the watercourses proposed to be crossed by the onshore cable route, the magnitude of downstream water quality impacts are not expected to result in a likely significant effect greater than at a local geographical scale.

Offline open-cut watercourse crossings that involve in-stream works have the potential to result in a negative, short to medium-term and reversible (i.e. until re-wetted areas have been reinstated and returned to as close to their original state as possible) likely significant effect at a local geographical scale.

Watercourse crossings that will not involve in-stream works and will avoid the watercourse include in-road open cut where the crossing is within the road infrastructure, and inline or offline HDD under the watercourse. Potential effects associated with near stream works will still apply for these crossing methods but the magnitude of the impact in these cases is considerably lower compared to in-stream works. With HDD activities there is a risk of frac-out in the watercourse bed which results in the return of drilling fluids to the surface during HDD and release of these fluids into the watercourse. However, it remains the most preferred method as it does not involve in-stream works. Watercourse crossings that do not involve in-stream works have the potential to result in a negative, temporary (i.e. from any small amounts of sediment entering the watercourse from near-stream works) likely significant effect at a local geographical scale.

Significance of effect: The onshore infrastructure of the proposed development will result in a negative, short to medium-term and reversible (i.e. until re-wetted areas have been reinstated and returned to as close to their original state as practicable) likely significant effect at a local geographical scale on lowland depositing rivers.

Each watercourse crossing is individually assessed in relation to aquatic and fisheries in Section 23.5.2.10, Table 23.19.

Drainage ditches

In total there are six drainage ditches measuring 1.31km in length occurring within the ecology study area of the proposed development. These are located at the landfall site, Blakes Cross South and at the existing Belcamp substation. Within the onshore development area, drainage ditches are associated with field boundaries and hedgerows and form ecological corridors for wildlife. The proposed development will result in temporary habitat loss of drainage ditches where the onshore cable route crosses these features at the landfall site and Blakes Cross South. The drainage ditch at the existing Belcamp substation will not be crossed or impacted. During construction, the working corridor of the cable route will be c. 11m wide where it crosses drainage ditches. Therefore, a maximum length of 55m of drainage ditch will be temporarily lost during construction. These areas will be reinstated as close to their original state as practicable once the onshore cable has been laid. When contextualising habitat loss as a result of the proposed development, the length of drainage ditch temporarily lost represents c. 4% of the total length of this linear habitat type that occurs within the onshore development area. The magnitude of such temporary habitat loss during construction and until such time as the habitat has been reinstated, will result in a negative effect, however it is not considered to be significant at any geographical scale. Given the size and flow of the drainage ditches to be crossed by the onshore cable route, the magnitude of downstream water quality impacts are not expected to result in an effect greater than at a very localised geographical scale.

Significance of effect: There will be no likely significant effect at any geographical scale on drainage ditches as a result of the proposed development.

Dry calcareous and neutral grassland, dry meadows and grassy verges and wet grassland/marsh

A total of 7.12ha of semi-natural grassland habitat comprising of dry calcareous and neutral grassland, dry meadows and grassy verges and/or wet grassland/marsh occurs within the ecology study area of the proposed development. Wet grassland/marsh is located at Blakes Cross South, and encompasses the riparian corridor at Wx12 Deanestown Stream. A small area of dry calcareous and neutral grassland is located at the M1 crossing. While areas of dry meadows and grassy verges are located around field margins at the landfall site and M1 crossing, within an unmanaged agricultural field at Blakes Cross South and Wx22 (Sluice Stream), and periphery areas at the existing Belcamp substation.

The onshore cable route will result in the loss of semi-natural grassland habitats that occur within the c. 18m wide working corridor and at temporary HDD and contractor compound locations. At Blakes Cross South, the Deanestown Stream including the riparian corridor and wet grassland/marsh habitat will be avoided using HDD, therefore no habitat loss will occur at this location.

Temporary habitat loss of semi-natural grasslands, dry calcareous and neutral grassland and dry meadows and grassy verges, will occur within the footprint of the onshore cable working corridor, however no significant areas of habitat will be lost in any one location. HDD compounds will be located in semi-natural grassland, however the construction compound at Blakes Cross South is located outside these habitats in an arable field. Considering habitats will be reinstated following the works to as near an original state as practicable, and the localised occurrences of these habitats within the onshore development area, any negative impact arising from the temporary loss of semi-natural grasslands, which will recolonise relatively quickly after reinstatement, is not considered to result in a likely significant effect at any geographical scale. Reinstatement methods for semi-natural grassland habitats are set out in the Habitat and Species Management Plan, see Appendix 23.10.

Significance of effect: There will be no likely significant effect at any geographical scale on dry calcareous and neutral grassland, dry meadows and grassy verges and wet grassland/marsh, as a result of the proposed development.

Hedgerows and treelines

- A total length of 6.86km of hedgerows and treelines occurs within the ecology study area of the proposed development. Hedgerows are present at each of the offline sections of the proposed development. Hedgerows, for the most part, were mature and established throughout the study area. Treelines occurred at the Blakes Cross North, Blakes Cross South, M1 crossing, Wx22 (Sluice Stream) and Belcamp substation.
- One hedgerow at the grid facility, totalling a length of c. 160m, will be removed to facilitate the onshore infrastructure and will result in permanent habitat loss at this location.
- A maximum of 20 hedgerows, three treelines and two areas of woodland will be intersected by the onshore cable route. The working corridor will be narrowed to 17m where intersecting hedgerows and treelines between the landfall site and grid facility, and narrowed to 11m at the remaining offline sections; and Wx10 (Aldrumman Stream), Wx13 (Ballyboughill Stream), Blakes Cross North, Blakes Cross South, M1 crossing, Wx22 (Sluice Stream) and the existing Belcamp substation.
- Each hedgerow or treeline proposed to be crossed by the cable route will be intersected by the cable route in one location only. Habitat loss of a single 17m to 11m gap in a hedgerow or treeline will fragment the linear feature and will result in habitat loss. However, the function of the feature as an ecological corridor is expected to continue, this, in part, is due to the wider structure and function of the hedgerow network in the surrounding agricultural landscape. While a proportion of these gaps will be replanted and reinstated following the cable route works, there will be an 8m exclusion zone where typical woody hedgerow or treeline species cannot be replanted. Instead, only shallow rooted plants, such as dog rose *Rosa canina*, grasses and crops can be planted. Due to the age and maturity of the hedgerows and treelines removed, like for like cannot be replanted and while some level of reinstatement of hedgerows and treelines will occur, reinstatement to their original condition at these locations is not practicable.
- The permanent loss of hedgerows and treelines, as outline above and which cannot be reinstated to their original habitat condition, is considered to result in a likely significant effect at a local geographical scale.

Dust impacts have the potential to negatively affect habitats occurring adjacent to any construction works and where access tracks are sited in close proximity to hedgerows and treelines. In these cases, dust impacts can cause degradation of habitat condition and effect long-term integrity of the habitat if impacts persist over time. However, given the relatively small area of bare ground that will be present from vegetation removal and small volume of stored material in any one location along the onshore cable route, dust impacts are not expected to occur at any magnitude that would cause habitat degradation and result in a likely significant effect at any geographical scale. This conclusion is supported by the assessment of dust impacts on ecologically sensitive areas provided in the Air Chapter.

Significance of effect: As a result of permanent habitat loss, the onshore infrastructure of the proposed development will result in a negative, permanent likely significant effect at a local geographical scale on hedgerows and treelines. Additionally, see significance of effect statement for terrestrial non-native invasive species below in Section 23.5.2.4.

Terrestrial Non-native Invasive Species

Himalayan balsam is the only Third Schedule non-native invasive species recorded close to but not within the onshore development area. One location is c. 167m north of the onshore development area at the landfall site, and the second location is at Blakes Cross North c. 47m east of the onshore development area and east of the R132. No works will occur that could lead to the spread of Himalayan balsam as it does not occur within the onshore development area.

Medium and high impact invasive species^{53,54} (NBDC) such as sycamore *Acer pseudoplatanus* or cherry laurel *Prunus laurocerasus* are common in hedgerows throughout the onshore development area. If not disposed of correctly, accidental dispersal of these species during the removal of vegetation has the potential to disperse and spread their distribution within the onshore development area and immediate surrounding area. Treatment methods and appropriate measures to remove medium and high impact invasive species are set out in the Habitat and Species Management Plan, see Appendix 23.10.

Significance of effect: There is potential for a negative, long-term, likely significant effect at a local geographical scale if medium and high impact invasive species were to disperse and spread as a result of the proposed development. This likely significant effect would impact hedgerows where medium and high impact invasive species occur.

23.5.2.3 Annex I Habitats

Viable examples of the Annex I habitats vegetated sea cliffs of the Atlantic and Baltic coasts (1230), perennial vegetation of stony banks (1220) and embryonic shifting dunes (2210) occur at the landfall site. As detailed above, the method of construction at the landfall to bring the offshore export cables from offshore to onshore will be Horizontal Directional Drilling (HDD). This method will drill under the coastal habitats and avoid any direct impact. On the landward side, an HDD compound will facilitate the HDD rig. The HDD rig will be located no closer than 50m to the nearest point of an Annex I habitat. The habitat perennial vegetation of stony banks is characterised by the highly unstable nature of its location. Prone to natural changes caused by high water and storms this habitat type is quickly recolonised and short-term impacts on fractions of the habitat are of no long-term significance. Where drainage is altered in the vicinity of soft sea cliffs, this has the potential to impact on the integrity of the soft cliff habitat by furthering seepage erosion, drying out flushes on soft cliffs and impacting on the habitats of several species of solitary bees and wasps as well as aquatic invertebrates which inhabit seepage areas of soft cliffs.

Changes to the management regime can furthermore lead to the introduction of fertiliser and pesticides into the soft cliff habitat through seepage areas impacting on species composition. The proposed development will not alter the land management at the landfall site. The 50m setback ensures there is no direct or indirect impact on the seepage zone of vegetated sea cliffs which are integral to the habitat. For reasons outlined above, there will be no likely significant effect, either directly or indirectly, on Annex I habitats at any geographical scale as a result of the proposed development.

Significance of effect: There will be no likely significant effect at any geographical scale on Annex I habitats, Atlantic and Baltic coasts (1230), perennial vegetation of stony banks (1220) and embryonic shifting dunes (2210) as a result of the proposed development.

Also see Volume 3, Chapter 12: Benthic and Intertidal Ecology for the impact assessment of Annex I habitats occurring in the offshore development area.

⁵³ National Biodiversity Data Centre (NBDC) Risk of Medium Impact invasive species in Ireland. Available at: https://invasives.ie/app/uploads/2022/01/Invasives_taggedMediumImpact_2013RA-2.pdf [last accessed March 2024]

⁵⁴ National Biodiversity Data Centre (NBDC) Risk of High Impact invasive species in Ireland. Available at: https://invasives.ie/app/uploads/2022/01/Invasives_taggedlist_HighImpact_2013RA-1.pdf [last accessed March 2024]

23.5.2.4 *Terrestrial Mammals*

Badger

Two badger setts were identified during surveys within the onshore ecological study area, however they both occur outside the onshore development area. The nearest identified badger sett is located at Blakes Cross South, over 50m from the onshore development area. This sett is believed to be a main sett as multiple entrances were identified, and could potentially be used as a breeding sett. As set out by NRA (2006a) guidelines, to avoid disturbance during the breeding season (December to June) works should not occur within 50m of an active sett, and no blasting or pile driving should occur within 150m of an active sett. In relation to the proposed development, works will not occur within 50m of the sett and no piling or blasting is proposed within 150m of the sett. A second sett was located near the existing Belcamp substation, over 150m from the onshore development area. As such, impacts to badger arising from the proposed development will not extend to the sett location (NRA, 2006a). Given the distance of both setts from the onshore development area, and that no piling or blasting will occur within 150m of either sett (NRA, 2006a), badgers will not be subject to temporary disturbance at sett locations during the construction phase of the onshore infrastructure of the proposed development, and therefore no likely significant effects are predicted.

Suitable foraging habitat for badger will be temporarily lost resulting from the onshore cable route working corridor and temporary compounds during the construction phase. Given that grassland habitats will be reinstated following construction and considering the substantial foraging habitat available to badger across the onshore cable route, any minimal temporary loss of foraging resource is not considered to result in a likely significant effect on badger.

Temporary artificial lighting at construction compounds may also alter badger behaviour at these locations. Across the onshore cable route there is substantial foraging and commuting habitat available to badger, as such no likely significant effects are predicted arising from artificial lighting impacts on badger at any geographical scale.

Significance of effect: There will be no likely significant effect at any geographical scale on badger as a result of the proposed development.

Small mammals

Habitat suitability for small mammals, pygmy shrew, hedgehog, and Irish hare, is present throughout the onshore development area. Temporary vegetation removal of these habitats is likely to result in a temporary impact, however, this is not predicted to be significant at any geographical scale given the suitable surrounding habitat that will accommodate any displaced individuals during the period of works.

Significance of effect: There will be no likely significant effect at any geographical scale on small mammals as a result of the proposed development.

23.5.2.5 *Otter*

Although otter signs were not recorded during surveys, they are likely to use watercourses and, possibly, the coastal area at the landfall site within the onshore development area, for commuting and foraging. Typically, otter do not forage greater than 80m from the coastline (Reid *et al.*, 2013). Otters can travel over large distances, in Ireland along freshwater river systems, female territories have been found to be 7.5 ± 1.5 km in length, while male territories have been found to be 13.2 ± 5.3 km in length (Reid *et al.*, 2013), with the average distribution range for otter considered to be 10km (NRA, 2008). Temporary in-stream works and dry working areas at watercourse crossings may affect prey availability and movement of otter. While there is ample suitable habitat for otter in the wider area, and any dry working area will be c. 11m in width, water quality impacts or an accidental pollution event arising from the onshore infrastructure of the proposed development at any of the 25 watercourse crossings or the coastal area at the landfall site could result in a likely significant effect on otter at a local geographic scale.

Artificial lighting and noise impacts at the landfall area to accommodate 24 hour working, including near-shore works at the HDD exit in the sub-tidal area, and at watercourse crossings, could affect behaviour of crepuscular species such as otter using the adjacent coastal and intertidal area. In the absence of mitigation measures disturbance and displacement effects are expected to result in a significant effect on otter at a local geographic scale.

Significance of effect: The onshore and offshore infrastructure of the proposed development could result in a negative, temporary to short-term (i.e. during the construction phase) and reversible (i.e. until re-wetted areas have been reinstated and prey availability returns) likely significant effect at a local geographical scale on foraging and commuting otter.

23.5.2.6 *Amphibian and Reptiles*

The onshore infrastructure of the proposed development will result in the loss of potentially suitable breeding habitat for common frog and smooth newt which occur in drainage ditches, watercourses that are choked with vegetation and have little flow, and riparian habitat along the fringes of watercourses.

Depending on the timing of works in suitable wetland habitats (i.e. if occurring within the breeding season for common frog and/or smooth newt), and even when considering the extent of suitable breeding and resting habitats for amphibians outside the onshore development area, the temporary loss of these habitats which will be reinstated post-construction is expected to result in a negative, temporary to short-term, and reversible likely significant effect on the local population of breeding common frog and smooth newt. An accidental pollution event during construction, of a sufficient magnitude, has the potential to affect water quality in downstream wetland habitats. Such an event is expected to affect downstream habitats and the local amphibian populations they support, therefore in this case there is potential to result in a likely significant effect at the local geographic scale.

Significance of effect: Temporary habitat loss of suitable breeding and resting habitat for amphibians and reptiles, which will be reinstated post-construction, is expected to result in a negative, temporary to short-term, and reversible likely significant effect on the local population of breeding common frog, smooth newt and/or common lizard. In the event of an accidental pollution event, the onshore infrastructure of the proposed development could result in a negative, temporary to short-term (i.e. during a spill event) and reversible likely significant effect at a local geographical scale on common frog and smooth newt.

Similarly, grassland habitat suitable for breeding common lizard that occurs within the onshore development area, will be temporarily lost during construction. Temporary vegetation removal of grassland habitats is likely to result in a temporary impact, however, this is not predicted to be significant at any geographical scale given the suitable surrounding habitat that will accommodate any displaced individuals during the period of works.

Significance of effect: There will be no likely significant effect at any geographical scale on reptiles as a result of the proposed development.

23.5.2.7 *Bats*

For roosting bats, the onshore infrastructure of the proposed development will result in the loss of trees that have been assessed as low to high suitability for roosting bats. No tree roosts were confirmed during surveys. While there were 43 potential roost feature (PRF) trees identified within, or in close proximity to, the onshore development area, not all of these will be removed to facilitate the cable route, i.e. if they are contained within the periphery treeline or hedgerow which the onshore development area overlaps with and will clearly not be removed. It is estimated that a maximum of c. 18 PRF trees assessed as low suitability and two PRF trees assessed as moderate suitability may be removed. Reinstatement of removed trees will not result in like for like features as shallow rooted planting either side of the onshore cable route will replace PRF trees which will not provide the same resource or features for roosting bats. Across the approximately 33-35km onshore cable route, a loss of this number of PRFs, and potential bat roosts, is considered to be a likely significant effect at a local geographical scale.

There is an abundance of moderate to good quality foraging and commuting habitat for bats throughout the onshore development area, which was confirmed by bat activity surveys, both transects and static detector results. The onshore development area will intersect a maximum of 20 hedgerows, three treelines, and two areas of woodland to facilitate the onshore cable route and onshore infrastructure. Any areas of hedgerow or treeline habitat loss will be reinstated with shallow rooted planting on either side of the onshore cable route, which is expected to maintain connectivity of these linear features for use by bats. However, for the duration of works and until such time as replacement vegetation has become established, temporary habitat loss affecting the abundance and diversity of bat prey items and connectivity of these linear features, is expected to result in a temporary significant impact on the local foraging and commuting population of bats.

Furthermore, these impacts will be greater during the spring and summer period, when it is likely that both commuting and foraging bats will be directly impacted. These seasons are crucial for bats as they rely heavily on their habitats for commuting, feeding and breeding.

As noted in the impact assessment for hedgerows and treelines, the function of these ecological corridors will continue, in part, due to the wider structure and function of the hedgerow network in the surrounding agricultural landscape. When considering the available surrounding suitable habitat for bats in the wider landscape, and that a proportion of the 11m gap where the route intersects hedgerows and treelines will be replanted, albeit not like for like, the temporary habitat loss of hedgerows and treelines is not expected to result in a likely significant effect on foraging and commuting bats at any geographical scale.

There will be temporary contractor compounds at three locations within the onshore development area. One substation contractor compound will be located at the grid facility, two cable contractor compounds will be located at the landfall site and another located at Blakes Cross South. Artificial lighting at contractor compounds could cause disturbance to bats utilising adjacent habitats, altering their behaviour and use of the area. Suitable foraging and commuting habitat, and/or PRF trees have been identified at these locations. In addition, artificial lighting associated with the 24-hour works at the landfall has the potential to alter bat behaviour utilising habitats at the landfall site. Additionally, the population of bats occurring above the HWM, and assessed in this section, are susceptible to interaction with the near-shore works at the HDD exit in the sub-tidal area. At this location, 24-hour artificial lighting and could alter their behaviour by attracting them offshore to investigate feeding opportunities at the HDD exit pit and has the potential to alter bat behaviour along this coastal stretch. Artificial lighting of a sufficient magnitude is predicted to result in a temporary, likely significant effect at a local geographical scale.

Offshore bats, which are considered to be migratory bats, island populations and bats foraging offshore within the offshore development area, are assessed in Volume 5, Chapter 35: Offshore Bats. Offshore bats are assessed as such in the Offshore Bats chapter.

Significance of effect: The onshore and offshore infrastructure of the proposed development could result in a negative, permanent (i.e. due to the loss of PRF trees) likely significant effect at a local geographical scale on roosting bats, and a temporary (i.e. during construction from artificial lighting) and reversible (i.e. following the completion of construction) likely significant effect at a local geographical scale on foraging and commuting bats.

Also see Volume 5, Chapter 35: Offshore Bats for the impact assessment of bats occurring in the offshore development area.

23.5.2.8 Breeding Birds

All wild bird species are protected under the Wildlife Acts 1976-2012, and it is an offence to disturb birds while on their nests, or to wilfully take, remove, destroy, injure, or mutilate their eggs or nests. In the absence of adoption of protocols for the protection of birds and their nests, there is potential for direct impacts on nesting birds and/or mortality of birds arising from the clearance of vegetation within the onshore development area.

Vegetation removal required to facilitate the construction of the onshore infrastructure of the proposed development will result in the loss of suitable breeding bird habitat including grassland, hedgerows, treelines, and scrub habitat which supports the existing breeding bird population within the onshore development area.

In most cases, the proposed development will temporarily remove a c. 11 to 18m wide corridor for the onshore cable to be laid. Additional areas of temporary suitable breeding habitat will be lost at the contractor compounds, and permanent habitat loss of hedgerow and marginal grassland habitat will be removed to facilitate the grid facility.

Temporary vegetation removal of such habitats will result in the displacement of birds and loss of feeding and nesting habitats. However, ample suitable adjacent habitat in the wider area will accommodate displaced birds from the working area during construction. In addition to vegetation removal, there will be temporary disturbance to breeding birds during the construction phase as a consequence of increased noise and human activity within the zone of influence of the proposed development. This disturbance is expected to result in localised temporary displacement of breeding birds occurring within this zone.

These impacts, with the exception of the permanent habitat loss at the grid facility, resulting in temporary displacement may result in potential reduction in the breeding success of the local bird population over one season, however this impact is not considered to result in a long-term likely significant effect at a population level or at any geographical scale.

The majority of birds recorded within the onshore development area were Green-listed species and are not considered to be of conservation concern in Ireland. Thirteen Amber-listed species are considered to breed in habitats that occur within the onshore development area and include kingfisher, goldcrest, greenfinch, house martin, house sparrow, linnet, skylark, starling, swallow, tree sparrow, willow warbler, mallard and shelduck. Two Red-listed species breed within the onshore development area and are meadow pipit and yellowhammer. Both are ground nesting birds. Meadow pipit typically nest in open habitats such as rough or unimproved grassland, salt marsh, dune habitats, bogs, and heath, and were recorded at the landfall site, grid facility, water crossings Wx09 (Oberstown Stream) and Wx10 (Aldrumman Stream) and Belcamp substation. Yellowhammer nest in marginal vegetation adjacent to hedgerows, scrub or drainage ditches, and are typically found in mosaics of arable farmland and established hedgerows, and were recorded at the landfall site, grid facility and Blakes Cross North. Both species will experience temporary to medium-term habitat loss within the onshore development area, along the route, at the landfall site, at contractor and HDD compound locations, and where access tracks will be instated and permanent habitat loss at the proposed grid facility location. Impacts on breeding birds as a result of habitat loss and disturbance during the construction phase are predicted to result in a temporary to medium-term likely significant effect at a local geographical scale. However, as for other breeding bird species, there is an abundance of suitable nesting habitat within the surrounding area which will accommodate displaced birds. Considering widespread habitat retention across the onshore development area for breeding birds and habitat reinstatement post-construction, long-term reduction in breeding success is not expected to prevail or result from any temporary significant effects.

Significance of effect: The onshore infrastructure of the proposed development will result in a negative, temporary (i.e. disturbance experienced during the construction phase) to medium-term (i.e. until habitats have been reinstated and returned to as close to their original state as practicable), reversible likely significant effect at a local geographical scale on Red-listed yellowhammer and meadow pipit. For all other breeding birds, the onshore infrastructure of the proposed development will result in a negative, temporary (i.e. disturbance experienced during the construction phase) and reversible (i.e. on completion of disturbance) likely significant effect at a local geographical scale.

23.5.2.9 Wintering Waterbirds

Construction activities associated with the onshore infrastructure of the proposed development have the potential to result in visual and auditory disturbance impacts on birds occurring adjacent the onshore development area at the landfall site, grid facility and Malahide Estuary, resulting from an increased presence of machinery and construction personnel, noise impacts, lighting impacts, vegetation clearance and the overall construction works. The nearest proposed onshore construction works to these sensitive receptors for wintering waterbirds are works at the landfall site adjacent to coastline habitat on the landward side and in the intertidal zone where the offshore cable route comes onshore, and inline works along the Estuary Road at Malahide Estuary.

As described in the Onshore Construction Chapter, it is expected that construction works at the landfall site will take approximately 10 months to complete. The actual offshore export cable landfall HDD drilling and duct pull-back will take up to eight weeks per HDD - working 24 hours a day - for each cable circuit. The railway HDD drilling and duct pull-back will take up to three weeks for each cable, working 24 hours a day for each circuit. These activities may take place consecutively or in parallel at certain times to accelerate the works programme. Along the onshore cable route and onshore infrastructure, construction works that are likely to result in the greatest disturbance impacts arising from noise include HDD works, hydraulic and rock-breaker machinery, dump trucks tipping fill and vegetation clearance machinery such as chainsaws. These works are not restricted to any one section of the onshore development area.

Areas of temporary habitat loss suitable for wintering waterbirds, i.e. arable or agricultural grassland fields, will occur within the footprint of the HDD compounds and the cable route at the landfall site. These habitats will be reinstated on completion of the works and agricultural land uses resumed. An area of permanent habitat loss of arable fields suitable for wintering waterbirds will occur to accommodate the grid facility.

Arable fields east of the Dublin-Belfast railway line were recorded to hold wintering waterbirds such as gull species (peak count of 80 herring gull), lapwing (peak count of 60 recorded which is equivalent to 0.007% of the national wintering population), curlew (peak count of 91 recorded, equivalent to 0.026% of the national wintering population) and golden plover (peak count of 58 recorded, equivalent to 0.006% of the national wintering population), and in numbers which represent significantly lower than 1% of the national population. The arable fields west of the Dublin-Belfast railway line were not identified as an important area for wintering waterbirds during surveys. Given these numbers, low usage by wintering waterbirds and similar surrounding habitat, temporary and permanent habitat loss at the landfall site and gird facility is not expected to result in a likely significant effect at any geographical scale.

Significance of effect: There will be no likely significant effect at any geographical scale on wintering birds arising from habitat loss as a result of the onshore infrastructure of the proposed development.

It is expected that birds will be exposed to visible and audible disturbances arising from the construction works at the landfall site and at Malahide Estuary. While it is not expected that disturbance impacts affecting wintering waterbirds will extend beyond a distance of c. 300m, as noise levels associated with general construction activities would attenuate close to background levels at that distance (Cutts *et al.*, 2009), waterbirds occurring within the 300m ZoI would potentially be displaced from the area during works. Wintering waterbirds that occurred in numbers of up to national importance at the landfall site and/or Malahide Estuary (i.e. in numbers greater than 1% of the national population) were golden plover, light-bellied brent goose and great crested grebe.

Wintering waterbirds in Dublin Bay have been shown to coexist alongside high levels of human activity and appear to tolerate pedestrians or recreational users along paths and only show disturbance when people deviated from these routes (Phelan & Nairn, 2007). This observation may indicate a level of tolerance to low level activity in areas of current human activity. However, construction phase, temporary and short-term disturbance impacts and lighting impacts may have knock-on effects on feeding time and efficiency, and energy expenditure rates which could cumulatively result in longer term impacts on affected winter birds (Platteeuw and Henkens, 1997).

The landfall site is north of the Balbriggan urban centre, and the coastline is frequented by pedestrians. Nevertheless, it is possible that birds may initially be disturbed by the works within their line-of sight and are expected to be temporarily displaced during periods of the most disturbing and intrusive construction activity. 24 hour working at the landfall site will result in lighting impacts which may cause disturbance to roosting birds using the adjacent coastline habitats. At Malahide Estuary, the inline construction works will be adjacent to the estuary within the busy Estuary Road and will be separated from the estuary by a grass strip c. 20-50m wide, which also serves as a regularly used public footpath. Considering this, it is expected that the disturbance events will be limited to the noisiest and most visible operations (such as cutting and breaking of tarmac). It is likely that road closures will be in place along the Estuary Road to facilitate the scheduling of works which will lower the existing baseline noise levels, to which the wintering waterbirds using the estuary and surrounding habitats are habituated. Wintering waterbirds associated with Malahide Estuary regularly use amenity grassland and arable field habitats south of the Estuary Road.

Noise impacts are likely to be periodic and irregular over the construction period. A study investigating the effects of piling noise on estuary birds found that irregular piling noise (above 70dB) had a high to moderate effect on birds, regular piling noise (below 70dB) and irregular noise (50-70dB) had a moderate affect, regular noise (50-70dB) moderate to low affect, and noise below 50dB low affect. The study also suggested that birds were seen to accept to wide range of steady state noise levels from between 55dB(A) to 85dB(A) in some cases (Cutts *et al.*, 2009). At the landfall site, the unmitigated noise level associated with the HDD compounds is 72dBLAeq at a distance of 20m from the compound perimeter (see Noise Chapter). For birds located on the beach or on the shoreline, that is, locations where the cliffs along the shoreline block line of sight to the HDD compounds, the cliff would act as a natural noise and visual barrier. In the absence of mitigation and considering the importance of wintering waterbirds occurring at the landfall site and Malahide Estuary, disturbance impacts arising from unmitigated noise impacts, visual disturbance or lighting impacts associated with the onshore development area are expected to result in a negative, temporary to short-term (i.e. for the period of the construction activity), reversible likely significant effect at a local geographical scale.

No longer-term impacts arising from unnecessary energy expenditure are predicted at the landfall site due to the relatively limited scale of works at this location and availability of alternative feeding and roosting habitat nearby. For wintering birds using the Malahide Estuary, no longer-term impacts are predicted as disturbance impacts at this location are considered to be lower due to the existing baseline level of disturbance.

Additionally, wintering waterbirds occurring at the landfall site have potential to interact with near-shore works at the HDD exit pit in the sub-tidal area which would extend to a point at a suitable distance offshore, usually several hundred metres considering geological features, water depths, mechanical properties of cables and ducts. At HDD exit pit, 24-hour working could result in a disturbance and displacement effect as a result of artificial lighting, noise impacts and the presence of construction vessels and machinery. Given the knowledge that it is not expected that disturbance impacts affecting wintering waterbirds will extend beyond a distance of *c.* 300m (Cutts *et al.*, 2009), and that the HDD exit pit will be located several hundred metres offshore, it is therefore only seabirds occurring offshore that could be impacted by the near-shore works. At the landfall site, the following offshore seabirds were recorded in numbers greater than 1% of the national population and included common scoter, great crested grebe, great northern diver and red-throated diver, with cormorant recorded in numbers of 0.95% of the national population. It is likely that these seabirds, and seabirds occurring in lower numbers offshore, could experience a temporary disturbance and displacement effect during near-shore works located in the sub-tidal area. While birds have been recorded at nationally important numbers in the vicinity of the HDD exit pit, the localised nature of the works and scale of the exit pit footprint relative to the marine environment, in the absence of mitigation, disturbance impacts arising from unmitigated noise impacts, visual disturbance or lighting impacts associated with the near-shore works of the offshore development area are expected to result in a negative, temporary to short-term (i.e. for the period of the construction activity), reversible likely significant effect at a local geographical scale.

Construction related impacts also extend to surface water run-off which could carry hydrocarbons and other contaminants, and bentonite release from the HDD process, and have potential to cause adverse impacts if come into direct contact with wintering waterbirds or may adversely impact habitat on which they rely on for roosting and/or feeding. Given the scale of the works, the likelihood and limited extent of any impact, such water quality impacts are predicted to result in a temporary and short-term (i.e. for the period of the construction activity) likely significant effect at a local geographical scale.

Significance of effect: Disturbance and displacement impacts arising from unmitigated noise impacts, visual disturbance or lighting impacts associated with the onshore and offshore infrastructure of the proposed development are expected to result in a negative, temporary to short-term (i.e. for the period of the construction activity), reversible likely significant effect at a local geographical scale.

Also see Chapter 15: Offshore Ornithology for the impact assessment of birds occurring in the offshore and intertidal environment.

23.5.2.10 Aquatic and Fisheries

In total 25 watercourses will be crossed with the installation of the onshore cable route. There are four watercourse crossing methods proposed which include in-road open cut, inline HDD, offline open cut and offline HDD. Watercourse crossings that will involve in-stream works include offline open-cut method which intersects the watercourse with an 11m wide working corridor. In-stream works would temporarily divert the water by pumping it overground, to create a dry works area for the open-cut and redirect the flow back into the stream channel downstream of the dry-works area. Creating a dry works area will result in temporary habitat loss for fish and aquatic species, it can temporarily alter the watercourse substrate structure until natural process regain its previous condition, and on re-wetting the dry works area can result in downstream water quality impacts from the suspension of siltation and sediments. In-stream works can also result in habitat degradation downstream aquatic habitats such as estuarine habitat due to water quality impacts through siltation, sediments, and/or pollutants. There is potential for eight of the watercourse crossings to involve instream works.

Watercourse crossings that will not involve in-stream works and will avoid the watercourse include in-road open cut where the crossing is within the road infrastructure, and inline or offline HDD under the watercourse.

Potential effects associated with near stream works will still apply for these crossing methods, and include potential water quality impacts from siltation, sediments and/or a pollution event, and can lead to downstream degradation of suitable fish habitat, however the magnitude of the impact in these cases is considerably lower compared to in-stream works. With HDD activities there is a risk of frac-out in the watercourse bed which results in the return of drilling fluids to the surface during HDD and release of these fluids into the watercourse. However, it remains the most preferred method as it does not involve in-stream works. Seventeen of the watercourse crossings will not involve in-stream works and will avoid direct impacts on watercourses either by staying within the road infrastructure, or by HDD under the watercourse within the alignment of the road or outside the alignment of the road in an offline section of the onshore cable route.

Table 23.19 below presents the predicted significance of effect for each watercourse crossing arising from the proposed watercourse crossing scenarios.

Table 23.19 Significance statement for aquatics and fisheries at each watercourse crossing within the onshore development area.

| Water Crossing number | Stream Name / WFD Name | Crossing method | Significance of effect ⁵⁵ |
|-----------------------|---|---|--|
| Wx01 | Bremore Stream / Matt_010 | In-road Open Cut Trench | Negative, temporary likely significant effect at a local geographical scale. |
| Wx02 | Bracken (Matt) River / Matt_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx03 | Knock Stream / Matt_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx04 | Balrothery Stream / Matt_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx05 | Balrickard Stream / Matt_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx06 | Rowans Big Stream | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx07 | Rowans Little Stream | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx08 | Courtough Stream / Ballough Stream_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx09 | Obserstown Stream / Ballough Stream_010 | Inline HDD In-road Open Cut Trench | Negative, temporary likely significant effect at a local geographical scale. |
| Wx10 | Aldruman Stream / Ballough Stream_010 | In-road Open Cut Trench Inline HDD Offline Open Cut Trench | Negative, short to medium-term and reversible likely significant effect at a local geographical scale due to the lack of fish suitability. |
| Wx11 | Ballough Stream / Ballough Stream_020 | Offline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx12 | Deanestown Stream / Ballyboghil_010 | Inline HDD (Combined with Wx13) Offline HDD (Combined with Wx13) | Negative, short to medium-term and reversible likely significant effect at a local geographical scale. |

⁵⁵ Where there are watercourse crossing options, the significance of effect is based on the crossing method which would result in the greatest potential impacts and significance of effect.

| Water Crossing number | Stream Name / WFD Name | Crossing method | Significance of effect ⁵⁵ |
|-----------------------|--------------------------------------|--|---|
| Wx13 | Ballyboghil Stream / Ballyboghil_010 | Inline HDD (Combined with Wx12) Offline HDD (Combined with Wx12) Offline Open Cut Trench | Negative, short to medium-term and reversible likely significant effect at a Regional/County geographical scale due to fish suitability and the presence of Rogerstown Estuary SAC adjacent to the onshore development area at this location. |
| Wx14 | Turvey Stream / Turvey_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx15 | Staffordstown Stream / Turvey_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx16 | Broadmeadow River / Broadmeadow_040 | In-road Open Cut Trench Inline HDD (Combined with Wx17) | Negative, temporary likely significant effect at a local geographical scale. |
| Wx17 | Ward River / Ward_040 | In-road Open Cut Trench Inline HDD (Combined with Wx16) | Negative, temporary likely significant effect at a local geographical scale. |
| Wx18 | Seapoint Stream / Gaybrook_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx19 | Greenfields Stream / Gaybrook_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx20 | Gaybrook Stream / Gaybrook_010 | In-Road open Cut Trench Inline HDD Offline Open Cut Trench | Negative, short to medium-term and reversible likely significant effect at a local geographical scale due to the lack of fish suitability. |
| Wx21 | Hazlebrook Stream / Sluice_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx22 | Sluice Stream / Sluice_010 | In-road Open Cut Trench Offline Open Cut Trench Offline HDD | Negative, short to medium-term and reversible likely significant effect at a County/regional geographical scale due to the presence of fish suitability. |
| Wx23A | Cuckoo Stream / Mayne_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx23B | Cuckoo Stream / Mayne_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx23C | Cuckoo Stream / Mayne_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx24A | Mayne Stream A / Mayne_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx24B | Mayne Stream A / Mayne_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx24C | Mayne Stream A / Mayne_010 | In-road Open Cut Trench Inline HDD | Negative, temporary likely significant effect at a local geographical scale. |
| Wx25 | Mayne Stream B / Mayne_010 | Offline Open-Cut In-Road Open Cut trench | Negative, short to medium-term and reversible likely significant effect at a local geographical scale due to the presence of European eel. |

There is no potential for interaction between effects arising from the onshore infrastructure of the proposed development, in the form of downstream water quality impacts, having an effect on fish and shellfish ecology in the offshore development area. Volume 3, Chapter 13: Fish and Shellfish Ecology presents the impact assessment of fisheries and shellfish occurring in the offshore development area.

23.5.3 Operational Phase

The grid facility and Belcamp substation will be unmanned and operated remotely. It is expected that one or two vehicles may attend each substation every four weeks for an inspection. Each inspection will be approximately four hours and will occur within normal working hours, however it may be necessary for maintenance personnel to access the site on an ad-hoc basis if required, for example in the event of an electrical fault or outage. Additional annual maintenance will be required throughout the operational phase of the proposed development.

Operational maintenance of the onshore cable route and infrastructure will comprise an inspection, typically once every year, by means of the link box and communication chambers located at the TJBs.

Maintenance/repairs of cables will be required on an ad-hoc basis in the event of a cable fault occurring. In the event of a fault, the cable will be pulled and replaced via the joint bay. While there will be an increased presence of machinery and personnel, operational maintenance works will not cause intrusive works or involve any excavation. In addition, emergency repair works may be required at any time and would involve a similar process and include artificial lighting if emergency works occur at night.

A description of the onshore and offshore infrastructure of the proposed development is provided in the Onshore Description Chapter, and construction activities are described in the Onshore Construction Chapter.

Operational phase impacts that are expected to result in potentially significant effects on terrestrial Important Ecological Features, as listed in Section 23.3.4, include the following:

- Disturbance and displacement of fauna during maintenance works and
- Lighting impacts at the grid facility

23.5.3.1 Designated Sites

European sites

- Disturbance impacts to fauna, including wintering birds, during the operational phase may arise during the maintenance works, as detailed above. These works will occur at TJBs, i.e. manhole locations, which are located at the landfall site and along the Estuary Road. Any disturbance or displacement impacts arising from maintenance works will be localised to the transition joint bay locations. At the landfall site, the coastal sea cliff will protect SCIs using the coastal and seaward habitats at the landfall site from exposure to disturbance impacts. SCIs using adjacent arable fields during maintenance works would be disturbed and displaced however, the works will be highly localised and not intrusive and are not predicted to result in any likely significant effect at any perceptible geographical scale. Maintenance works along the Estuary Road will occur within the road network and will not cause disturbance or displacement to SCIs using the Malahide Estuary.
- At the grid facility, operational lighting will be switched off during the hours of darkness with the exception for emergency repairs to outdoor equipment. Motion sensor technology will be implemented to control lighting at access doors and security gates within the grid facility. No important areas for SCIs associated with European sites were identified at the grid facility or which could be impacted by operational lighting at the grid facility.
- Significance of effect: There will be no likely significant effect at any geographical scale on European sites and their SCIs (i.e. wintering birds) arising from the operation of the onshore infrastructure of the proposed development.

The assessment of European sites in relation to the offshore development area is considered in relevant chapters in Volume 3, Chapter 12: Benthic and Intertidal Ecology, Chapter 13: Fish and Shellfish Ecology, Chapter 14: Marine Mammal and Megafauna Ecology, and Chapter 15: Offshore Ornithology. Also see the proposed development Natura Impact Statement.

National sites

- As above for European sites, disturbance impacts to fauna, including wintering birds, during the operational phase may arise during the maintenance works, as detailed above. These works will occur at TJBs, i.e. manhole locations, which are located at the landfall site and along the Estuary Road. Any disturbance or displacement impacts arising from maintenance works will be localised to the transition joint bay locations and will not involve any intrusive or loud works where noise impacts would arise. At the landfall site, the coastal sea cliff will protect wintering waterbirds using the coastal and seaward habitats at the landfall site from exposure to disturbance impacts. Birds using adjacent arable fields during maintenance works would be disturbed and displaced however, the works will be highly localised and not intrusive and are not predicted to result in any likely significant effect at any perceptible geographical scale. Maintenance works along the Estuary Road will occur within the road network and will not cause disturbance or displacement to wintering waterbirds using the Malahide Estuary.
- At the grid facility, operational lighting will be switched off during the hours of darkness with the exception for emergency repairs to outdoor equipment. Motion sensor technology will be implemented to control lighting at access doors and security gates within the grid facility. No important areas for wintering waterbirds associated with national sites were identified in close proximity to the grid facility and which could be impacted by operational lighting.

Significance of effect: There will be no likely significant effect at any geographical scale on national sites, and associated fauna (i.e. wintering birds) arising from the operation of the onshore infrastructure of the proposed development.

23.5.3.2 Habitats

The operational phase will not involve any habitat removal or excavation works. Maintenance works will occur at TJBs. As such, no impacts to habitats are expected during the operational phase. Therefore, significant, negative effects on habitats are not anticipated during the operational phase.

Significance of effect: There will be no likely significant effect at any geographical scale on habitats arising from the operation of the onshore infrastructure of the proposed development.

23.5.3.3 Annex 1 Habitats

The operational phase will not involve any habitat removal or excavation works. Maintenance works will occur at TJBs. While there is a joint bay at the landfall site, it is located at a distance of greater than 50m from any Annex I habitat. As such, no impacts to Annex I habitats are expected during the operational phase. Therefore, significant, negative effects on habitats are not anticipated during the operational phase.

Significance of effect: There will be no likely significant effect at any geographical scale on Annex I habitats arising from the operation of the onshore infrastructure of the proposed development.

23.5.3.4 Terrestrial Mammals

No badger setts were recorded at the grid facility, therefore operational lighting at the grid facility location will not impact any identified badger setts. Operational maintenance works will involve an annual inspection at the cable TJBs at the landfall site and the joint bays along the onshore cable route. While these works will not be intrusive works, emergency repairs may involve artificial lighting. Emergency repairs and associated artificial lighting will be highly localised and will not result in effects on badgers or terrestrial mammals at any perceptible geographical scale. Therefore, significant, negative effects on terrestrial mammals are not anticipated during the operational phase.

Significance of effect: There will be no likely significant effect at any geographical scale on terrestrial mammals arising from the operation of the onshore infrastructure of the proposed development.

23.5.3.5 Otter

Lighting impacts at the grid facility will be localised to the facility and will not extend to any watercourse or to the coastline at the landfall site. Operational maintenance works will involve an annual inspection at the cable TJBs at the landfall site and the joint bays along the onshore cable route. Emergency repairs and associated artificial lighting will be highly localised and will not result in effects on otters at any perceptible geographical scale. Therefore, significant, negative effects on otter are not anticipated during the operational phase.

Significance of effect: There will be no likely significant effect at any geographical scale on otter arising from the operation of the onshore infrastructure of the proposed development.

23.5.3.6 Amphibian and Reptiles

Lighting impacts at the grid facility will be localised to the facility and will not extend to any watercourse or wetland habitat. Operational maintenance works will involve an annual inspection at the cable TJBs at the landfall site and the joint bays along the onshore cable route. Emergency repair works will be limited to the TJBs and will not result in effects on amphibian and reptiles at any geographical scale. Therefore, significant, negative effects on amphibian & reptiles are not anticipated during the operational phase.

Significance of effect: There will be no likely significant effect at any geographical scale on amphibian and reptiles arising from the operation of the onshore infrastructure of the proposed development.

23.5.3.7 Bats

The grid facility is located in an area that was identified as suitable bat foraging and commuting habitats, with bat activity surveys confirming a moderate to high level of activity (likely associated with hedgerow) at this location. External artificial lighting installed at the grid facility could alter bat behaviour and long-term use of the retained perimeter hedgerows, if not suitably designed. Common pipistrelle, being the most active species in the region and exhibiting synanthropic and opportunistic behaviour, could potentially benefit from the increased insect attraction caused by the lighting. Although less synanthropic and opportunistic, soprano pipistrelles can also benefit from the attraction of insects by lighting the sites. The literature is somewhat conflicting about the effects of lighting on *Nyctalus* spp. (i.e. Leisler's bat), but it is very probable that Leisler's bats might be negatively affected by lighting. *Myotis* species, which occur at a much lower frequency at the grid facility location, might be negatively affected by lighting. At the grid facility, external artificial lighting will be switched off during the hours of darkness with the exception for emergency repairs to outdoor equipment. Motion sensor technology will be implemented to control lighting at access doors and security gates within the grid facility. While a change in habitat suitability of perimeter hedgerows due to lighting impacts could result in a long-term change of habitat use by particular bat species any potential effect is not considered to occur at a perceptible geographical scale. Artificial lighting associated with emergency repair works will be limited to the TJBs and will not result in effects on bats at any geographical scale.

Significance of effect: There will be no likely significant effect at any geographical scale on bats arising from the operation of the onshore infrastructure of the proposed development.

Also see Volume 5, Chapter 35: Offshore Bats for the impact assessment of bats occurring in the offshore development area.

23.5.3.8 Breeding Birds

The operational phase will not involve any habitat removal or excavation works. Maintenance works will occur at TJBs. No impacts to breeding birds are expected during the operational phase. Therefore, significant, negative effects on habitats are not anticipated during the operational phase.

Significance of effect: There will be no likely significant effect at any geographical scale on breeding birds arising from the operation of the onshore infrastructure of the proposed development.

23.5.3.9 Wintering Waterbirds

- Disturbance and displacement impacts to wintering birds during the operational phase may arise during maintenance works. These works will occur at TJBs which are located at the landfall site and along the Estuary Road. Any disturbance and displacement impacts arising from maintenance works will be localised to the transition joint bay locations and will not involve any intrusive or loud works where noise impacts would arise. At the landfall site, the coastal sea cliff will protect wintering waterbirds using the coastal and seaward habitats at the landfall site from exposure to disturbance impacts. Birds using adjacent arable fields during maintenance works would be disturbed and displaced however, the works are highly localised and not intrusive and are not predicted to result in any likely significant effect at any perceptible geographical scale. Maintenance works along the Estuary Road will occur within the road network and will not cause disturbance and displacement to wintering waterbirds using the Malahide Estuary.
- At the grid facility, operational lighting will be switched off during the hours of darkness with the exception for emergency repairs to outdoor equipment. Motion sensor technology will be implemented to control lighting at access doors and security gates within the grid facility. No important areas for wintering waterbirds associated with national sites were identified in close proximity to the grid facility and which could be impacted by operational lighting.

Significance of effect: There will be no likely significant effect at any geographical scale on wintering birds arising from the operation of the onshore infrastructure of the proposed development.

23.5.3.10 Aquatic and Fisheries

The operational phase will not involve any in-stream or near-stream works. Maintenance works will occur at TJBs. As such, no impacts to habitats are expected during the operational phase. Therefore, significant, negative effects on habitats are not anticipated during the operational phase.

Significance of effect: There will be no likely significant effect at any geographical scale on aquatic and fisheries arising from the operation of the onshore infrastructure of the proposed development.

23.5.4 Decommissioning

Decommissioning of the onshore infrastructure of the proposed development is described in the Onshore Description Chapter. It is anticipated that the decommissioning process will involve similar activities to the construction process, but these will be undertaken in reverse. All above ground structures (i.e. access track, marker posts, link box covers) between the TJBs and the grid facility will be removed, and the sites will be returned to their previous state. It is not proposed to remove any planting. The cabling will be removed but below ground ducting will remain in place. As the removal of the underground structures may have more of an environmental impact if they were to be removed, these features will remain in-situ. The compensation substation at the Grid Facility will be decommissioned. The Bremore substation in the grid facility and onshore cable route will not be decommissioned as these will form part of the wider National Electricity Transmission Network (NETN) owned by EirGrid. The exact approach will be detailed in the Decommissioning Plan and Programme.

Decommissioning phase impacts that are expected to result in potentially significant effects on terrestrial ecology occurring landward of the HWM and Important Ecological Features, as listed in Section 23.3.4, include the following:

- Disturbance and displacement of fauna
- Loss of nesting/roosting sites
- Temporary lighting impacts
- Water quality impacts arising from surface water run-off of sediments and/or an accidental pollution spill

Decommissioning will result in likely significant effects similar to those outlined for the construction phase of the proposed development in Section 23.5.2. A range of significance of effects on terrestrial ecology occurring landward of the HWM and Important Ecological Features, as listed in Section 23.3.4, would likely result from the decommissioning phase. A range from no likely significant effects at any geographical scale, to, a negative, temporary to short-term (i.e. for the period of decommissioning), reversible likely significant effect at a local to National geographical scale is predicted.

23.6 Mitigation and Monitoring Measures

Mitigation provided at two key areas is shown on landscape plans and referred to in this section: one for the grid facility area (see planning drawing 281240_MCR_ONS_GF_DR_YE_1010 *Grid facility Landscape Plan* in Appendix 7.1) and one for Blakes Cross North (see planning drawing 281240_MCR_ONS_GF_DR_YE_1011 *Blakes Cross North Landscape Plan*, in Appendix 7.1). These plans show the combined landscaping and biodiversity mitigation proposals at these locations. A Habitat and Species Management Plan has been prepared for these areas to ensure the desired outcome for biodiversity is achieved, see Appendix 23.10.

23.6.1 Construction Phase

A suitably qualified Ecological Clerk of Works (ECoW) will be appointed to ensure the mitigation measures outlined in this section, in the Habitat and Species Management Plan (Appendix 23.10) and in Volume 8, Appendix 9.1: Onshore Construction Environmental Management Plan (CEMP) are implemented during the construction phase of the onshore infrastructure of the proposed development.

The appointed ECoW will deliver a toolbox talk to all contractors, including sub-contractors, prior to construction starting on ecologically sensitive features within or in close proximity to the works area. The duties of the ECoW will be to monitor the efficacy of mitigation measures implemented by the contractors and to report on the application and success of these measures. In the event of pollution occurring or the potential to occur, the ECoW will have a ‘Stop Works’ authority to ensure measures to stop a pollution event are implemented immediately.

All mitigation measures detailed in the below sections have been incorporated into the CEMP.

23.6.1.1 Designated Sites

Measures to mitigate against downstream water quality impacts

Best practice guidelines during construction

The following measures will be implemented by the contractor to ensure the protection of downstream waters and habitats in European and nationally designated sites. The measures have been based on the following best practice guidelines to ensure that water bodies are adequately protected during construction work:

- Construction Industry Research and Information Association (CIRIA), (2001). C532 Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors
- CIRIA, (2005). C650 Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site
- BPGCS005, Oil Storage Guidelines
- CIRIA, (2007). C697 The SUDS Manual
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004
- CIRIA, (2006). C648 Control of water pollution from linear construction projects: Technical guidance (Murnane et al. 2006)

- CIRIA, (2006). C648 Control of water pollution from linear construction projects: Site guide (Murnane et al. 2006)
- Inland Fisheries Ireland (IFI), (2016). Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters and
- Fisheries Protection during Development Works (Foyle and Carlingford areas) Environmental Guidelines Series – No. 1. Loughs Agency

Release of hydrocarbons and contaminates

The contractor will be required to implement the following standard practice construction methods and mitigation measures for release of hydrocarbons, polluting chemicals, sediment/silt, and contaminated waters control:

- Storage of sand/gravel/soil will be kept away from watercourses or hydrological pathways to designated sites and grading adjacent to these kept to a minimum
- Surface water run-off from temporary works area to be collected in silt/gravel traps prior to discharge to the surface water drainage network
- Silt fences (to Hy-Tex Premium specification or similar) and silt traps will be installed prior to commencement of works and will be inspected daily to inform adaptive management as required. The locations of same will be determined by the ECoW
- All refuelling to take place in bunded enclosures and a minimum of 50m from any watercourse, or coastline. The only exception to this would be plant of limited mobility such as HDD rigs: for refuelling of these items, a small mobile fuel bowser will be used for refuelling, drip trays and plant nappies would be utilised to mitigate any potential spill of fuel during refuelling, and additional supervision employed
- Visual checks of the working areas and all silt/gravel traps carried out during weekly audits and maintenance procedures applied
- All chemical/fuel etc. will be stored in bunded containers and storage to have sufficient bunding for all liquids stored (110% of the capacity of the largest drum)
- Spill Kits will be maintained on sites and works areas
- Implementation of the spill response procedure
- Spill incidents to be reported
- The contractor will prepare a spill response procedure and implement it, if required
- Spill incidents will be reported to the ECoW
- Oil interceptors to be installed on surface water drainage network at the grid facility works areas for the construction phase
- No foul sewer discharge to enter the surface water drainage network and
- Toolbox talks to be carried out by contractor with all staff before work commences to identify environmental issues

Protection of watercourses

The contractor will be required to implement the following standard practice construction methods and mitigation measures for in-stream or near-stream works:

- For works occurring within 50m of a watercourse, weather forecasts will be monitored prior to and during works to avoid working in adverse weather conditions such as heavy rains. No excavations for watercourse crossings to take place during a yellow rain warning or higher issued by Met Eireann.

- All instream works will only take place during the permitted annual instream working window which runs from July to September (IFI, 2016), unless otherwise agreed with IFI.
- At the offline open cut trench crossings, the riverbed levels will be surveyed to allow them to be reprofiled back to their original condition at the completion of construction of the crossing
- Instream dewatered working zones, once construction is completed, will be reinstated with clean rounded river gravels of various sizes (30-100mm) and not the excavated material removed as this material will have become unstable and will release suspended solids if used for reinstatement of the watercourse bed. Alternatively, the excavated material will be cleaned and reinstated
- Excavated material will be placed in such a way as to avoid any disturbance of areas near to the banks of watercourses and any spillage into the watercourses
- An ECoW will be present for the entire duration of any instream works and monitoring will be conducted in line with the monitoring requirements set out in the Water chapter.
- During instream works at offline open cut watercourse crossings, no materials, tools or machinery with the potential to cause pollution will be left within the dry works area outside of working hours. This will avoid a potential pollution event in the event of water entering the dry working area overnight.
- Instream dewatered working zones, once construction is completed, will be reinstated with clean rounded river gravels of various sizes (30-100mm) and not the excavated material removed as this material will have become unstable and will release suspended solids if used for reinstatement of the watercourse bed. Alternatively, the excavated material will be cleaned and reinstated
- No crossing of watercourses by machinery outside of the working footprint unless within the dewatered, dry working area.
- All outflows from drainage associated with construction activities will be treated through temporary settlement ponds prior to release and will be released by diffuse overland drainage at appropriate locations.
- Refuelling of machinery will take place in bunded enclosures, at a minimum of 50m away from watercourses or coastlines to prevent runoff into nearby watercourses. All machinery must carry on onboard spill kit in the event of oil/ fuel spill during all phases.
- The only exception to refuelling within 50m of a watercourse or coastline, would be plant of limited mobility, such as HDD rigs: for refuelling of these items, a small capacity double-skinned fuel bowser will be used for refuelling. Drip trays and plant nappies would be utilised to mitigate any potential spill of fuel and the refuelling process supervised both at the bowser and at the plant item.
- A complete mechanical check of all hoses and fluid reservoirs of machinery will be carried out by a competent member of the construction team before machinery arrives to site.
- A hydrocarbon oil boom will be available at working areas for immediate deployment within any watercourse in the event of any hydrocarbon spillage at the site. A fuel spillage will be considered to be any loss of fuel, oil or lubricant, including hydraulic oil and spot leakage.
- To reduce the amount of silt laden water to be treated, clean water drains will be created to divert water away from dirty water and construction areas, this will lessen the volume of water to be treated onsite.
- The extent of open excavations along the onshore cable route will be kept to a practical minimum, e.g. do not excavate the entire onshore cable route as this acts as a pathway for the mobilisation of suspended solids.
- Deposition areas for spoil will be enclosed with silt fencing to prevent mobilisation of solids during adverse weather conditions and no drainage from these areas will be directed into the temporary drainage systems. A Sustainable Urban Drainage System (SUDS) will be implemented to allow controls to be designed for the retention of large volumes of water that may arise from spoil deposition areas.

- Silt traps and fencing will be placed in working areas that have the potential to carry silt laden material from the working area to aquatic environments. Silt traps and fences will not be erected within flowing watercourses as these can act as a barrier for movement of species.
- Re-seeding of all areas of bare ground or the placement of jute matting will take place as soon as practicable to prevent run-off; and
- All onsite welfare facilities will be installed and managed as per regulations to prevent nutrient overloading of aquatic environments.

Protection from HDD Operations and Frac-Out

The contractor will be required to implement the following standard practice construction methods and mitigation measures for HDD operations and frac-out:

- The contractor will implement a number of specific measures with respect to HDD operations at the landfall and the relevant crossings along the cable route, as detailed below.
- Any groundwater or rainwater that collects in the HDD drilling pit will be pumped away. Then it will be discharged through a filter medium onto the adjacent land, not directly into a waterway. This will avoid the build-up of silt, as some granular material will, inevitably, be pumped out with the water from the pit.
- The contractor and the ECoW will monitor weather conditions and will carry out daily inspections of the mud pit to ensure the volume of the mud pit does not ‘overtop’ to the surrounding land. Where required, measures such as pumping to secure containment will be used where required to prevent overtopping.
- Any bentonite, which comprises 95% water and 5% bentonite clay which is a non-toxic, natural substance, (or similar HDD drilling head lubrication material) will be handled and removed by the drilling contractor.
- In order to eliminate the migration of drilling fluids through the subsurface to waterbodies the following measures will be employed:
 - Drilling pressures will be closely monitored and not exceed those needed to penetrate the formation.
- Exit and entry points for the HDD on land (entry point for landfall HDD is on the seabed) will be enclosed by silt barriers (e.g. straw or silt fence) to prevent any runoff into surface water bodies.
 - If pressure drops during drilling or if there is a lack of returns, the drilling will stop immediately to allow an assessment of a potential leakage of drilling fluid into the surrounding formation. A leak stopping compound, such as mica, may be used to prevent the leak from migrating further into the formation. If the leak stopping compound is not successful, the drilling direction may need to change to avoid the area where the leak occurred.
- While the bentonite drilling fluid is non-toxic, if sufficient quantity enters a watercourse, it can potentially settle on the bottom, smothering benthic flora and affecting faunal feeding and breeding sites. The drilling contractor will develop a location specific HDD frac-out contingency plan, detailing measures to be taken to reduce the risk of bentonite breakout and measures to be taken for the protection of sensitive ecological receptors, should a breakout occur.
- In event of managing a breakout or frac-out on land, the following measures will be adopted:
 - Stop drilling immediately
 - Contain the bentonite by constructing a bund e.g. using sandbags
 - Recover the bentonite from the bund by pumping to a suitable container or back to the entry pit for recycling
 - If necessary, inert and non-toxic lost circulation material (mica) will be pumped into the bore profile, which will swell and plug any fissures
 - The area will be monitored closely to determine if the breakout has been sealed and

- Check and monitor mud volumes and pressures as the works recommence
- In event of managing a breakout or frac-out under water, the following measures will be adopted:
 - Stop drilling immediately
 - Pump lost circulation material (mica), which will swell and plug any fissures
 - Check and monitor mud volumes and pressures as the works recommence
 - Repeat process as necessary until the breakout has been sealed
- Any bentonite will be managed and removed by the specialist drilling contractor on completion of the operation.
- The total volume of water required is estimated to be up to 1,000m³ for each land-based HDD bore, and for the landfall, the volume of water would be approximately 4,500m³ per HDD bore. Water will be brought to site in tankers (to make up drilling fluid) for lubrication of the bore and to provide the requisite volumes of water to the compound. The water used will be non-saline and non-potable water.
- On completion of the operation the drill fluid will be disposed of to an appropriately licensed facility.

Protection of the Rogerstown Estuary SAC at Wx13

Where an open-cut watercourse crossing method is proposed at Wx13 (Ballyboghill Stream), which flows directly into the Rogerstown Estuary SAC and SPA, no in-stream works will occur within 150m of the SAC boundary.

Full watercourse protection measures for in-stream works, as outlined in the above sections for protection of downstream water quality and watercourses will be adhered to.

Measures to mitigate against dust impacts

The contractor will be required to implement the following standard practice construction methods and mitigation measures for release of dust:

Preparing and maintaining the site

- Plan construction compound layout so that machinery and dust causing activities are located away from receptors, as far as is possible
- Erect a 2m minimum site hoarding around all construction/ contractor compounds
- Keep site fencing, barriers and scaffolding clean using wet methods
- Cover, seed or fence stockpiles to prevent wind whipping

Construction Plant Operations

- Ensure an adequate water supply on the working areas for effective dust/particulate matter suppression/mitigation
- Use enclosed chutes where possible and conveyors and covered skips
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate
- Ensure equipment and spill kits are readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place

Measures specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable
- Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable
- Only remove the cover in small areas during work and not all at once

Measures specific to Track-out

- Ensure no mud or debris accumulates on the public road and public roads are clean of any mud, dust or debris by suitable means. Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site.
- Ensure vehicles entering and leaving sites are covered when transporting materials that are likely to generate dust to prevent escape during transport
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable)

Measures specific to the grid facility construction activities are:

- Dust generation and dermal exposure during site construction works will be controlled by appropriate dust control measures e.g., water sprays and appropriate personal protective equipment (PPE)
- Where the asphalt layer is removed at the grid facility site this will occur in a phased basis and will be replaced with granular hardcore as soon as possible to prevent the generation of windblown dust

Measures to be applied at the Malahide Estuary and the Landfall site:

- Erect a 2m minimum site hoarding around the working areas adjacent to the Malahide Estuary (Estuary Road) and where works are in proximity to the North West Irish Sea cSPA

Measures to mitigate against disturbance impacts on SCI wintering waterbirds

Mitigation measures set out in Section 23.6.1.10 for wintering waterbirds will be implemented for the protection of SCI wintering waterbirds from disturbance.

23.6.1.2 Habitats

Measures to mitigate against habitat degradation and water quality impacts on lowland depositing rivers

Standard practice construction methods and mitigation measures set out in Section 23.6.1.1 for protection of watercourses will be implemented to minimise and reduce impacts on lowland depositing rivers.

Measures to protect lowland depositing rivers from HDD Operations and Frac-Out

Standard practice construction methods and mitigation measures set out in Section 23.6.1.1 for protection from HDD operations and frac-out, will be implemented to minimise and reduce impacts on lowland depositing rivers.

Measures to mitigate against habitat loss of hedgerows and trees/treelines

Hedgerow planting to be located around the periphery of the grid facility and at Blakes Cross North will supplement existing hedgerows where appropriate. The total length of new hedgerow planting at the grid facility will be 166m. Areas of supplementary hedgerow planting at Blakes Cross North will mirror existing hedgerows within the onshore development area to create double hedgerows and total 400m. Hedgerow planting will include the following species *Alnus glutinosa*, *Prunus spinosa*, *Ilex aquifolium*, *Rubus fruticosus*, *Corylus avellana*, *Rosa canina*, *Euonymus europaeus* and *Crataegus monogyna*.

Trees and woodland will be planted around the periphery of the grid facility. This planting area will measure a total 8,325m². Tree planting will include *Alnus glutinosa*, *Betula pubescens*, *Ilex aquifolium*, *Pinus sylvestris*, *Prunus padus*, *Prunus avium* and *Quercus robur*. This planting will have an understory and shrub planting of *Prunus spinosa*, *Rosa canina* and *Euonymus europaeus*.

Replanting will be in place at the earliest opportunity after the commencement of construction works, to facilitate early establishment/growth, but will not be put at risk of accidental damage due to ongoing construction works (e.g., machinery movement, material storage).

To enhance the biodiversity potential of hedgerow and tree planting, management measures will be undertaken which are outlined under the Biodiversity Enhancement section below and are described in the Habitat and Species Management Plan (see Appendix 23.10).

Measures to mitigate against habitat degradation of hedgerows and trees/treelines

Where works are occurring in close proximity to hedgerows, temporary and permanent access tracks will not be sited within 3m from the edge of the hedgerow vegetation, unless existing tracks in such locations are being utilised. Where existing agricultural tracks are present at the landfall, and other offline locations, these tracks will be used by traffic associated with the works. No other construction works or activities will be located within 5m of the hedgerow vegetation.

Under supervision of the ECoW, where works occur within close proximity to trees, e.g. at watercourse crossing Wx22 Sluice Stream, a root protection zone will be implemented at specific locations to protect trees from indirect damage to their root network.

Measures to avoid disturbance and damage to breeding birds during vegetation removal

In order to avoid disturbance to breeding birds, their nests, eggs and/or their unflown young, as protected under the Wildlife Acts, all works involving the removal of vegetation, not just trees and hedgerows but also grassland habitat suitable for ground nesting birds, will be undertaken outside of the breeding bird nesting season (1 March to 31 August inclusive). Only where seasonal restrictions cannot be met, see measures set out in Section 23.1.6.9 to protect breeding birds.

Measures to avoid dispersal of Non-native Invasive Species

Medium and high impact invasive species such as cherry laurel, butterfly bush, rock cotoneaster and Himalayan honeysuckle were recorded within the onshore development area, mainly within hedgerows and treelines. Where these terrestrial non-native invasive species not listed on the Third Schedule are present, vegetation will be removed and will be disposed of appropriately. Cherry laurel occurs in several hedgerows within the onshore development area and is a high impact invasive species in Ireland. Methods of removal include chemical treatment by a licensed contractor, or mechanical/physical treatment. Any invasive species plant material that is removed will be disposed of at an appropriate licenced waste facilitator.

See Appendix 23.10 Habitat and Species Management Plan for prescriptive detail on invasives species management methods and treatment.

Pre-construction surveys will be undertaken along the onshore cable route, at each offline section, and where works are proposed in close proximity to recorded of non-native invasive species. Appropriate avoidance and treatment measures will be taken if there is a risk of encountering non-native invasive species, with attention to Third Schedule species.

While Himalayan balsam does not occur within the onshore development area. Treatment measures including methods of mechanical/physical or chemical⁵⁶ for Himalayan balsam are included in the Habitat and Species Management Plan (Appendix 23.10).

23.6.1.3 Habitat Enhancement

No likely significant effects have been identified as a result of the construction phase on grassland habitats. While mitigation measures are therefore not required to reduce a likely significant effect, the below habitat enhancement measures will that ensure habitat enhancement at the grid facility and Blakes Cross North is maximised through careful consideration of the planting scheme. The following biodiversity planting has been proposed and will be managed as outlined here and in Appendix 23.10 Habitat and Species Management Plan, to maximise its biodiversity potential for the widest range of species.

⁵⁶ Invasive Species Ireland. Best Practice Management Guidelines for Himalayan Balsam (*Impatiens glandulifera*). Available at: <https://invasivespeciesireland.com/wp-content/uploads/2012/01/Himalayan-Balsam-BPM.pdf> [Accessed February 2023]

Natural reseeding method for semi-natural grasslands

Reseeding of grassland habitats will be implemented using hay transfer. This is an effective near-natural solution for grassland restoration⁵⁷ which avoids importing a seed mix and instead utilises the existing seed bank and seed resource. Adjacent, or nearby, grassland similar to the grassland that is being removed will be cut when grasses and flowering plants are in seed.

These cuttings will be laid over the reinstated bare ground for natural colonisation. This method will be used, but not limited to, the following scenarios: at the margins of arable and agricultural grassland fields, at field boundaries where drainage ditches and hedgerows are crossed, at watercourse riparian edges if HDD has not been used and at temporary compound locations where semi-natural grassland is present.

See Appendix 23.10 Habitat and Species Management Plan for prescriptive details on reseeding methods.

Habitat enhancement for semi-natural grasslands

A species rich grassland mix will be used in appropriate grassland areas of the grid facility in an area of 33,483m². At Blakes Cross North an additional area of species rich grassland will be sown, measuring 5,500m².

The species rich grassland seed mix will include the species as listed, or a similar native grassland seed mix: *Festuca pratensis*, *Festuca ovina*, *Lolium prene L.*, *Festuca rubra*, *Festuca rubra subsp. Commutate*, *Poa pratensis*, *Poa trivialis*, *Alopecurus pratensis*, *Phelum pratense*, *Plantago lanceolata*, *Prunella vulgaris*, *Achillea millefolium*, *Daucus carota*, *Leucanthemum vulgare*, *Galium verum*, *Rumex acetosella*, *Lotus corniculatus*, *Rhinanthus minor*, *Trifolium repens* and *Trifolium pratense*, *Centaurea nigra*, *Hypochoeris radicata*, *Anthriscus sylvestris*, *Vicia sepium*, *Lathyrus pratensis*, *Conopodium majus*.

In addition, the attenuation basin in the grid facility, which will be infrequently wet depending on rainfall levels, will be planted with a riparian grass and herb mix. The planted area will measure a total area of 6,411m². This species rich grassland mix will include important food plants for the butterflies and invertebrates and will benefit foraging bats and birds. This riparian grass and herb mix will include the following species as listed, or a similar native species mix: *Juncus effusus*, *Ranunculus peltatus*, *Sagittaria sagittifolia*, *Potamogeton natans*, *Mentha aquatica*, *Ceratophyllum demersum*, *Glyceria maxima*, *Hydrocharis morus-rane*, *Sparganium erectum*, *Berula erecta*, *Filipendula ulmaria*, *Callitriche platycarpa*, *Lychnis flos-cuculi*, *Myosotis scorpiodes*, *Iris psedudacorus*, *Alisma plantago-aquatica*, *Althaea officinalis*, *Berula erecta*, *Filipendula ulmaria*, *Mentha aquatica*, *Glyceria fluitans*, *Lychnis flos-cuculi*, *Myosotis scorpiodes*, *Iris psedudacorus*, *Alisma plantago-aquatica*, *Althaea officinalis*.

Areas of seeded grassland will be managed through a once or twice annual mowing regime, whereby mowing is undertaken outside of the breeding bird period (1 March to 31 August). Cuttings will be removed from the site after each mow. Strips will also be left unmown with seed heads intact for the winter period providing a winter food resource for birds.

Insecticides and herbicides will not be used to manage habitats, with the exception of the treatment of non-native invasive species.

See Appendix 23.10 Habitat and Species Management Plan for details on management of grassland to enhance the biodiversity potential.

Habitat enhancement for hedgerow and trees

Hedgerow planting will be located around the periphery of the grid facility and at Blakes Cross North, which will supplement existing hedgerows where appropriate. The total length of new hedgerow planting at the grid facility will measure a distance of 166m. Areas of supplementary hedgerow planting at Blakes Cross North will mirror existing hedgerows within the onshore development area to create double hedgerows and total 400m. Hedgerow planting will include the following species *Alnus glutinosa*, *Prunus spinosa*, *Ilex aquifolium*, *Rubus fruticosus*, *Corylus avellana*, *Rosa canina*, *Euonymus europaeus* and *Crataegus monogyna*.

⁵⁷ Orsolya Valko, O., Radai, Z. and Deak, B. (2022) Hay transfer is a nature-based and sustainable solution for restoring grassland biodiversity. Journal of Environmental Management Vol. 311

Trees and woodland will be planted around the periphery of the grid. This planting area will measure a total 8,325m². Tree planting will include *Alnus glutinosa*, *Betula pubescens*, *Ilex aquifolium*, *Pinus sylvestris*, *Prunus padus*, *Prunus avium* and *Quercus robur*. This planting will have an understory and shrub planting of *Prunus spinosa*, *Rosa canina* and *Euonymus europaeus*.

Leaf litter and fallen branches will not be removed from the understory of the woodland to create habitat for invertebrates, which will also be utilised by mammals.

Insecticides and herbicides will not be used to manage habitats, with the exception of treatment of non-native invasive species.

See Appendix 23.10 Habitat and Species Management Plan for details on management of hedgerows and tree planting to enhance the biodiversity potential.

23.6.1.4 *Annex 1 Habitats*

Mitigation measure to ensure protection of Annex 1 habitats at the landfall site

An exclusion zone of 50m will be implemented at the coastline to ensure there is no accidental damage or unnecessary trampling of these sensitive habitats. Demarcation of the exclusion zone will be implemented at the landward side of the landfall site, and the seaward side if necessary. No works will occur within this exclusion zone.

23.6.1.5 *Terrestrial Mammals*

Mitigation measure to ensure protection of badger setts from disturbance

While no badger setts were confirmed within the onshore development area during baseline ecological surveys, as mammals are mobile species and can move into new areas over time, pre-construction surveys for badger will be undertaken at offline sections which contain suitable habitat for setts.

For any setts identified during pre-construction surveys within 150m of the onshore development area, monitoring will be undertaken using trail cameras to confirm the status of the sett in line with NRA (2006a) guidelines. If any sett occurring within 150m is confirmed to be a breeding sett, no works will occur within 50m of the sett during the badger breeding period (1 December to 30 June). A 50m exclusion zone will be implemented and demarcated to ensure protection of any sett occurring within 50m from disturbance during the construction phase. Additionally, if any sett is confirmed to be a breeding sett no piling or blasting will occur within a 150m exclusion zone during the breeding period (1 December to 30 June).

23.6.1.6 *Otter*

Mitigation measure to ensure protection of otter from disturbance

No evidence of otter was recorded within the ecological study area. However, given their mobile nature pre-construction surveys will be undertaken at watercourse crossing and at the landfall site where suitable habitat for otter is present to ensure no holts or resting places occupy the works area and 150m either side of the works area. Pre-construction surveys for otter will be undertaken in line with NRA guidelines (2008).

Mitigation measure to ensure protection of otter from lighting impacts

Artificial lighting associated with construction activities and placed at the landfall site and at watercourse crossings will be of a design that limits light spill beyond the working areas. The ECoW will be consulted to ensure that lighting at the construction compounds and in active working areas, which are in close proximity to watercourses and the landfall site, will minimise light spill on habitats used by otter.

Some, or all, of the below mitigation measures will be employed to reduce light spill where necessary:

- The use of sensor / timer triggered lighting
- LED luminaires to be used where practicable due to their sharp cut-off, lower intensity, good colour rendition and dimming capability

- Column heights to be considered to minimise light spill
- Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed and
- Where night-time works are required, the appointed contractor will liaise with the engaged suitably experienced and qualified ecologist(s) and implement measures to mitigate the impact of such works on otter

Mitigation measures to ensure protection of otter from water quality impacts

Mitigation measures set out in Section 23.6.1.1 for protection of downstream water quality will be implemented for the protection of otter from water quality impacts.

23.6.1.7 Amphibians

Mitigation measure to ensure protection of amphibians from habitat loss

No evidence of amphibians was recorded within the ecological study area. However, given their mobile nature, for works occurring in suitable breeding habitat for amphibians during the period February to March, pre-construction surveys will be undertaken to avoid mortality to breeding common frog or smooth newt. If either are confirmed to breed within the onshore development area, consultation with the NPWS will be undertaken and if deemed necessary a translocation licence application will be submitted.

Mitigation measures to ensure protection of amphibians from water quality impacts

Standard practice construction methods and mitigation measures set out in Section 23.6.1.1 for protection of downstream water quality will be implemented for the protection of amphibians from water quality impacts.

23.6.1.8 Bats

Mitigation measures to ensure protection of bats from lighting impacts

Floodlighting associated with construction activities will be of a design that limits light spill beyond the working areas. The ECoW will be consulted to ensure that lighting at the construction compounds and in active working areas, which are in close proximity to watercourses, hedgerows and treelines, and the landfill site, will be designed to minimise light spill onto habitats used by bats reducing any impacts to foraging or commuting bats.

Some, or all, of the below mitigation measures will be employed to reduce light spill where necessary:

- The use of sensor / timer triggered lighting
- LED luminaires to be used where practicable due to their sharp cut-off, lower intensity, good colour rendition and dimming capability
- Column heights to be considered to minimise light spill
- Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed and
- Where night-time works are required, the appointed contractor will liaise with the engaged suitably experienced and qualified ecologist(s) to implement the measures outlined in the above bullet points to mitigate the impact of such works on bats

Mitigation measures to ensure protection of bats from loss of roosts

No tree roosts were confirmed during surveys within the ecological study area. Where practicable, tree removal, especially of trees that have been identified as Potential Roost Features (PRFs), will be avoided through micro-siting of the cable route and in consultation with the ECoW.

Where avoidance is not practicable, prior to removal of PRF trees, all trees that were confirmed as having potential for roosting bats will be re-examined immediately prior to their removal to assess whether bats are present. Pre-construction surveys will be undertaken as set out below:

- Low suitability trees will be subject to a visual inspection at height using an endoscope. If no bats are confirmed to use the tree it will be felled on the same day using sectional felling or soft felling technique. Limbs and tree sections will be left *in situ* on the ground for at least 24 hours before they are processed, to allow any bats to fly out.
- Trees of moderate suitability or higher will be subject to a roost emergence and re-entry survey to confirm there are no bats using the tree prior to felling. If no bats are found to use the tree, it will be felled on the same day using sectional felling or soft felling technique. Limbs and tree sections will be left *in situ* on the ground for at least 24 hours before they are processed, to allow any bats to fly out.
- For trees identified as having moderate PRF suitability, which could be used as a maternity roost, these will be felled during the period March-April and/or October-early November which is outside the maternity season and when bats are capable of flight.
- For trees identified as having low PRF suitability, subject to visual inspection as outlined above, these trees can be felled during the period March to early November as there is an unlikely risk of these features having suitability to hold a maternity roost.
- To minimise habitat loss due to the removal of PRF trees and areas of treeline, bat boxes to the specification of a woodcrete box intended for bats that normally reside in tree cavities⁵⁸, or similar, will be installed in appropriate locations within lands under the control of the applicant, including lands at the grid facility and Blakes Cross North. A variety of types of bat boxes will be erected to provide bats with alternatives and a variety of conditions. Bat boxes will be installed by a suitably qualified ecologist, or the project ECoW.

23.6.1.9 *Breeding Birds*

Mitigation measures to ensure protection of breeding birds from disturbance

In order to avoid disturbance of breeding birds, their nests, eggs and/or their unflown young, as protected under the Wildlife Acts, all works involving the removal of vegetation within the onshore development area, not just trees and hedgerows but also grassland habitat suitable for ground nesting birds, will be undertaken outside of the breeding bird nesting season (1 March to 31 August inclusive).

Only where this seasonal restriction cannot be observed, a breeding bird survey will be undertaken during the appropriate survey season (between early March and late June, and as late as August for late nesting birds) by an ecologist with experience undertaking breeding bird surveys in order to confirm whether birds are nesting within suitable habitat affected by or immediately adjacent to. Where nesting birds are encountered during surveys, the removal of trees, hedgerows or suitable grassland habitat will be delayed until after the nesting season (1 March to 31 August inclusive).

Mitigation measures to ensure protection of yellowhammer from habitat loss

Habitat enhancement at the grid facility for yellowhammer will include a suitable nesting habitat, summer food resource and winter food resource. Nesting habitat will include new hedgerow planting and supplementary planting at existing periphery hedgerows with an adjacent grassland margin which will be under a minimal management regime. A pollinator/wildflower grass mix will support invertebrate populations and provide a summer food resource for yellowhammer. Unmown grass strips will be left with seed heads intact for the winter period providing a food resource for yellowhammer.

⁵⁸ An example of such a box is 'The Convex Bat Box is a woodcrete box intended for bats that normally reside in tree cavities, it has two access options, one at the front and one at the bottom allowing bats to land on the tree and crawl inside.' Available at: <https://www.wildcare.co.uk/convex-bat-box.html>

At Blakes Cross North, hedgerow enhancement for yellowhammer will consist of planting a double hedgerow immediately adjacent to existing hedgerows.

Hedgerows and marginal grassland will not be cut during the breeding bird season (1 March to 31 August inclusive). Only where this seasonal restriction cannot be observed, a thorough breeding bird survey and nest check will be undertaken by an ecologist with experience undertaking breeding bird surveys in order to confirm the presence of breeding yellowhammer within suitable habitat affected by or immediately adjacent to vegetation removal.

Where displaying yellowhammer or nesting birds are encountered during surveys, the removal of trees, hedgerows or suitable grassland habitat will be delayed until after the nesting season (1 March to 31 August inclusive). Yellowhammer can breed late in the season so the delay until after period must be strictly adhered to.

See Appendix 23.10 Habitat and Species Management Plan for details on management of habitats for yellowhammer.

Mitigation measures to ensure protection of meadow pipit from habitat loss

Habitat enhancement at the grid facility will provide a summer and winter food resource for meadow pipits. As meadow pipits are ground nesting birds, grassland margins and semi-natural grassland planting at the grid facility and Blakes Cross North managed under a minimal management regime, will develop into suitable nesting habitat in the form of grassland tussocks. A pollinator/wildflower grass mix will support invertebrate populations and provide a summer food resource for meadow pipit. Unmown grass strips will be left with seed heads intact for the winter period providing a food resource.

Grassland will not be cut during the breeding bird season (1 March to 31 August inclusive). Only where this seasonal restriction cannot be observed, a thorough breeding bird survey and nest check will be undertaken by an ecologist with experience undertaking breeding bird surveys in order to confirm the presence of breeding meadow pipit within suitable habitat affected by or immediately adjacent to the area of vegetation removal. Where displaying meadow pipit or nesting birds are encountered during surveys, the removal of suitable grassland habitat will be delayed until after the nesting season (1 March to 31 August inclusive).

See Appendix 23.10 Habitat and Species Management Plan for details on management of habitats for meadow pipit.

23.6.1.10 Wintering Waterbirds

Mitigation measures to ensure protection of wintering waterbirds from lighting impacts

Construction lighting used during months August to March will be reviewed by the project ECoW. Construction lighting in areas at the landfall site and Malahide Estuary will be kept to a minimum where practicable and will be directed away from habitats utilised by wintering waterbirds to minimise light spill and avoid disturbance.

Some, or all, of the below mitigation measures will be employed to reduce light spill where necessary

- The use of sensor / timer triggered lighting
- LED luminaires to be used where practicable due to their sharp cut-off, lower intensity, good colour rendition and dimming capability
- Column heights to be considered to minimise light spill
- Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed and
- Where night-time works are required, the appointed contractor will liaise with the ECoW and implement measures outlined in the bullet points above to mitigate the impact of such works on wintering birds

Mitigation measures to avoid disturbance impacts on wintering waterbirds

At the landfall site, the HDD compounds near the shoreline will have noise barriers on the northerly, easterly and southerly perimeters, to reduce noise levels in these directions.

At Malahide Estuary, the first measure will be to avoid works along the Estuary Road during the period September to March when wintering birds are present.

Where this is not practicable, for works at Malahide Estuary during the period September to March, noise barriers will line the works area within the Estuary Road on the estuary side to protect wintering waterbirds utilising the nearest estuarine habitats.

In addition, the temporary noise barriers at the landfall site and at Malahide Estuary along the Estuary Road will act as a visual barrier and reduce disturbance impacts and potential likely effects on wintering waterbirds.

An ECoW will be present during all works along the Estuary Road.

Toolbox talks will be delivered by the appointed ECoW to all construction staff on the sensitivity of wintering waterbirds at the landfall site and at Malahide Estuary.

Mitigation measures to ensure protection of wintering waterbirds from water quality impacts

Standard practice construction methods and mitigation measures set out in Section 23.6.1.1 for protection of downstream water quality will be implemented for the protection of wintering waterbirds from water quality impacts.

23.6.1.11 Aquatic and Fisheries

Measures to mitigation against impacts on watercourses

Standard practice construction methods and mitigation measures set out in Section 23.6.1.1 and 23.6.1.2, for the protection of lowland depositing rivers and downstream water quality, will be implemented for the protection of aquatic features and fisheries.

Measures to protect from HDD Operations and Frac-Out

Standard practice construction methods and mitigation measures set out in Section 23.6.1.1 for protection of downstream water quality, including protection from HDD operations and frac-out, will be implemented for the protection of aquatic features and fisheries from water quality impacts.

Measures to protect fish and aquatic species during instream works

- The contractor will be required to implement the following standard practice construction methods and mitigation measures for in-stream works:
- All personnel must ensure strict bio-security measures are employed prior to any contact of equipment with the aquatic environment, as per Inland Fisheries Ireland (IFI) guidance⁵⁹ and detailed below. On completion of work in freshwater habitats the following procedures will be undertaken (where relevant)
- Visual inspection of all equipment that has come in to contact with water for evidence of attached plant or animal material or other substances
- Removal of any identified plant or animal material or other substances before leaving the operation site
- Ensure that all water will be drained from boats and other water retaining equipment before transportation elsewhere

⁵⁹ Available at: https://www.fisheriesireland.ie/sites/default/files/2021-06/research_biosecurity_biosecurity_for_fieldsurveys_2010.pdf [Accessed January 2023]

- High-pressure steam cleaning with water >40 degrees C will be undertaken on all boats and associated equipment (this facility is available at a number of roadside garages). After this cleaning, a further visual inspection will be undertaken. Disinfectant will be applied to the undercarriage and wheels of the vehicle and trailer after this cleaning has taken place
- Any wet or live wells and other retaining compartments in survey boats will be cleaned with a 1% solution of Virkon Aquatic or another proprietary disinfection product and rinsed with water
- Outboard motors will be flushed with a 1% solution of Virkon Aquatic or another proprietary disinfection product, or with water > 40 degrees C
- Nets (to include monofilament and braided gill nets, fyke nets and seine nets) will be cleaned of all vegetation and debris before returning to base. The clean nets will be placed in a freezer for a period of four days (3 days will suffice for monofilament nets). Following this treatment, the nets will be soaked in a 1% solution of Virkon Aquatic or a proprietary disinfectant for a period of not less than 15 minutes and thoroughly rinsed thereafter
- Footwear will be dipped in or scrubbed with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and thoroughly dried afterwards
- All personal protective equipment (PPE) will be visually inspected, and any attached vegetation or debris removed. Where appropriate, the gear will be wiped down with a cloth soaked in 1% solution of Virkon Aquatic or another proprietary disinfection product
- Sampling equipment (e.g. electrofishing electrodes and cable, grab samplers, meter sticks, buckets and bins, etc.) will be cleaned, rinsed or wiped down with or dipped in a suitable disinfectant solution
- Landing nets and hand nets will be dipped in disinfectant solution and rinsed in clean water
- Once the dams are constructed for the creation of any instream working areas, translocation of any fish trapped within the dammed channel will take place before total dewatering of the works area starts. If the area is too deep for electrofishing, then dewatering will begin in a controlled manner to reach a preferred water height where electrofishing can take place. Translocation of fish will be through the method of electrofishing by a competent operator and the placement of captured fish will be upstream of the works. Electrofishing will be conducted under an authorisation under Section 14 of the Fisheries (Consolidation) Act 1959 from the Department of Communications, Climate Change, and the Environment. This method will mitigate against direct impacts on fish species within this area
- If any dammed dry working area becomes inundated with flood waters due to dam breaches during flood conditions, then the method of fish removal through electrofishing will recommence before full dewatering take place
- If crayfish are encountered within any dry working area, then they will be removed by a licensed ecologist outside of the working zone to prevent direct impacts on this species
- All pumps will have a mesh cover over the intake to prevent fish from entering the pump during dewatering processes thus preventing direct impacts on fish species
- Mitigation measures set out in Section 23.6.1.1 for protection of downstream water quality will be implemented for the protection of aquatic features and fisheries from water quality impacts

23.6.2 Operational Phase

No likely significant effects have been identified as a result of the operational phase of the onshore infrastructure of the proposed development. While mitigation measures are therefore not required to reduce a likely significant effect, the below management and monitoring of habitat enhancement areas will ensure the full biodiversity potential is reached in these areas at the landfall site and Blakes Cross North.

23.6.2.1 Habitat management

Areas of seeded species rich grassland at the grid facility and Blakes Cross North will be managed through an annual mowing regime, whereby mowing is undertaken outside of the period March to August. Cuttings

will be removed from the grassland after each mow. Strips of unmown flowering plants and seed heads in the species rich grassland areas will retain their seed heads throughout the winter and provide a valuable food resource for birds throughout the year especially during the winter months when food is limited.

No vegetation will be cut during the breeding bird season (1 March to 31 August).

Leaf litter and fallen branches will not be removed from the understory of the woodland to create habitat for invertebrates, which will also be utilised by mammals.

Insecticides and herbicides will not be used to manage habitats, with the exception of treatment of non-native invasive species.

See Appendix 23.10 Habitat and Species Management Plan for details of the operational management of habitats at the grid facility and Blakes Cross North to enhance the biodiversity potential.

23.6.2.2 Monitoring

Monitoring the success of establishment of reseeded grassland habitats and replanted hedgerows and trees at the grid facility and Blakes Cross North will be undertaken in Years 1, 2, 3 and 5 post planting. Reporting in monitoring years will include any remedial action required to achieve mitigation measures and biodiversity enhancement aims.

Any remedial action identified the grid facility and Blakes Cross North (which may include replacement of planted species or reseeded/stabilising of ground), will be undertaken at an appropriate time within one year of the monitoring visit.

See Appendix 23.10 Habitat and Species Management Plan for details of the monitoring schedule of habitats at the grid facility and Blakes Cross North.

23.6.3 Decommissioning

Mitigation measures, described above for the construction phase and which are relevant to decommissioning, updated to reflect good practice at the time, will be implemented for the decommissioning phase.

23.7 Residual Effects

23.7.1 Construction Phase

See Table 23.20 which summarises residual effects on terrestrial ecology occurring landward of the HWM and on Important Ecological Features assessed in this chapter.

While mitigation measures will reduce and alleviate likely significant effects, some temporary residual effects may occur during the construction phase that cannot be fully mitigated against. These include temporary habitat loss of lowland depositing rivers until the dry works areas are reinstated, temporary habitat loss of hedgerows and treelines until replacement planting is re-established, short-term habitat loss for breeding birds until replacement planting is re-established, and temporary habitat loss for aquatic species until the dry works areas are reinstated.

Table 23.20: Summary of construction phase potential effects, pre-mitigation and post-mitigation, and any identified residual effects

| Feature | Potential Effect (Pre-Mitigation) | Predicted Effect (Post-Mitigation) |
|----------------------------|---|---|
| Designated Sites | | |
| European sites (SACs/SPAs) | Negative, temporary to short-term, reversible likely significant effects at a local geographical scale on hydrologically and hydrogeologically connected international sites: Malahide Estuary SAC, Rogerstown Estuary SAC, Baldoyle Bay SAC, Malahide Estuary SPA, Rogerstown Estuary SPA, Baldoyle Bay SPA and North-West Irish Sea cSPA. Dust impacts: Negative, temporary, reversible likely significant effects at a local geographical scale on immediately adjacent national sites: | Water quality impacts: No likely significant residual effect. Dust impacts: No likely significant residual effect. Disturbance and displacement: any remaining likely significant effect would be imperceptible at any geographical scale. No likely significant residual effect. See explanation below under Wintering waterbirds heading. |

| Feature | Potential Effect (Pre-Mitigation) | Predicted Effect (Post-Mitigation) |
|--|---|--|
| | <p>Malahide Estuary SAC, Malahide Estuary SPA and North-West Irish Sea cSPA.</p> <p>Disturbance and displacement: Negative, temporary to short-term, reversible likely significant effects predicted at a local geographical scale on international sites: Malahide Estuary SPA, Rogerstown Estuary SPA, Baldoyle Bay SPA, North-West Irish Sea cSPA, North Bull Island SPA, River Nanny Estuary and Shore SPA, South Dublin Bay and River Tolka Estuary SPA, Skerries Islands SPA, Rockabill SPA, Lambay Island SPA and Boyne Estuary SPA.</p> | |
| National sites (NHAs/pNHAs) | <p>Water quality impacts: Negative, temporary to short-term, reversible likely significant effects at a local geographical scale on hydrologically and hydrogeologically connected national sites: Malahide Estuary pNHA, Rogerstown Estuary pNHA, Knock Lake pNHA, Sluice River Marsh pNHA and Baldoyle Bay pNHA.</p> <p>Dust impacts: Negative, temporary, reversible likely significant effects at a local geographical scale on immediately adjacent national sites: Malahide Estuary pNHA and Rogerstown Estuary pNHA.</p> <p>Disturbance and displacement: Negative, temporary to short-term, reversible likely significant effects predicted at a local geographical scale on national sites: Malahide Estuary pNHA, Rogerstown Estuary pNHA, Baldoyle Bay pNHA, Skerries Island NHA, North Dublin Bay pNHA, Laytown Dunes/Nanny Estuary pNHA, Portraine Shore pNHA, Ireland's Eye pNHA and South Dublin Bay pNHA.</p> | <p>Water quality impacts: No likely significant residual effect.</p> <p>Dust impacts: No likely significant residual effect.</p> <p>Disturbance and displacement: any remaining likely significant effect would be imperceptible at any geographical scale. No likely significant residual effect. See explanation below under Wintering waterbirds heading.</p> |
| Habitats | | |
| CB1 Shingle and gravel banks, CD1 Embryonic dunes, CS3 Sedimentary Sea cliffs | No likely significant effect. | No likely significant residual effect. |
| FW2 Lowland depositing river | <p>Habitat loss: Negative, short to medium-term, reversible likely significant effect at a local geographical scale.</p> <p>Water quality impacts: Negative, temporary likely significant effect at a local geographical scale.</p> | <p>Habitat loss: Short-term, reversible likely significant residual effect at a local geographical scale until lowland depositing rivers are reinstated at dry working areas.</p> <p>Water quality impacts: No likely significant residual effect.</p> |
| FW4 Drainage ditches | No likely significant effect. | No likely significant residual effect. |
| GS4 Wet grassland/GM1 Marsh, GS1 Dry calcareous and neutral grassland, GS2 Dry meadows and grassy verges | No likely significant effect. | No likely significant residual effect. |
| WL1 Hedgerows, WL2 Treelines | <p>Habitat loss: Negative, permanent likely significant effect at a local geographical scale.</p> <p>Non-native invasive species: Negative, long-term likely significant effect at a local geographical scale.</p> | <p>Habitat loss: Short-term, reversible likely significant residual effect at a local geographical scale until replacement planting is established at the landfall site and Blakes Cross North.</p> <p>Non-native invasive species: No likely significant residual effect.</p> |
| Annex I Habitats | | |
| Perennial vegetation of stony banks (1220), | No likely significant effect. | No likely significant residual effect. |

| Feature | Potential Effect (Pre-Mitigation) | Predicted Effect (Post-Mitigation) |
|--|--|--|
| Embryonic shifting dunes (2210), Vegetated sea cliffs of the Atlantic and Baltic coasts (1230) | | |
| Terrestrial Mammals | | |
| Badger | No likely significant effect. | No likely significant residual effect. |
| Small mammals (pygmy shrew, hedgehog, Irish hare) | No likely significant effect. | No likely significant residual effect. |
| Otter | | |
| Foraging and commuting otter | Habitat loss: No likely significant effect. Water quality impacts: Negative, temporary to short-term, reversible likely significant effect at a local geographical scale. Disturbance and displacement: Negative, temporary to short-term, reversible likely at a local geographical scale. | No likely significant residual effect. |
| Amphibian and Reptiles | | |
| Smooth newt & common frog | Habitat loss: Negative, temporary to short-term, reversible likely significant effect at a local geographical scale. Water quality impacts: Negative, temporary to short-term, reversible likely significant effect at a local geographical scale. | No likely significant residual effect. |
| Common lizard | No likely significant effect. | No likely significant residual effect. |
| Bats | | |
| Foraging/commuting bats | Habitat loss: No likely significant effect. Disturbance and displacement: Negative, temporary and reversible likely significant effect at a local geographical scale. | No likely significant residual effect. |
| Roosting bats | Habitat loss: Negative, permanent likely significant effect at a local geographical scale. | No likely significant residual effect. |
| Breeding Birds | | |
| Breeding birds | Habitat loss: negative, temporary to medium-term, reversible likely significant effect at a local geographical scale on Red-listed yellowhammer and meadow pipit. For all other breeding birds this impact is temporary. Disturbance and displacement: negative, temporary, reversible likely significant effect at a local geographical scale. | Habitat loss: Short-term, reversible likely significant residual effect at a local geographical scale until habitats are reinstated and replacement planting is established at the landfall site and Blakes Cross North. Disturbance and displacement: any remaining likely significant effect would be imperceptible at any geographical scale. No likely significant residual effect. |
| Wintering Waterbirds | | |
| Wintering waterbirds | Habitat loss: No likely significant effect. Disturbance and displacement: Negative, temporary to short-term, reversible likely significant effect at a local geographical scale. | Habitat loss: No likely significant residual effect. Disturbance and displacement: any remaining likely significant effect would be imperceptible at any geographical scale. No likely significant residual effect. See explanation below under Wintering waterbirds heading. |
| Aquatic and Fisheries | | |

| Feature | Potential Effect (Pre-Mitigation) | Predicted Effect (Post-Mitigation) |
|------------------------|--|--|
| Aquatic & fish species | Negative, temporary to medium-term, reversible likely significant effect at a local to Regional/County geographical scale. | Habitat loss: Temporary, reversible likely significant residual effect at a local geographical scale until watercourses are reinstated at dry working areas. |

Wintering waterbirds

At the landfall site, noise barriers described in the mitigation section (Section 23.6.1.10) around the HDD compounds will reduce predicted noise levels at ground level to levels set out below:

| Activity at Landfall | Mitigated noise level @20m, LAeq | Mitigated noise level @60m, LAeq | Mitigated level @100m, LAeq |
|-----------------------|----------------------------------|----------------------------------|-----------------------------|
| Landfall HDD compound | 62 | 53 | 48 |

Wintering waterbirds on the shoreline (below the top edge of the sea cliffs, located at least 50m from the HDD compound perimeter) will benefit from further natural screening provided by the sea cliff (c. 4-6m in height) which will act as an additional noise, and visual barrier. As such no seasonal restrictions are required at the landfall site. With this mitigation in place, no likely significant residual effects on wintering waterbirds are predicted at the landfall site.

At the Malahide Estuary, the mitigation measures set out in Section 23.6.1.10, including avoiding works along the Estuary Road during the period September to March when wintering birds are present, or the provision of noise barriers along the onshore cable route construction works, will reduce the predicted noise at ground level and at the intertidal and estuarine habitats used by wintering waterbirds to the following noise levels set out below:

| Activity at Estuary Road | Mitigated noise level @20m, LAeq | Mitigated noise level @60m, LAeq | Mitigated level @100m, LAeq |
|--------------------------|----------------------------------|----------------------------------|-----------------------------|
| Road breaking out | 63 | 53 | 49 |
| Trenching/backfilling | 57 | 48 | 43 |
| Road resurfacing | 58 | 49 | 44 |
| HDD compound | 62 | 53 | 48 |

With the mitigation in place, no exceedance of predicted construction noise levels of above 70dBLAeq are predicted during the period September to March, and therefore no likely significant residual effects on wintering waterbirds are predicted at the Malahide Estuary.

In addition, the temporary noise barriers at the landfall site and along the Estuary Road will act as a visual barrier and reduce disturbance impacts and potential likely effects on wintering waterbirds.

With the mitigation in place, no likely significant residual effects arising from disturbance and displacement on wintering waterbirds are predicted at the landfall site or at Malahide Estuary.

23.7.2 Operational Phase

No likely significant effects were identified on terrestrial ecology occurring landward of the HWM and on Important Ecological Features as a result from the operational phase of the onshore infrastructure and onshore cable route of the proposed development. Therefore, no operational phase residual effects occur.

Positive, long-term effects as a result of biodiversity enhancement planting at the landfall site and Blakes Cross North, including species rich grassland and hedgerow and tree planting, will benefit a range of biodiversity and terrestrial ecology. The biodiversity planting will provide a food resource for terrestrial mammals, bats and breeding birds, and will strengthen ecological corridors and provide a stepping stone for movement of fauna in the wider area.

23.7.3 Decommissioning

Following the full and successful implementation of the mitigation measures during the decommissioning phase, no long-term likely significant effects on biodiversity arising from the proposed development are predicted at any geographical scale.

23.8 Transboundary Effects

Considering the onshore infrastructure of the proposed development occurs entirely within the Republic of Ireland, and the nature of the ecology assessed in this chapter occurring landward of the HWM, no transboundary effects on Biodiversity are predicted.

23.9 Cumulative Effects

A long list of “other projects” which were deemed to be potentially relevant to be included in the cumulative impact assessment was compiled (see Volume 6, Chapter 38: Cumulative and Inter-related Effects (hereafter referred to as the ‘Cumulative and Interrelated Effects Chapter’)). A screening exercise of the “long list” was carried out to determine whether each of the projects has the potential to give rise to likely significant cumulative effects from a Biodiversity perspective with the proposed development. Many of the other projects were screened out for a number of reasons including the location, scale and nature of the project. Those projects which were “screened in” were carried forward for assessment. The results of the assessment are presented in the Cumulative and Interrelated Effects chapter.

The assessment concluded that there are no likely significant direct or indirect cumulative effects predicted for Biodiversity during the construction, operation or decommissioning phases of the proposed development.

23.10 References

- Barron, S.J., Delaney, A., Perrin, P.M., Martin, J.R. and O’Neill, F.H. (2011). National survey and assessment of the conservation status of Irish sea cliffs. Irish Wildlife Manuals, No. 53. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
- Bibby, C.J., Burgess, N.D., Hill, D.A. (2000) Bird Census Techniques. Academic Press, London, 2nd edition.
- CIEEM (2017) Guide to Ecological Surveys and Their Purpose. December 2017.
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. September 2018.
- Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition). The Bat Conservation Trust, London.
- Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Edition). The Bat Conservation Trust, London.
- Cummins, S., Lauder, C., Lauder, A. & Tierney, T. D. (2019) The Status of Ireland’s Breeding Seabirds: Birds Directive Article 12 Reporting 2013 – 2018. Irish Wildlife Manuals, No. 114. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.
- Cutts, N., Phelps, A. & Burdon, D. (2009) Construction and waterfowl: defining sensitivity, response impacts and guidance. Institute of Estuarine & Coastal Studies (IECS) The University of Hull.
- DEFRA (2002): Soft Cliffs - Prediction of Recession Rates and Erosion Control Techniques. Soft Cliffs manual for Managers. DEFRA Flood Management Division, London.
- Delaney, A., Devaney, F.M, Martin, J.M. and Barron, S.J. (2013). Monitoring survey of Annex I sand dune habitats in Ireland. Irish Wildlife Manuals, No. 75. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- Department of Agriculture Northern Ireland (1995) The Evaluation of habitat for Salmon and Trout (DANI, 1995). Advisory leaflet No. 1, produced for the Northern Ireland Fisheries Division.
- Dublin City Council (2022) Dublin City Development Plan 2022-2028. December 2022
- Dublin City Council (2021) Dublin City Biodiversity Action Plan 2021-2025.
- EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Report. May 2022. Environmental Protection Agency, Dublin
- Eirgrid (2012) Ecology Guidelines for Electricity Transmission Projects – a standard approach to ecological assessment of high voltage transmission projects.
- European Commission (2017) Environmental Impact Assessment of Projects. Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU).

- European Communities (1999) Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions. Published May 1999. ISBN 92-894-1337-9.
- Fingal County Council (2010) Fingal Biodiversity Action Plan 2012-2015. December 2010
- Fingal County Council (2023) Fingal Development Plan 2023-2029. April 2023
- Fingal County Council (2022) Fingal Biodiversity Action Plan 2022-2030. Draft for Consultation. Dublin, Fingal County Council.
- Fossitt, J. (2000) A Guide to Habitats in Ireland. The Heritage Council, Kilkenny
- Gilbert, G., Gibbons, D.W., Evans, J. (1998) Bird Monitoring Methods – a manual of techniques for key UK species. RSPB.
- Gilbert G, Stanbury A and Lewis L (2021) Birds of Conservation Concern in Ireland 2020 –2026. Irish Birds 9: 523—544.
- Gillings, S. and Fuller, R.J. (1999) Winter ecology of golden plovers and lapwings: A review and consideration of extensive survey methods. British Trust of Ornithology (BTO) Research Report No. 224.
- Harris, S. Cresswell, P., and Jefferies, D.J. (1989) Surveying Badgers. The Mammal Society.
- Inland Fisheries Ireland (IFI) (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters.
- Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
- Kepel, A., Ciechanowski, M., Jaros, R. (2011). How to assess the potential impact of wind turbines on bats using bat activity surveys? A case study from Poland, XII European Bat Research Symposium, August 22-26, 2011, Vilnius Lithuania.
- Kerbiriou, C., Bas, Y., Le Viol, I., Lorrilliere, R., Mougnot, J. and Julien, J.F. (2019) Potential of bat pass duration measures for studies of bat activity. *Bioacoustics* 28(2): 177-192.
- Lewis, L. J., Burke, B., Fitzgerald, N., Tierney, T. D. & Kelly, S. (2019) Irish Wetland Bird Survey: Waterbird Status and Distribution 2009/10-2015/16. Irish Wildlife Manuals, No. 106. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.
- Lundy, M.G., Aughney, T., Montgomery, W.I. and Roche, N. (2011) Landscape conservation for Irish bats & species-specific roosting characteristics. *Bat Conservation Ireland*.
- Maitland PS (2003). Ecology of the River, Brook and Sea Lamprey. *Conserving Natura 2000 Rivers Ecology Series No. 5*. English Nature, Peterborough.
- Meehan, S.T. (2013) National Newt Survey 2013 Report. Irish Wildlife Trust, Dublin.
- Middleton N., Fround A. & French K (2014) Social Calls of the Bats of Britain and Ireland. Pelagic Publishing, Exeter.
- National Roads Authority (NRA) (2006a) Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. National Roads Authority.
- NRA (2008) Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. National Roads Authority.
- NRA currently known as Transport Infrastructure Ireland (TII) (2009a). Guidelines for the Assessment of Ecological Impacts of National Road Schemes (Rev 2). National Roads Authority.
- NRA (2009b). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (Rev 2). National Roads Authority.

O'Flynn, C., Kelly, J. and Lysaght, L. (2014). Ireland's invasive and non-native species – trends in introductions. National Biodiversity Data Centre Series No. 2. Ireland.

Platteeuw, M. and Henkens, R.J.H.G. (1997) Possible impacts of disturbance to waterbirds: Individuals, carrying capacity and populations. The Wildfowl & Wetland Trust. Wildfowl (1997) 48: 225-236

Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. & Montgomery, W.I. (2013) National Otter Survey of Ireland 2010/12. Irish Wildlife Manuals No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Russ, J. (2012) British Bat Calls: A Guide to Species Identification. Pelagic Publishing, Exeter.

Scottish Natural Heritage (SNH) Guidance: Assessing connectivity with Special Protection Areas (SPAs).

Smal, C. (1995) The badger and habitat survey of Ireland. National Park and Wildlife Service (NPWS) and Department of Agriculture.

Whitehouse, A.T. (2007) Managing Coastal Soft Cliffs for Invertebrates. Buglife – The Invertebrate Conservation Trust, Peterborough.

Wray, S., Wells, D., Long, E. and Mitchell-Jones, T. (2010) Framework for valuing bats in Ecological Impact Assessment, CIEEM journal. Edition 70. Pg. 23 – 25. December 2010.