Sure Partners Limited

ARKLOW BANK WIND PARK PHASE 2 **ONSHORE GRID INFRASTRUCTURE**

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

VOLUME II

Chapter 12 Biodiversity

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Contents

12 Biodiversity

12.1 Introduction

This chapter of the EIAR provides an assessment of the likely significant effects of the proposed Arklow Bank Wind Park Phase 2 Onshore Grid Infrastructure, herein referred to as the proposed development, on terrestrial and aquatic biodiversity in the receiving environment. Full details of the proposed development can be found in **Chapter 5** *Description of Development*.

This chapter describes the existing flora and fauna within and in the vicinity of the proposed development and the surrounding area. This chapter reviews the likely significant effects and proposes measures for the mitigation of these effects, where appropriate.

The potential impacts on biodiversity in this chapter should be read in conjunction with the other chapters of the EIAR including **Chapter 5** *Description of Development*, **Chapter 6** *Construction Strategy*, **Chapter 7** *Air Quality*, **Chapter 8** *Climate*, **Chapter 9** *Land and Soils*, **Chapter 10** *Water*, **Chapter 11** *Noise and Vibration*, **Chapter 19** *Major Accidents and Disasters* and **Appendix 6.1** Construction Environmental Management Plan (CEMP*)*.

12.2 Assessment Methodology

12.2.1 Introduction

This assessment is based on surveys of the proposed development area (Refer to **Figure 5.1** *Overview of proposed development*). The proposed development comprises the onshore grid infrastructure including the landfall of the offshore export circuits at Johnstown North, the 220kV cable route through to the onshore 220kV substation at Shelton Abbey and overhead connection from the substation to the National Electricity Transmission Network (NETN), and the surrounding area.

A review of desktop data was also carried out to identify potential ecological issues. Ecological surveys were carried out between July 2019 and February 2021.

12.2.2 Relevant Legislation

Flora and fauna in Ireland are protected at a national level by the Wildlife Act 1976, as amended, and the European Communities (Birds and Natural Habitats) Regulations 2011. They are also protected at a European level by the EU Habitats Directive (92/43/EEC) and the EU Birds Directive 2009/147/EC.

Under this legislation, sites of nature conservation importance are then designated in order to legally protect faunal and floral species and important/vulnerable habitats. The relevant categories of designation are as follows:

- Special Areas of Conservation (SAC) are designated under the European Communities (Birds and Natural Habitats) Regulations 2011 to comply with the EU Habitats Directive (92/43/EEC);
- Special Protection Areas (SPAs) are designated under the EU Birds Directive (79/409/EEC) amended in 2009 as the Directive 2009/147/EC; and
- Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHA) are listed under the Wildlife (Amendment) Act, 2000, as amended. A NHA is designated for its wildlife value and receives statutory protection. A list of proposed NHAs (pNHAs) was published on a non-statutory basis in 1995, but these have not since been statutorily proposed or designated. Consultation with the NPWS is still required if any development is likely to impact on a pNHA.

Relevant European Legislation

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive);
- Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (The Birds Directive);
- Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (The Water Framework Directive);
- Directive 2006/44/EC of the European Parliament and of the Council of 6 September 2006 on the quality of fresh waters needing protection or improvement in order to support fish life (The Fish Directive (consolidated)).

Relevant Irish Legislation

- The Wildlife Act 1976 as amended by the Wildlife Act 1976 (Protection of Wild Animals) Regulations, 1980, the Wildlife (Amendment) Act 2000, the Wildlife (Amendment) Act 2010, Wildlife (Amendment) Act 2012, European Communities (Wildlife Act, 1976) (Amendment) Regulations 2017. (The Wildlife Act);
- European Communities (Conservation of Wild Birds) Regulations 1985 (S.I. No. 291/1985) as amended by S.I. No. 31/1995;
- European Communities (Natural Habitats) Regulations, S.I. No. 94/1997 as amended by S.I. 233/1998 and S.I. No 378/2005 (The Habitats Regulations);
- Fisheries (Consolidation) Act, 1959 (as amended), hereafter referred to as the Fisheries Act;
- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011));
- The Flora (Protection) Order, 2015 (S.I. No. 356/2015).

12.2.3 Desktop Review

A desktop study was carried out to collate the available information on the local ecological environment.

The purpose of the desktop study was to identify features of ecological value occurring within the proposed development site and those occurring in proximity to it. A desktop review also allows the key ecological issues to be identified early in the assessment process and facilitates the planning of surveys. Sources of information utilised for this report include the following:

- National Parks and Wildlife Service (NPWS) - www.npws.ie;
- Environmental Protection Agency (EPA) – www.epa.ie;
- National Biodiversity Data Centre – www.biodiversityireland.ie;
- Wicklow Biodiversity Action Plan 2010-2015 (Wicklow County Council 2009);
- Bat Conservation Ireland - www.batconservationireland.org;
- Birdwatch Ireland - www.birdwatchireland.ie;
- British Trust for Ornithology (BTO)-www.BTO.ie and
- National Biodiversity Action Plan 2017-2021 (NPWS 2017).

12.2.4 Guidance

This chapter of the EIAR follows the Environmental Protection Agency's Draft *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2017). It also takes account of the draft *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (Department of Environment, Community and Local Government, August 2018), Chartered Institute of Ecology and Environmental Management *Guidelines on Ecological Impact Assessment in the UK and Ireland, 2nd edition* (CIEEM 2016) and *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, Version 1.1* (CIEEM, 2019). Reference was also made to the following key documents where relevant:

- *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 Union, 2017)*;*
- *Guidance on integrating climate changes and biodiversity into environmental impact assessment* (EU Commission 2013);
- *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (National Roads Authority 2009);
- *Draft Ecology Guidelines for Electricity Transmission Projects* (EirGrid 2020)*;*
- *Commission notice Guidance document on wind energy developments and EU nature legislation* (European Commission 2020);
- *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011);

- *A Guide to Habitats in Ireland* (Fossitt, 2000) and following the guidelines contained in *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011);
- *Guidelines for the treatment of Badgers prior to the construction of National Road Schemes. National Roads Authority, Dublin* (National Roads Authority (NRA) 2005a);
- *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* (National Roads Authority (NRA) 2005b).
- *Guidelines for the treatment of bats during the construction of national road schemes* (National Roads Authority (NRA) 2005c);
- *Guidelines for the protection and preservation of trees, hedgerows and scrub prior to, during and post construction of national road schemes*. (National Roads Authority (NRA) 2006).
- *Guidelines for the treatment of Otters prior to the construction of National Road Schemes* (National Roads Authority (NRA) 2008);
- *Bird Census Techniques* Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S.H. (2000) and
- *Bird Monitoring Methods - a Manual of Techniques for Key UK Species.* Gilbert, G., Gibbons, D.W. & Evans, J. (1998).

12.2.5 Surveys Overview

Surveys were carried out at the survey area between June 2019 and February 2021. The survey areas included all lands within the planning boundary as well as any areas of interest in the vicinity e.g., cliffs near landfall site, woodland habitats and the Avoca River. The likelihood of additional ecological impacts occurring, which have not been identified in this EIAR, is considered remote. The following surveys were carried out:

- Habitats were mapped according to the classification scheme outlined in the Heritage Council publication A Guide to Habitats in Ireland (Fossitt, 2000) and following the guidelines contained in Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011). Habitats were cross referenced with Habitats Directive Annex I habitats. The main habitat surveys were carried out on the 18 June, 21 July and 30 July 2020. Additional habitat surveys were carried out on the 19 November and 17 December 2020 and 22 January and 17 February 2021.
- The site was surveyed for invasive species and rare floral species. The main surveys were carried out on the 18 June, 21 July and 30 July 2020. Additional observations, which were made during subsequent site visits, were also recorded where relevant.
- A general mammal survey was carried out in conjunction with the habitat survey. Surveys were conducted on the 18 June, 21 July and 30 July 2020. The survey focused in particular on Otter, Badger and identifying potential roosting sites for bats (NRA 2005a, NRA 2005b, NRA 2005c, NRA 2008).

- All aquatic habitats were visually assessed during initial habitat surveys. Kick sampling and electrofishing fish assessment surveys were carried out on 25 September 2020.
- All bird species recorded during the habitat survey were recorded (Bibby *et al*. 2000; Gilbert *et al.* 1998). In addition, specialised bird surveys were conducted as follows:
    - Breeding bird survey during the walkover survey of proposed cable route. Surveys were conducted on the 21 May, 18 June, 25 June, 21 July and 30 July 2020.
    - Winter bird surveys at landfall sites and coastal habitats in the vicinity of the planning boundary. Surveys were carried out on 05 November 2019, 18 November 2019, 16 December 2019, 25 January 2020, 13 February 2020 and 27 March 2020.
    - A survey of cliffs habitats and breeding birds was carried out 300m northwest and southeast of the landfall location. Survey was carried out on 21 July 2020. It is noted that while this survey was conducted outside the optimal survey period/peak bird activity, therefore both the presence of birds and signs of breeding, including staining of cliffs were used to assess site usage.
    - Survey of Whooper Swan and Curlew usage of fields at to the northeast of the planning boundary. Surveys were carried out on 19 November and 17 December 2020 and 22 January and 17 February 2021.

12.2.6 Consultation

All key stakeholders, including the public, have been consulted to ensure that their views were addressed in the development process. The organisations consulted are listed in **Chapter 3** *EIA Methodology*, including the National Parks and Wildlife Service (NPWS) and Inland Fisheries Ireland (IFI). Findings of the consultations are integrated into the assessment.

12.3 Baseline Environment

12.3.1 General Landscape

The proposed cable route, as shown in **Figure 5.5** in **Chapter 5** *Description of Development*, originates at the landfall site location in Johnstown North approximately 4.5km northeast of Arklow Harbour. The total cable corridor length is c.6km.

The location of the proposed landfall is shown in **Figure 5.3** in **Chapter 5** *Description of Development*. The coastline at this location is defined by small coves and relatively low sea cliffs (circa 10m in height). These small coves are inaccessible however there is access to Ennereilly Beach from the R750 approximately 320m to the north of the landfall site, as shown in **Figure 5.3** in **Chapter 5** *Description of Development*.

From the proposed landfall point the route passes through an agricultural landscape dominated by pasture and arable land. The average field size is large and a number of streams flow through the survey area. The most substantial rivers within the survey area are the Avoca River and Templerainy Steam, the remaining watercourses are small or seasonal. Due to the intensive nature of agricultural management, semi-natural habitats are generally limited in extent and are generally confined to field margins, along watercourses and hedgerows/treelines and within small pockets of woodland.

The proposed 220kV substation site is located at Shelton Abbey. This is a brownfield site which covers an area of approximately 4ha and is part of the Avoca River Business Park. The Avoca River forms the southern boundary of the Avoca River Business Park. A short length of the existing flood defences, in an area consisting of pasture and woodland adjoining the Avoca River, will be increased in height.

Further detail on the proposed development is included in **Chapter 5** *Description of Development*.

12.3.2 Designated Conservation Areas

12.3.2.1 European Sites

Special Areas of Conservation (SACs) and candidate SACs are protected under the Habitats Directive 92/43/EEC and the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Special Protection Areas (SPAs) are protected under the Birds Directive 2009/147/EC and European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Collectively, these sites are referred to as Natura 2000 or European sites.

In accordance with the European Commission Methodological Guidance (EC 2018), a list of Natura 2000 Sites that can be potentially affected by the proposed project has been compiled. All candidate SACs (cSAC) and SPAs sites which could potentially be impacted by the proposed development have been identified. **Table 12.1** lists the relevant Natura 2000 sites, the location of which are shown in **Figure 12.1**.

Table 12.1. Designated sites and location relative to the proposed development.

Site	Code	Distance at the closest point (approximate)
Special Area of Conservation (SAC) or candidate Special Area of Conservation (cSAC)		
Buckroney-Brittas Dunes and Fen	000729	320m northeast
Kilpatrick Sandhills	001742	8.2km south
Magherabeg Dunes	001766	10.3km north
Slaney River Valley SAC	00781	12.5km southwest
Deputy's Pass Nature Reserve	000717	13.3 northwest

Site	Code	Distance at the closest point (approximate)
Vale of Clara (Rathdrum Wood)	000733	14.5km northwest

The proposed development site is potentially connected to one of the Natura 2000 sites listed in **Table 12.1**, i.e. Buckroney-Brittas Dunes and Fen cSAC. This cSAC is potentially hydrologically connected to the proposed development via the Irish Sea. Groundwater emissions during the construction phase could potentially impact on water quality in the vicinity of the proposed development and subsequently on groundwater dependent qualifying habitats within this cSAC. Therefore, a potential source-pathway-receptor link has been identified between the source (proposed development) and the receptor (Buckroney-Brittas Dunes and Fen cSAC) via a potential pathway (surface water run-off during the construction phase and potential impacts on groundwater).

No pathway exists by which the proposed development could impact on any other Natura 2000 site due to the distances involved and/or the lack of any significant hydrological, hydrogeological or any other relevant connection pathways.

The Buckroney-Brittas Dunes and Fen cSAC is an extensive sand dune and fen system that covers an 8km stretch of the coastline of Co. Wicklow. The site contains three sand dune systems - Brittas Bay, Buckroney and Pennycomequick. The sediment source is mainly siliceous (low shell fragment content), with maximum carbonate levels of 3.5%. The dunes have cut off the outflow of a small river at Mizen Head and a large fen has developed. Its proximity to Dublin City makes Brittas Bay a very popular recreational area. Parts of the dune systems have already been developed as caravan parks and a golf course. Part of the Buckroney dune system has been acquired by the NPWS for conservation use.

The site contains a range of well-developed dune types, which are typical of those found in eastern Ireland. The dune systems are fairly extensive in area and generally of good quality. Of particular note are the fixed dunes, the decalcified fixed dunes (*Calluno-Ulicetea*), the humid dune slacks, the dunes with *Salix repens* and the shifting Marram dunes. Buckroney Fen is a fine example of a diverse wetland system, including alkaline fen, and is one of the most important examples in eastern Ireland. The site is particularly notable for its eastern flora and fauna. In addition to five Red Data Book plant species, there are a number of nationally scarce species including an abundance of Marsh Fern (*Thelypteris palustris*) and Fen Bedstraw (*Galium uliginosum*). The invertebrate fauna is of high interest, with some rare species including Manx Robber Fly (*Machimus cowini*). Little Tern (*Sterna albifrons*) has bred at the site in the past.

Potential impacts on designated Natura 2000 sites (SAC/cSAC/SPA) are specifically addressed in a Report for Screening for Appropriate Assessment (AA) and Natura Impact Statement (NIS) which has been submitted as part of this application. This report concluded the following:

It has been objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted effects from the proposed development and with the implementation of the mitigation measures proposed, that the construction, operation and

decommissioning of the proposed development will not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plans or projects. There is no reasonable scientific doubt in relation to this conclusion. The competent authority will make the final determination in this regard.

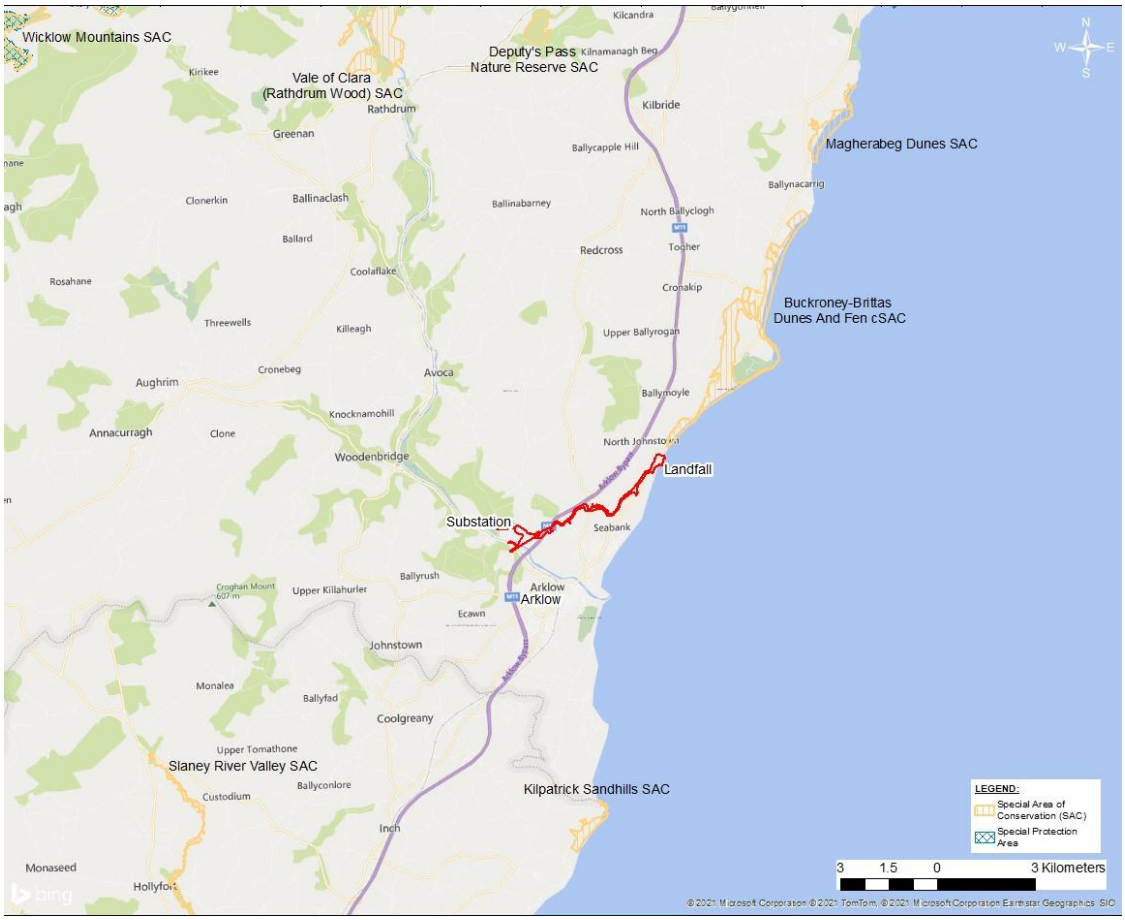

Figure 12.1. Location of proposed development site in relation to Natura 2000 sites Source: EPA Envision mapping (https://gis.epa.ie/EPAMaps/)

12.3.2.2 Nationally Protected Sites

Natural Heritage Areas (NHAs/pNHAs) are national designations under the Wildlife Act 1976, as amended. A NHA is designated for its wildlife value and receives statutory protection. A list of proposed NHAs (pNHAs) was published on a non-statutory basis in 1995, but these have not since been statutorily proposed or designated.

The following proposed NHAs are located within 15km of the proposed development (location at closest point). No potential effects have been identified beyond the 15km radius. The closest pNHAs to the proposed development site are illustrated in **Figure 12.2**.

- Avoca River Valley (Site Code: 001748) located approximately 200m northwest
- Buckroney-Brittas Dunes and Fen (Site Code: 000729) located approximately 320m northeast
- Arklow Sand Dunes (Site Code: 001746) located approximately 500m east
- Arklow Town Marsh (Site Code: 001931) located approximately 750m southeast
- Arklow Rock-Askintinny (Site Code: 001745) located approximately 3.8km southeast
- Kilpatrick Sandhills (Site Code: 001742) located approximately 8.0km southeast
- Kilgorman River Marsh (Site Code: 001834) located approximately 10.2km south-southwest
- Ballymoney Strand (Site Code: 000745) located approximately 13.6km south-southwest
- Magherabeg Dunes (Site Code: 0001766) located approximately 14.4km northeast.
- Ballinacor Wood (Site Code: 001749) located approximately 14.9km northwest

The Avoca River Valley (001748) is a proposed Natural Heritage Area (pNHA) and is a large mixed woodland which extends through the Avoca and Aughrim River valleys. The area is located approximately 200m west of the proposed development site. This pNHA is located upstream of the proposed development site.

The Arklow Town Marsh (001931) is a pNHA located approximately 750m downstream of the proposed development substation site. The Avoca River forms the southern boundary of this large wetland area. The Arklow Town Marsh is likely to be in hydraulic connection with the Avoca River as the area is underlain by gravels.

The Arklow Sand Dunes (001746) is a pNHA located 500m east of the cable route at its nearest point. The coastal site comprises sand dunes, grassland and wet woodland which is noted to be vulnerable to pressure from adjacent amenity sites. The Templerainy Stream flows along the southern boundary of the sand dunes. If contamination enters the Templerainy Stream (or the Kilbride Stream) during the construction phase it has the potential to enter the Arklow Sand Dunes pNHA. It is noted that wet woodland habitat within this pNHA is groundwater dependent and therefore could be sensitive to groundwater contribution.

The Buckroney-Brittas Dunes and Fen (000729) is a pNHA and SAC located approximately 320m to the north of the planning boundary. This coastal site comprises sand dunes, salt marshes, and fens. The designated site is not within the same water catchment as the landfall site or any part of the proposed development. Therefore, this site is only considered downstream in terms of its interaction with the coastal waterbody (Irish Sea - Brittas Bay (HA 10)).

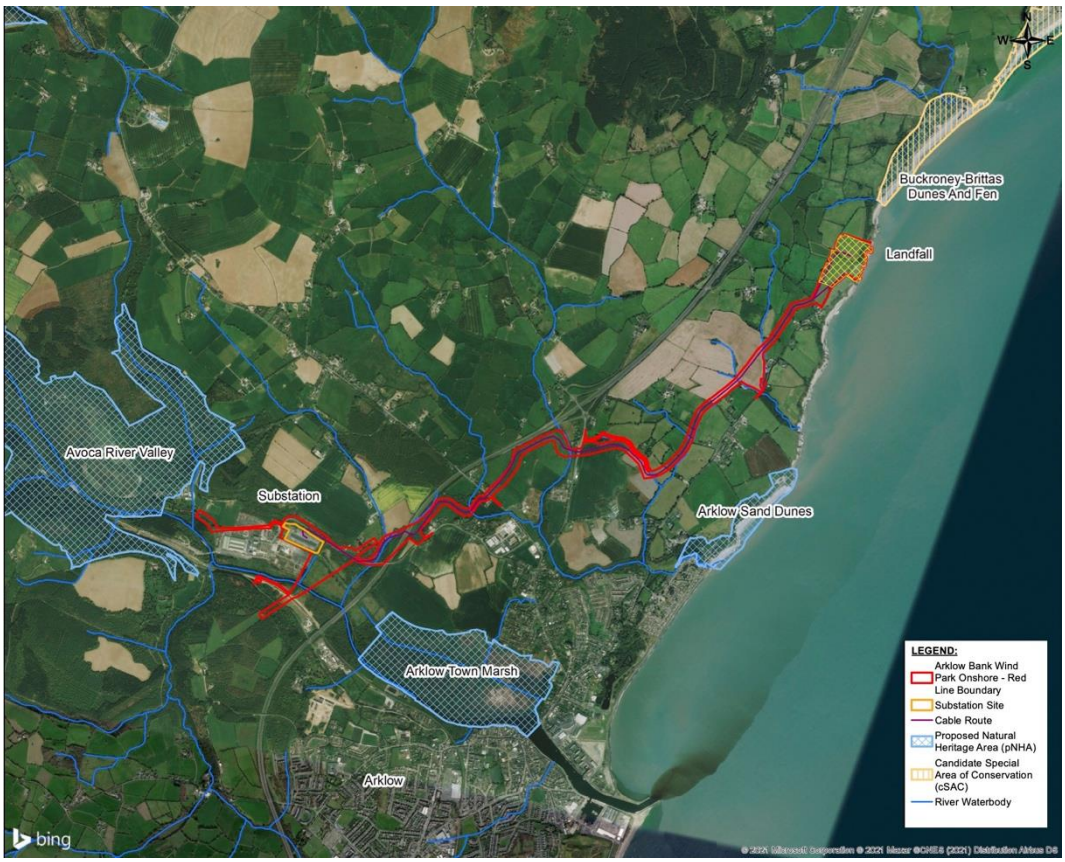

Figure 12.2. Location of proposed development site in relation to pNHAs in the vicinity| Not to Scale | Source: EPA Envision mapping (https://gis.epa.ie/EPAMaps/**)**

12.3.3 IFI Fish data

IFI were consulted with regard to watercourses located within the planning boundary which could potentially be impacted by the proposed development. IFI (emailed correspondence, IFI 03 November 2020) noted the following in relation to fish stocks in watercourses within and in proximity to the proposed works:

The Avoca River represents an important salmonid system with excellent populations of Atlantic salmon, Sea trout and Brown trout throughout. The Avoca also supports populations of eel, and all three species of lamprey listed under Annex II of the Habitats Directive. Estuaries serve as the natural linkage for migratory species such as Salmon, Sea trout, Lamprey and Eels migrating between freshwater and ocean environments, providing the necessary habitat for their transition. Fish monitoring carried out by IFI under WFD in the Avoca Estuary in 2015 classifies the Avoca at "good ecological status" due to the presence of four indicator species Atlantic salmon, Brown trout, European eel and River lamprey. (www.wfdfish.ie) .

The watercourses listed Johnstown North and South, Ticknock, Coolboy, Templerainy are all salmonid with populations of Brown trout. A small but significant population of Sea trout has been recorded in the lower Templerainey.

It should be noted that while the IFI data classifies the Avoca River as "good ecological status", this section of the Avoca River has not been assigned a WFD status and is "failing to achieve good" chemical surface water status due to cadmium levels (Source: EPA via catchments.ie). The section of the Avoca River which flows directly to the south of the proposed substation site (Avoca_030) is associated with historical pollution and industry pressures. Further detail on the Avoca River is included in **Chapter 10** *Water*.

12.4 Habitats

The primary habitat surveys were carried out on the 18 June, 21 July and 30 July 2020. Additional habitat surveys were carried out on the 19 November and 17 December 2020 and 22 January and 17 February 2021. Habitat mapping was carried out in line with the methodology outlined in the Heritage Council Publication, *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011). The terrestrial and aquatic habitats within or adjacent to the planning boundary was classified using the classification scheme outlined in the Heritage Council publication *A Guide to Habitats in Ireland* (Fossitt, 2000) and cross referenced with Annex I Habitats where required. The survey results are representative of the habitats within the application site and include the dominant and characteristic species of flora.

No rare plant species were recorded within the works area during the site survey and, given the modified nature of the habitats within the proposed development area, are highly unlikely to occur. A full list of plant species recorded during site surveys is included in **Appendix 12. 1 of Volume 3**. Site photographs are included in **Appendix 12.2 of Volume 3**.

A current overview of habitats recorded within the planning boundary is outlined in the habitat maps included in **Appendix 12.4 of Volume 3.** Habitats recorded within the planning boundary and their ecological value are detailed in **Table 12.2.** The ecological value of habitats has been defined using the classification scheme outlined in the *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA 2009) which is included in **Appendix 12.3 of Volume 3** of this EIAR. It should be noted that the value of a habitat is site specific and will be partially related to the amount of that habitat in the surrounding landscape.

- Habitats that are considered to be good examples of Annex I and Priority habitats are classed as being of International or National Importance.
- Semi-natural habitats with high biodiversity in a county context and that are vulnerable, are considered to be of County Importance.
- Habitats that are semi-natural, or locally important for wildlife, are considered to be of Local Importance (higher value) and
- Sites containing small areas of semi-natural habitat or which maintain connectivity between habitats are considered to be of Local Importance (lower value).

12.4.1 Habitat Surveys

The proposed cable route from the landfall site at Johnstown North to the substation at Shelton Abbey is approximately 6km long. The cable route will primarily traverse agricultural land as well as some semi-natural habitats.

A planning boundary of up to 50m is proposed to accommodate the c. 30m temporary working width. Habitats recorded within the planning boundary are set out below. The main elements of the proposed development are described in more detail in **Chapter 5** *Description of Development*. Habitats recorded within the planning boundary are mapped in **Appendix 12.4 of Volume 3** and site photographs, are including in **Appendix 12.2 of Volume 3**.

12.4.1.1 Habitats Near the Landfall Site

The coastline to the east of the cable HDD location / cable landfall transition joint bay location consists of relatively low **Rocky sea cliffs (CS1)** (circa 10m in height) and **Shingle and gravel shores (LS1) (**Refer to **Appendix 12.4 of Volume 3**, *Sheet 1*). The cliffs at the landfall location have a **Dry calcareous neutral grassland/Scrub (GS1/WS1**) cover for a distance of approximately 20m inland until the vegetation meets **Improved agricultural grassland (GA1)**. It is noted that the cliffs at the landfall site are not vertical and there are no significant sections of rocky cliff habitat or sea stacks of value for breeding birds. As grassland habitats on sea cliffs are not actively managed (i.e., grazed or fertilised) they are generally more diverse than more highly managed agricultural grassland. Species noted include Kidney Vetch (*Anthyllis vulneraria*), Red Fescue (*Festuca rubra*), False Oat Grass (*Arrhenatherum elatius*), Bracken (*Pteridium aquilinum*), Tufted Vetch (*Vicia cracca)* and Gorse (*Ulex* spp.).

More specialised species, which are more associated with maritime environments including Sea Plantain (*Plantago maritima*), Thrift (*Armeria maritima*) and Sea Mayweed (*Tripleurospermum maritimum*) as well as the invasive species Hottentot Fig (*Carpobrotus edulis*), were also recorded. Scrub species (Blackthorn (*Prunus spinosa*), Bramble (*Rubus* spp.) and Bracken (*Pteridium* spp.) are invading this grassland habitat and in parts grow down towards the shore.

The habitat type Vegetated sea cliffs of the Atlantic and Baltic coasts (habitat code 1230) is listed on Annex I of the EU Habitats Directive. Vegetated sea cliffs can be defined as follows (Commission of the European Communities 2007):

"Vegetated sea cliffs exhibit a complex pattern of vegetation reflecting the degree of maritime exposure, geology and geomorphology, biogeographical provenance and pattern of human management. Typically, on the most exposed cliffs there is a zonation from crevice and ledge communities of the steepest slopes beside the sea (Crithmo-Armerietalia, Géhu 1964) through to closed maritime grasslands on upper cliff slopes, cliff tops and cliff ledges where there is a deeper accumulation of soils (Silenion maritimae, Malloch 1973). Further inland and on more sheltered cliffs, these grade into a complex assemblage of maritime and para-maritime types of heath, calcareous grassland, acid grassland, therophyte, tall herb scrub and wind-pruned woodland vegetation, each enriched by floristic elements characteristic of coastal habitats. On soft coasts with much active movement, complex assemblages of maritime and non-maritime vegetation occur."

This is a relatively broad definition which was further refined in an Irish context by Barron *et al*. (2011). In sections the species recorded show a primary affinity to a vegetative association described by Barron *et al.* (2011) *Group D. Armeria maritima - Plantago maritima maritime grassland.*

The cliffs within the survey area consist primarily of vegetated cliffs which are not steep and large areas are dominated by relatively common grassland and herbaceous species. No rare species were recorded. Therefore, where this habitat occurs within the planning boundary, it is not considered a particularly valuable example of this Annex I Habitat type.

12.4.1.2 Habitats Along Cable Route – Terrestrial Habitats

Most of the habitats within the planning boundary are highly modified and are used for agricultural purposes. Semi-natural habitats of higher ecological value are confined to field boundaries, river corridors and small areas of scrub or woodland.

Habitats within fields which are used for intensive agricultural purposes are generally of low value and are common in the Irish landscape (Refer to **Appendix 12.4 of Volume 3**, *Sheets 1-9*). The dominant habitats within the planning boundary are **Improved agricultural grassland (GA1)** and **Arable crops (BC1)**. Improved agricultural grasslands (GA1) within the planning boundary have been reseeded and regularly fertilised and are grazed by sheep and cattle.

Dominant species within this habitat are Yorkshire Fog (*Holcus lanatus*), Red Clover (*Trifolium pratense*) and Ryegrass (*Lolium* spp.) and this habitat is of limited ecological value. Arable crops (BC1) recorded within the planning boundary included Wheat (*Triticum* spp.), Barley (*Hordeum vulgare*), Field Beans (*Vicia faba*), Potatoes (*Solanum tuberosum*) and Leek (*Allium ampeloprasum*). Chemical fertilisers and pesticide use means that species diversity within these agricultural habitats is low.

Small areas of **Dry calcareous and neutral grassland (GS1)** are located within the planning boundary (**Appendix 12.4 of Volume 3** *Sheet 1 and 4*). One site in particular (**Appendix 12.4 of Volume 3** *Sheet 4*) has been unmanaged which has resulted in increased biodiversity with wet marshy depressions, and with encroachment of hedgerow and scrub from the field margins. Species recorded within this habitat include Sweet Vernal Grass (*Anthoxanthum odoratum*), Jointed Rush (*Juncus articulates*), Greater Birds Foot Trefoil (*Lotus pedunculatus*), Common Sorrel (*Rumex acetosa*), Meadowsweet (*Filipendula ulmaria*), Mint (*Mentha* spp.), Foxglove (*Digitalis* spp.), Purple Loosestrife (*Lythrum salicaria*), Common Sedge (*Carex nigra*), Meadow Vetchling (*Lathyrus pratensis*), Selfheal (*Prunella vulgaris*), Mouseear, *Carex ledicocarpa*, Marsh Thistle (*Cirsium palustre*), Common Knapweed (*Centaurea nigra*), Silverweed (*Potentilla anserina*), Ribwort Plantain (*Plantago lanceolata*), Lesser Stitchwort (*Stellaria graminea*), Cocksfoot (*Dactylis glomerata*) and Oat Grass (*Arrhenatherum* spp.).

There are **Hedgerows (WL1)** and **Treelines (WL2)** on field boundaries which are of variable quality. Species recorded within these boundary habitats include Ash (*Fraxinius* spp.), Alder (*Alnus* spp.), Whitebeam (*Sorbus aria*), Oak (*Quercus* spp.), Sycamore (*Acer pseudoplatanus*), Cherry (*Prunus avium*), Willow, Hawthorn, Birch (*Betuala* spp.), Blackthorn, Elder (*Sambucus nigra*), Aspen (*Populus tremuloides*), Field Maple (*Acer campestre*) and Holly (*Ilex* spp.). Understorey species included Marsh Foxtail (*Alopecurus geniculatus*), Soft Rush, (*Juncus effusus*), Common Nettle (*Urtica dioica*), Creeping Thistle (*Cirsium arvense*), Woodbine *(Lonicera periclymenum*), Timothy (*Phleum pratense*), Spear Thistle (*Cirsium vulgare*), Cleavers (*Galium aparine*), Field Rose (*Rosa arvensis*), Tufted Vetch, Creeping Buttercup (*Ranunculus repens*), Dog Rose (*Rosa canina*), Sow Thistle (*Sonchus oleraceus*) and Mayweed (*Matricaria* spp.).

On the eastern border of the Templerainy Stream, Gorse (*Ulex europaeus*), dominated **Scrub (WS1)** grades into **Immature woodland (WS2)** which is dominated by Alder (**Appendix 12.4 of Volume 3;** *Sheet 6*). A small area of Gorse dominated **Scrub (WS1)** also borders the Kilbride Stream (**Appendix 12.4 of Volume 3;** *Sheet 7*) and an area south of the M11 (**Appendix 12.4 of Volume 3;** *Sheet 8*). Other species recorded within scrub habitats include: Crested Dogstail (*Cynosurus cristatus*), Hard Rush (*Juncus inflexus*), Common Sedge, Black Medick (*Medicago lupulina*), Wild Carrot (*Daucus carota*), Fuschia (*Fuchsia magellanica*), Catsear (*Hypochaeris radicata*), False Fox Sedge (*Carex otrubae*), Red Clover, Sweet Chestnut (*Castanea sativa*), Alder, Oak, Bramble, Broad Buckler Fern (*Dryopteris dilatate*), Ground Elder (*Aegopodium podagraria*), Willow, Hogweed (*Heracleum* spp.) Herb Robert (*Geranium robertianum*), Common Nettle, Ivy (*Hedera* spp.), Broadleaved Dock (*Rumex obtusifolius*), Horsetail (*Equisetum arvense*), Foxglove, Creeping Thistle, Sycamore, Rosebay

Willowherb (*Chamaenerion angustifolium*), European Gorse, Bittersweet (*Solanum dulcamara*), Curled Dock (*Rumex crispus*), Creeping Buttercup, Yorkshire Fog, Cleavers, Holly, Ash, Honeysuckle (*Lonicera* spp.), Common Ragwort (*Jacobaea vulgaris*), Sanicle (*Sanicula europaea*), Hazel and Bluebell (*Hyacinthoides non-scripta*).

North of the M11 the planning boundary passes through an area of **Mixed broadleaved woodland (WD1)** (**Appendix 12.4 of Volume 3;** *Sheet 8*). This is an old woodland with a well-established ground flora, which is dominated by Sycamore. These trees are regrowth from a previously established woodland plantation (c.50 years old). This woodland is typical of second rotation well-established woodland with understorey species including Ivy, Hard fern (*Blechnum spicant*), Broad Buckler Fern (*Dryopteris dilatata*), Red fescue and Sanicle. Silver Fir (*Albies alba*) were also noted here. North of the track which cuts through this woodland, mature Beech, Holly, Hawthorn and Spindle (*Euonymus europaeus)* were recorded. To the southwest of the mature woodland, areas of **Immature woodland (WS2)** border the M11, where trees were planted during the motorway construction. This area is dominated by Ash and Alder with a poorly developed ground flora.

This woodland area continues northwest towards the substation site (**Appendix 12.4 of Volume 4;** *Sheet 9*). Here **Mixed broadleaved woodlands (WD1)** and **Immature woodland (WS2)** form a mosaic of habitats. It is noted that only patches of this woodland area are located within the planning boundary. This is a planted woodland and includes Norway Maple (*Acer platanoides*) and Grey Poplar (*Populus* × *canescens*) as well as Sycamore and Birch. North of the proposed substation site, succession from **Scrub (WS1)** has created extensive areas of **Immature woodland (WS2)** under 5m in height. Species include Grey Willow (*Salix cinerea*), Birch, Sycamore as well as Hawthorn, Hazel and Spindle within the lower canopy. Some trees here are over 5m in height and these may originate from landscape planting. Along the roadside **Mixed broadleaved woodlands (WD1)** borders the substation site. This area contains planted woodland dominated by Hazel (*Corylus avellana*.), Elm (*Ulmus* spp.) and Alder with a poorly developed ground layer with Bramble and Ivy.

An area of plantation **Mixed broadleaved woodland (WD1)** Sycamore and Beech is located on the outside of the planning boundary to the northeast of the substation site. Over 80% of the trees here are dead. This habitat is likely to provide an important feeding area for Great Spotted Woodpecker (*Dendrocopos major*) and one possible nesting site was noted within this area of woodland outside the breeding season.

Patches of **Recolonising bare ground (ED3)** are located close to the substation site (**Appendix 12.4 of Volume 3;** *Sheet 9*). This includes areas of rubble and a track which has overgrown (approximately 50% cover) due to limited use. This area is dominated by early successional species including Scarlett Pimpernel (*Anagallis arvensis*), Greater Plantain (*Plantago major*) and Groundsel (*Senecio vulgaris*).

12.4.1.3 Habitats Along Cable Route – Aquatic Habitats

Following initial site surveys it was determined that three watercourses i.e. Templerainy Stream, Kilbride Stream and Johnstown North Stream, within the planning boundary were of sufficient size to support fish populations. These small watercourses were therefore selected to carry out fish stock assessments. As part of this assessment a water quality study of these watercourses was carried out using the standard EPA methodology. Full details of this survey are outlined in the *Fish Survey and Water Quality Assessment* included in **Appendix 12.9 of Volume 3.**

The largest watercourse within this area is the Avoca River which is considered a high value habitat due, in particular, to the presence of Atlantic Salmon (*Salmo salar*), Brook Lamprey (*Lampetra planeri*), Sea lamprey (*Petromyzon marinus*) and River Lamprey (*Lampetra fluviatilis*) which are listed on Annex II of the Habitats Directive.

The Templerainy Stream (FW1) is the largest watercourse along the actual cable route (**Appendix 12.4 of Volume 3;** *Sheet 6*). The Templerainy Stream is a moderately sized watercourse and with the exception of the Avoca River is most significant watercourse within the survey area. In the upper catchment north of the M11 motorway, the catchment is dominated by a mixture of pasture and tillage land with areas of riparian woodland in the lower catchment south of the M11 motorway. Ultimately this watercourse discharges to the Irish Sea northeast of Arklow Town.

Nutrient levels within the Templerainy Stream were generally high with substantial algal growth and elevated silt levels noted, due primarily to the presence of a large number of cattle drinking points. The electro-fishing fish stock assessment recorded relatively high numbers of Brown Trout (*Salmo trutta*) and juvenile River/Brook Lamprey, which are listed on Annex II of the Habitats Directive, within this watercourse. IFI noted that a small but significant population of Sea trout has been recorded in the lower Templerainy Stream.

The Kilbride Stream (FW1) is the most significant tributary of the Templerainy Stream and drains a similar catchment of mixed tillage and pasture (Refer to **Appendix 12.4 of Volume 3;** *Sheet 7).* It is of limited size and like the Templerainy Stream, passes under the M11 motorway. The fish stock assessment recorded Brown Trout and European Eel (*Anguilla anguilla*) within the Kilbride Stream. European Eel is listed by the International Union for Conservation of Nature (IUCN) as a critically endangered species, with numbers in catastrophic decline. Although there is some habitat of potential value, no lamprey were recorded and it is considered unlikely that they are present due to the limited size of the watercourse.

The Johnstown North is a small watercourse of limited size and fisheries potential which drains intensively managed pasture and tillage land. The upper reaches of the Johnstown North Stream are characterised by a narrow channel, low flows and high shade levels (**Appendix 12.4 of Volume 3;** *Sheet 2* and *Sheet 3).* It discharges to the sea approximately 1.3km north of Arklow Town.

Although some flowing water was recorded, no fish were captured during the fish stock assessment and the upper reaches of this stream are considered too small to be of value for fish. IFI have noted that Brown Trout do occur within the Johnstown North, however any such population is likely to occur further downstream of the planning boundary, where flows are greater.

A number of other watercourses were recorded within the survey area (Tiknock, Coolboy, Johnstown South, Kilbride Church, Sheepwalk). These were either dry or had insufficient water depth for electrofishing purposes. Whilst the presence of fish in small pockets of deeper water downstream of the survey area cannot be entirely excluded, these small streams are considered of low value for all fish species.

Drainage ditches FW4 with standing water form part of the drainage network around the substation site (**Appendix 12.4;** *Sheet* 9, *Sheet 10* and *Sheet 11*). Species recorded here include Hemp Agrimony (*Eupatorium cannabinum*), Willow, Alder, Horsetail and Angelica (*Angelica archangelica*). Brooklime (*Veronica beccabunga*), Foxglove, Bramble, Holly, Nettle, Creeping Thistle, Bulrush (*Typha latifolia*), Fools Watercress (*Apium nodiflorum*), Remote Sedge (*Carex remota*) and Catsear.

South of the substation site, a small area of **Canal (FW3**), also known as the Shelton Abbey Canal, which is located within the planning boundary (**Appendix 12.4 of Volume 3;** *Sheet 9 and Sheet 11*). This is approximately 10m wide with marsh vegetation growing on its banks including Branched Bur Reed (*Sparganium erectum*)**,** and Soft Rush. The Shelton Abbey Canal, which was previously owned by IFI, extends from the south east of the substation site and flows east discharging into the Avoca River upstream of Arklow Bridge.

12.4.1.4 Habitats within and in proximity to the Substation Site

The proposed substation site is situated in the townland of Shelton Abbey, on the banks of the Avoca River, approximately 2.1km north of Arklow Town. It has an area of approximately 4ha. This is a brownfield site, located in an industrial setting as part of the Avoca River Business Park, and consists of made ground overlying sands and gravels as described in **Chapter 9** *Land and Soils* (See **Appendix 12.4 of Volume 3**).

The substation site is dominated by **Buildings and artificial surfaces (BL3)** (**Appendix 12.4 of Volume 3;** *Sheet 9*). This area is currently paved with asphalt. A small area of **Scattered trees and parkland (WD5)** with planted Poplar (*Populus* spp.) is located to the immediate west of the substation site (**Appendix 12.4 of Volume 3;** *Sheet 9*). This is grazed by cattle.

Areas of **Mixed broadleaved woodlands WD1** and **Immature woodland WS2** form a mosaic of habitats to the north, east and west of the substation site (**Appendix 12.4 of Volume 3;** *Sheet 9*). Northwest of the substation, an area of planted **Mixed broadleaved woodland WD1** includes Norway Maple and Grey Poplar as well as Sycamore and Birch. North of the proposed substation site, succession from **Scrub WS1** has created extensive areas of **Immature woodland (WS2)** under 5m in height.

Species include Grey Willow, Birch and Sycamore as well as Hawthorn, Hazel and Spindle within the lower canopy. Some trees here are over 5m in height and these may originate from landscape planting.

A small linear patch of **Dry meadows and grassy verges GS2** borders the access road (**Appendix 12.4 of Volume 3;** *Sheet 9*). This grassland is of poor quality with coarse grasses including Cocksfoot and False Oat Grass predominant. **Wet grassland GS4** is the dominant grassland habitat of low-lying areas near the substation. It is ungrazed and beginning to be colonised by **Scrub WS1** of Bramble, Willow, Hawthorn and Blackthorn.

Patches of **Recolonising bare ground (ED3)** are located close to the substation site (**Appendix 12.4 of Volume 3;** *Sheet 9*). This includes areas of rubble and a track which has overgrown (approximately 50% cover) due to limited use. This area is dominated by early successional species including Scarlett Pimpernel (*Anagallis arvensis*), Greater Plantain (*Plantago major*) and Groundsel (*Senecio vulgaris*)

South of the substation site, a small area of **Canal FW3** is located within the planning boundary (**Appendix 12.4 of Volume 3;** *Sheet 9* and *Sheet 11)*.

12.4.1.5 Habitats at NETN Connection Working Areas and Flood Defence Improvement

The main habitats recorded in this area occur in a mosaic of **Dry meadows and grassy verges GS2**, **Wet grassland GS4** and **Scrub WS1** in a large field bordered by a **Canal FW3** and **Drainage ditch FW4** to the north and the Avoca River (**Depositing/Lowland River FW2**) to the south (**Appendix 12.4 of Volume 3;** *Sheet 11*).

The southern banks of the Avoca River here are bordered by **Reed and large sedge swamp FS1**, grading into **Dry calcareous and neutral grassland GS1** which is being invaded by **Scrub WS1**. An attenuation pond (**Other artificial lakes and ponds FL8**) is located on the western boundary of this grassland. This drains hard standing areas of the adjacent Avoca River Business Park Industrial Estate. The pond contains stands of vegetation including Bulrush and Common Reed (*Phragmites australis*) (**Appendix 12.4 of Volume 3;** *Sheet 11*).

Approximately 500m west of the substation site the existing Avoca River Business Park Industrial Estate flood defences require improvement works (**Appendix 12.4 of Volume 3;** *Sheet 10*). Habitats recorded within the planning boundary here include a small areas of **Scattered trees and parkland WD5** of mature Monterey Pine (*Pinus radiata*) and an area of **Mixed broadleaved woodland WD1** just south of Shelton Abbey on the Banks of the Avoca River. This habitat is dominated by Sycamore. However, the understorey within this woodland has a dense growth of Himalayan Knotweed and Japanese Knotweed.

Table 12.2. Habitat affected within the survey area and their relative ecological value

Habitats	Comments	Ecological value (NRA guidelines)
Arable crops (BC1)	This is a highly modified habitat with low species diversity and little value for wildlife.	Local importance (Lower value)
Improved agricultural grassland (GA1)	This is a highly modified habitat with low species diversity and low value for wildlife.	Local importance (Lower value)
Dry calcareous and neutral grassland (GS1)	This area has higher species diversity and is therefore of higher ecological value than more intensive agricultural grassland. This habitat has links to the Annex I 'Calcareous grasslands with either high numbers or diversity of orchids correspond to the priority habitat, 'semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometea) (*important orchid sites) (6210)'. However this is not an example of this habitat type.	Local importance (Higher value)
Treelines (WL2)	The treeline habitats within the site are of moderate quality with moderate diversity. Treelines can provide important habitats for local wildlife such as birds, insects, and mammals.	Local importance (Higher value)
Hedgerows (WL1)	The hedgerow habitats within the site are of moderate quality with moderate diversity. Hedgerows can provide important habitats for local wildlife such as birds, insects and mammals.	Local importance (Higher value)
Mixed broadleaved woodland (WD1)	The woodland habitats on site are generally of moderate diversity with a well-developed ground flora and shrub layer. Woodland can provide important habitats for local wildlife such as birds, insects and mammals.	Local importance (Higher value)
Buildings and artificial surfaces (BL3)	Most extensive example is the substation site. Low value habitat which supports some common early successional species.	Local importance (Lower value)
Scattered trees and parkland (WD5)	Small area of parkland located adjacent to the substation site.	Local importance (Lower value)

Habitats	Comments	Ecological value (NRA guidelines)
Recolonising bare ground (ED3)	Most extensive example is the substation site. Low value habitat which supports some common early successional species.	Local importance (Lower value)
Immature woodland (WS2)	The woodland habitats on site are generally of moderate diversity with a poorly developed ground flora and shrub layer. Woodland can provide important habitats for local wildlife such as birds, insects and mammals including bats.	Local importance (Higher value)
Wet grassland (GS4)	This area has higher species diversity and is therefore of higher ecological value than more intensive agricultural grassland.	Local importance (Higher value)
Dry meadows and grassy verges (GS2)	This area has higher species diversity and is therefore of higher ecological value than more intensive agricultural grassland.	Local importance (Higher value)
Scrub (WS1)	This area has higher species diversity and is therefore of higher ecological value	Local importance (Higher value)
Depositing/lowland rivers (FW2) – Avoca River	The Avoca River supports a number of Annex II species of the Habitats Directive i.e. Otter, Atlantic Salmon, Brook Lamprey, River Lamprey and Sea Lamprey as well as other fish species such as Sea Trout, Brown trout and European Eel.	County Importance
Eroding river (FW1) – Templerainy Stream	The Templerainy Stream supports River/Brook Lamprey, an Annex II Habitats Directive species and a substantial population of Brown Trout. This stream is also likely to support Otters (although no signs of Otter were recorded within the survey area).	County Importance
Eroding river (FW1) – Kilbride Stream	The Kilbride Stream is small but supports Brown Trout and European Eel. No lamprey species were here recorded during electrofishing surveys. This stream is also likely to support Otters (although no signs of Otter were recorded within the survey area).	Local importance (Higher value)
Eroding River (FW1) – Johnstown North, Johnstown South, Tiknock, Coolboy, Kilbride Church and Sheepwalk	Dry or low flows within the survey area. IFI noted the presence of Brown Trout within the Johnstown North, Johnstown South, Tiknock and Coolboy. These populations are likely to occur in the lower reaches where there is greater flow.	Local importance (Higher value)

Habitats	Comments	Ecological value (NRA guidelines)
Canal (FW3)	A small canal is located on the southern boundary of the substation site and discharges to the Avoca River upstream of Arklow Bridge. This could potentially provide habitat for amphibian species.	Local importance (Higher value)
Drainage ditches (FW4)	Drainage ditches may connect to higher value habitats and can support some specialised species. A common habitat type and no high value examples were recorded within the survey area.	Local importance (Lower value)
Other artificial lakes and ponds (FL8)	An attenuation pond associated with the Avoca River Business Park could potentially provide habitat for amphibian species such as Common Newt and Common Frog.	Local importance (Higher value)
Rocky sea cliffs CS1	Corresponds loosely to Annex I habitats of the Habitats Directive, 'Vegetated sea cliffs of the Atlantic and Baltic coasts (1230)'. No rare flora were recorded within this habitat.	County importance
Reed and large sedge swamps (FS1)	A small strip of this habitat is located along a section of the Avoca River.	Local importance (Higher value)

12.5 Flora

The site of the development lies within Ordnance Survey National Grid 10km square T27. The National Parks and Wildlife Service (NPWS) rare plant database does not list the presence of any protected plant species within T27 (NBDC 02/11/2020). In addition, no rare, threatened or legally protected plant species, as listed in the Irish Red Data Book (Curtis & McGough, 1988), were found within the planning boundary.

The National Biodiversity Data Centre (NBDC) online database provides data on the distribution of mammals, birds, and invertebrates within 10km grid squares. Some 390 flowering plants are listed by the NBDC as present in the grid square T27.

Of these species listed, five are listed as a threatened species (**Table 12.3**). No rare species were recorded during the site survey, nor are they expected to occur given that the habitats within the works areas are relatively common.

Table 12.3. Threatened Flowering Plant Species recorded within T27

Grid Square	Common Name	Latin Name	Designation
T27	Darnel	*Lolium temulentum*	Threatened Species: Regionally Extinct
	Dwarf Spike-rush	*Eleocharis parvula*	Threatened Species: Endangered
	Meadow Saxifrage	*Saxifraga granulata*	Threatened Species: Regionally Extinct
	Spring Vetch	*Vicia lathyroides*	Threatened Species: Vulnerable
	Wild Asparagus	*Asparagus prostratus*	Threatened Species: Vulnerable

Source: NBDC accessed 16/02/21

12.5.1 Invasive Species

Non-native plants are defined as those plants which have been introduced outside of their native range by humans and their activities, either purposefully or accidentally. Invasive non-native species are so-called as they typically display one or more of the following characteristics or features: (1) prolific reproduction through seed dispersal and/or re-growth from plant fragments; (2) rapid growth patterns; and, (3) resistance to standard weed control methods.

Where a non-native species displays invasive qualities and is not managed it can potentially: (1) out compete native vegetation, affecting plant community structure and habitat for wildlife; (2) cause damage to infrastructure including road carriageways, footpaths, walls and foundations; and, (3) have an adverse effect on landscape quality. The NBDC lists a number of both aquatic and terrestrial high impact invasive plant species which have been recorded within grid square T27 (**Table 12.4**). It should be noted that this data relates to the entire 10km^2 area and these species will not necessarily occur within the proposed site boundary.

Table 12.4. NBDC list of high impact invasive plant species

Common Name	Latin Name
Japanese Knotweed	*Fallopia japonica*
Cherry Laurel	*Prunus laurocerasus*
Rhododendron	*Rhododendron ponticum*
Hottentot-fig	*Carpobrotus edulis*

Source: NBDC accessed 16/02/21

Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 make it an offence to plant, disperse, allow dispersal or cause the spread of certain species e.g. Japanese knotweed and Rhododendron, keep the plant in possession for purpose of sale, breeding, reproduction, propagation, distribution, introduction or release, keep anything from which the plant can be reproduced or propagated from the species, without a granted licence and keep any vector material for the purposes of breeding, distribution, introduction or release. Regulation 49 deals with the '*Prohibition on introduction and dispersal*' while Regulation 50 deals with the '*Prohibition on dealing with and keeping certain species*'. Regulation 50 has yet to be brought into Irish law. Regulation 74 is a transitional provision in relation to Regulation 49 and 50.

The Wildlife (Amendment) Act 2000 states that anyone who plants or otherwise causes to grow in a wild state in any place in the State any species of (exotic) flora, or the flowers, roots, seeds or spores of (exotic) flora shall be guilty of an offence. There is a statutory obligation under S.I. 477 of 2011 of the European Communities (Birds and Natural Habitats) Regulations 2011 to address invasive species in Ireland.

The NBDC also categorizes species listed as invasive in Ireland based on a prioritization risk assessment (Kelly *et al.* 2013). This includes 48 non-native species which are ranked as at risk of having a High Impact and 78 species at risk of having a Medium Impact. While there is a statutory obligation under S.I. 477 of 2011 of the European Communities (Birds and Natural Habitats) Regulations 2011 to address invasive species in Ireland, it should be noted that not all species categorized as high and medium impact by the NBDC are listed under these regulations. However, the NBDC lists species that, under the right ecological conditions, may have an impact on the conservation objectives of a European site or impact on a water body achieving good/high ecological status under the Water Framework Directive.

The high-risk, non-native and invasive species Japanese Knotweed (*Fallopia japonica*) and Himalayan Knotweed (*Persicaria wallichii*) were recorded within the planning boundary on the banks of the Avoca River. The medium impact listed species Buddleia (*Buddleia davidii*) was also recorded on recolonising bare ground within the planning boundary between the M11 and the substation site. Hottentot Fig (*Carpobrotus edulis*) a high impact listed species, was recorded on sea-cliffs close to the landfall location (Refer to **Appendix 12.4 of Volume 3;** *Sheet 13*).

Japanese knotweed is a highly invasive, non-native species which was originally introduced as an ornamental plant but has since spread along transport routes and rivers to become a serious problem. From an ecological viewpoint it out-competes native species by forming dense stands which suppresses growth of other species. It grows extremely vigorously and can penetrate through small faults in tarmac and concrete and thus can damage footpaths, roads and flood defence structures. As it can survive in poor quality soils, including spoil, it often thrives in brownfield sites and in urban areas.

Himalayan knotweed is a terrestrial plant found across many habitats, including disturbed areas, roadsides, forests, and grasslands.

It is highly invasive as it spreads vegetatively, grows quickly, shading out native species, and is a habitat generalist. It can cause declines in native plants, including rare or localised species, due to their quick growth and shading out other plants.

Hottentot Fig was recorded on sea-cliffs close to the landfall location. This species requires sandy soil in a sunny position and is found on loose sand dunes or cliffs being able to tolerate increased salt concentrations. Originally from South Africa, the species has been introduced to many parts of the world and forms dense mats. It is noted that while this species was recorded within the planning boundary, no works will take place within the cliff habitats where it was recorded and therefore there is no potential for this species to be spread during construction works.

The medium impact listed species Buddleia (*Buddleja davidii*) was recorded adjacent to the substation site and the access road to the substation site. Buddleia is also included in the NRA *Guidelines on the Management of Noxious Weeds and Non-native Species on National Roads* (NRA 2010) as this species has been shown to have an adverse impact on landscape quality, native biodiversity or infrastructure.

An Invasive Species Management Plan (ISMP) has been prepared for the project and this is included in **Appendix 6.1** Construction Environmental Management Plan (CEMP***)***.

12.6 Fauna

12.6.1 Bats

In Ireland, nine species of bat are currently known to be resident with the residency of the tenth recorded species yet to be proven.

These are classified into two Families: the Rhinolophidae (Horseshoe bats) and the Vespertilionidae (Common bats). The Lesser Horseshoe Bat *Rhinolophus hipposideros* is the only representative of the former Family in Ireland. All the other Irish bat species are of the latter Family and these include three pipistrelle species: Common *Pipistrellus*, Soprano *P. pygmaeus* and Nathusius' *P. nathusii*, four *Myotids*: Natterer's *Myotis nattereri*, Daubenton's *M. daubentonii*, Whiskered *M. mystacinus*, Brandt's *M. brandtii*, the Brown Long-eared *Plecotus auritus* and Leisler's *Nyctalus leisleri* bats.

Whiskered and Natterer's bats are listed as 'Threatened in Ireland', while the other species are listed as 'Internationally Important' in the Irish Red Data Book 2: Vertebrates (Whilde, 1993). The population status of both Whiskered and Natterer's Bats was considered 'indeterminate' because of the small numbers known of each, a few hundred and approximately a thousand respectively. Ireland is considered to be an international stronghold for Leisler's Bat, whose global status is described as being at 'low risk, near threatened' (LR; nt) by the IUCN (Hutson, *et al*. 2001).

Near threatened status is applied to those taxa that are close to being listed as vulnerable (facing a high risk of extinction in the wild in the medium-term future on the basis of a range of criteria defined by the IUCN). The Irish population of the Lesser Horseshoe Bat is estimated at 14,000 individuals and is considered of International Importance because the species has declined dramatically and become extinct in many other parts of Europe. Data collected shows that the species increased significantly between from the early 1990s to present.

A review of existing bat records within a 10km radius of the planning boundary (sourced from Bat Conservation Ireland's (BCI) National Bat Records Database via the NBDC) indicates that six of the nine Irish bat species listed in **Table 12.5**, have been recorded within T27. It is noted that Nathusius's Pipistrelle have not been included in this database, but they could potentially occur in this general area. However, the closest record for Nathusius's Pipistrelle is approximately 30km southwest of the site (BCI 9 September 2007). Lesser horseshoe bat is the only species of bat listed on Annex II of the Habitats Directive (Directive 92/43/EEC) and does not occur in the east of the country. It is noted that a recent survey at the Avoca River Business Park recorded Lesser Noctule, Common Pipistrelle, Soprano Pipistrelle, Whiskered Bat, Natterer's Bat, Daubenton's Bat, and Brown Long-eared Bat (Aecom 2020).

Table 12.5. Presence of Irish bat species within grid squares T27

Common name	Scientific name	Presence
Lesser Noctule	*Nyctalus leisleri*	Present
Pipistrelle	*Pipistrellus pipistrellus sensu lato*	Present
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Present
Daubenton's Bat	*Myotis daubentoniid*	Present
Natterer's Bat	*Myotis nattereri*	Absent
Brown Long-eared Bat	*Plecotus auratus*	Present
Whiskered Bat	*Myotis mystacinus*	Present
Lesser Horseshoe	*Rhinolophus hipposideros*	Absent
Nathusius's Pipistrelle	*Pipistrellus nathusii*	Absent

Source BCI via NBDC 16/02/21

All bat species are protected under the Wildlife Act 1976, as amended, which make it an offence to wilfully interfere with or destroy the breeding or resting place of all species; however, the Acts permit limited exemptions for certain kinds of development. All species of bats in Ireland are listed in Schedule 5 of the 1976 Act and are therefore subject to the provisions of Section 23 which make it an offence to:

- Intentionally kill, injure or take a bat
- Possess or control any live or dead specimen or anything derived from a bat
- Wilfully interfere with any structure or place used for breeding or resting by a bat

- Wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose.

All bats are listed on Annex IV of the EU Habitats Directive. The domestic legislation that implements this Directive gives strict protection to individual bats and their breeding and resting places. It should also be noted that any works interfering with bats and especially their roosts, including for instance, the installation of lighting in the vicinity of the latter, may only be carried out under a licence to derogate under the European Communities (Birds and Natural Habitats) Regulations 2011 (which transposed the EU Habitats Directive into Irish law) issued by NPWS.

The details with regards to appropriate assessments, the strict parameters within which derogation licences may be issued and the procedures by which and the order, in relation to the planning and development regulations, such licences should be obtained, are set out in Circular Letter NPWS 2/07 *"Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 - strict protection of certain species/applications for derogation licences"* issued on behalf of the Minister of the Environment, Heritage and Local Government on the 16th of May 2007.

Table 12.6 summarises the protection given to bats by national and international legislation and conventions.

Evidence of bat activity associated with potential roost sites includes bat droppings, urine staining, feeding remains and dead/alive bats. Indicators that potential roost locations and access points are likely to be inactive include the presence of cobwebs and general detritus within the apertures. Bats generally make use of large mature trees that contain natural holes, cracks/splits in major limbs, loose bark, hollows/cavities, dense epicormic growth (bats may roost within it) and bird and bat boxes. The importance of trees to bats varies with species, season and foraging behaviour. Evidence indicating bat presence, includes dark stains running below holes or cracks, bat droppings, odours, or scratch marks.

Table 12.6. Legislative protection for bats in Ireland

Legislation/Convention	Relevance to Irish bats
The Wildlife Act 1976, as amended	It is an offence to wilfully interfere with or destroy the breeding or resting place of bats, (with some exemptions for certain kinds of construction development). Provides for the creation of NHAs.
EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Directive 92/43/EEC), commonly known as the 'Habitats Directive, transposed into Irish law by the European Communities (Birds and	Lists all the vesper bats in Annex IV as in need of strict protection and also encourages Member States to conserve landscape features such as river corridors, field boundaries, ponds and woodlands. It also requests that Member States establish a system to monitor the incidental capture and killing of the animals listed in Annex IV. The lesser horseshoe bat is further listed in Annex II of the EU Habitats Directive The level of protection offered

Legislation/Convention	Relevance to Irish bats
Natural Habitats) Regulations 2011	to lesser horseshoe bats effectively means that areas important for this species are designated as Special Areas of Conservation.
The Convention on the Conservation of European Wildlife and Natural Habitats, commonly known as the 'Berne Convention'.	It obliges states to protect and conserve animals and their habitats, especially those listed as endangered or vulnerable. Also obliges parties to promote national policies for the conservation of wild fauna and natural habitats
The Convention on the Conservation of Migratory Species of Wild Animals, commonly known as the 'Bonn Convention'.	This led to the European Bats Agreement (EUROBATS), which lists a wide range of objectives, including promoting research programmes relating to the conservation and management of bats, promoting bat conservation and public awareness of bats, and identifying and protecting important feeding areas of bats from damage and disturbance.

Bats also often use features such as hedgerows, treelines, woodland edges and waterways as commuting pathways between roosts and foraging areas. Sheltering vegetation, such as treelines and woodland, not only acts as cover from potential predators and the weather, but also provides structure for acoustic orientation and navigation. Sheltered areas also allow insects to gather and therefore support bat foraging.

Linear features within the planning boundary, including treelines, hedgerows and streams, have the potential to link roost sites to foraging areas and facilitate the dispersal of bats into the wider landscape. Large areas of pasture with hedgerows and treelines in the surrounding area and outside the planning boundary, have the potential to provide feeding habitat.

No mature trees or buildings, with the potential to be used as significant bat roosting sites, have been recorded within the planning boundary. Overall, it has been concluded that the habitats within the planning boundary are of low to moderate value for foraging bats. Linear features, i.e. treelines, hedgerows, watercourses and more diverse habitats such as woodland, grassland and scrub, provide moderate bat foraging habitat. Arable areas provide low value habitat.

12.6.2 Otter

Otters, along with their breeding and resting places, are protected under the provisions of the Wildlife Act 1976, as amended.

Otters have additional protection because of their inclusion in Annex II and Annex IV of the Habitats Directive which is transposed into Irish law in the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Otters are also listed as requiring strict protection in Appendix II of the Berne Convention on the Conservation of European Wildlife and Natural Habitats and are included in the Convention on International Trade of Endangered species (CITES).

Although rare in parts of Europe, Otters are widely distributed in the Irish countryside in both marine and freshwater habitats. Otters are solitary and nocturnal and as such are rarely seen. Thus, surveys for Otters rely on detecting signs of their presence. These include spraints (faeces), anal gland secretions, paths, slides, footprints and remains of prey items. Spraints are of particular value as they are used as territorial markers and are often found on prominent locations such as grass tussocks, stream junctions and under bridges. In addition, they are relatively straightforward to identify.

Otters occasionally dig out their own burrows but generally they make use of existing cavities as resting placing or for breeding sites. Suitable locations include eroded riverbanks, under trees along rivers, under fallen trees, within rock piles or in dry drainage pipes or culverts etc. If ground conditions are suitable the holt may consist of a complex tunnel and chamber system. Otters often lie out above ground especially within reed beds where depressions in the vegetation called "couches" are formed (NRA, 2008). Generally, holts or resting areas can be located by detecting signs such as spraints or tracks.

In contrast, natal holts which are used by breeding females, can be extremely difficult to locate. They are often located a considerable distance from any aquatic habitats and Otters may also use habitats adjoining small streams with minimal or no fish populations. In addition, natal holts are usually carefully hidden and without obvious sprainting sites. Otters do not have a well-defined breeding season.

It is noted that Otters are largely nocturnal, particularly in areas subject to high levels of disturbance as evidenced by the presence of Otters in the centre of Irish cities. Thus, they are able to adapt to increased noise and activity levels; however, breeding holts are generally located in areas where disturbance is lower.

A review of existing records showed that Otter or signs of Otter have been recorded on two occasions within grid square T27, the most recent being in February 2015 (NBDC). The closest record of Otter relative to the proposed development site is on the Avoca River at Arklow Bridge, approximately 1.8km southwest of the planning boundary. There are no records of Otter on the other watercourses located within the planning boundary (NBDC).

No evidence of Otter was recorded during site surveys within the proposed development site boundary or along fish-bearing watercourses within a radius of 150m of the planning boundary. No breeding holts were recorded.

Otter are most likely to occur within larger watercourses which support fish stocks namely the Avoca, Templerainy, and Kilbride watercourses. The Kilbride Stream supports Brown Trout and Eel and may be utilised by Otters.

However, given its limited size, this is unlikely to be a critical resource for local Otter populations. Otter could potentially feed in the lower reaches of smaller watercourses such as the Johnstown North, outside of the proposed development area.

12.6.3 Other Terrestrial Mammals

Fourteen other species of terrestrial mammal have been recorded within grid square T27, four of which are protected under the Wildlife Act 1976, as amended, namely Badger, Red Squirrel, Pine Marten and Hedgehog.

12.6.3.1 Badger (Meles meles)

Badger (*Meles meles*) and their setts are protected under the provisions of the Wildlife Act 1976, as amended, and it is an offence to intentionally, knowingly or unknowingly kill or injure a protected species, or to wilfully interfere with or destroy the breeding site or resting place of a protected wild animal. Badger setts are formed by a complex group of interlinked tunnels, and therefore works in proximity to setts can potentially cause damage to a protected species.

Badgers are known to occur within the wider landscape (NBDC). Field signs are characteristic and sometimes quite obvious and include tufts of hair caught on barbed wire fences, conspicuous Badger paths, footprints, small excavated pits or latrines in which droppings are deposited, scratch marks on trees, and snuffle holes, which are small scrapes where Badgers have searched for insects and plant tubers.

The **Appendix 12.5 of Volume 3 (***Ecological Survey for Birds* (RPS 2019)) recorded signs of Badger activity within the survey area. While no setts were recorded, latrines and footprints were recorded at various locations. It is noted that the RPS surveys were carried out prior to the finalisation of the planning boundary, and therefore the survey boundary differed from the DixonBrosnan 2020/2021 surveys, (**Appendix 12.6 of Volume 3**). The DixonBrosnan 2020/2021 surveys recorded signs of Badger within woodland and feeding signs were noted in pastureland in the western section of the site (See **Appendix 12.4 of Volume 3).** However, no setts were recorded.

12.6.3.2 Hedgehog (Erinaceus europaeus)

Hedgehog (*Erinaceus europaeus*), also listed on Appendix III of the Berne Convention, can be found throughout Ireland, with male Hedgehogs having an annual range of around 56 hectares. A number of factors are thought to influence the distribution of Hedgehogs in a habitat, with nest sites, food availability and the presence of predators believed to be major contributory factors. Generally, Hedgehogs prefer edge habitat and pasture but in recent years have begun to colonize urban areas. Due to the habitats recorded within the proposed development site and surrounding landscape, Hedgehog is likely to occur.

12.6.3.3 Red Squirrel (*Sciurus vulgaris*)

Red Squirrel (*Sciurus vulgaris*), also listed on Appendix III of the Berne Convention, can be found throughout Ireland. Red Squirrels feed mainly on tree seeds, although they can utilise fungi, fruit and buds as they become available in the woodland. They are found in all types of habitat but typically are in higher densities in mature mixed broadleaved forests.

They can also survive in monoculture coniferous woodland. Red Squirrel is known to occur in the wider area (NBDC records). However, no signs of Red Squirrel were recorded during site surveys and there will not be an impact on high quality habitat for this species during construction works. It is noted that Grey Squirrel, which is a non-native species, were recorded in the woodland to the west of the substation.

12.6.3.4 Pine Marten (*Martes martes*)

Pine Marten (*Martes martes*), also listed Annex V of the EU Habitats Directive 1992 and Appendix III of the Bern Convention 1979, are habitat specialists, requiring forest or scrub habitat to exist in an area. They are adept at climbing trees as they have powerful non-retractable claws. The species is primarily active at night and individuals live in territories that can vary in size from 50 hectares to 400 hectares.

There are no records of Pine Marten within or the vicinity of the planning boundary (NBDC) and no evidence of this species was recorded during site surveys. The proposed route will not impact on high quality habitat for this species.

12.6.4 Reptiles and Amphibians

12.6.4.1 Amphibians

According to records held by the NBDC, Common Frog (*Rana temporaria)* and Smooth Newt (*Lissotriton vulgaris*) are the only amphibians recorded within grid square T27.

Common Frog is listed in Annex V of the EU Habitats Directive and is protected under the Wildlife Acts. The species was not recorded during the site survey although it is likely to occur in wetland habitats within the proposed development site. This species has been recorded on occasion from an attenuation pond in the Avoca River Business Park, into which storm water from the development will be directed.

The Smooth Newt is the only member of the Urodela (the tailed amphibians) found in Ireland. While commonly encountered near water bodies, adult newts are actually terrestrial, only returning to water bodies to breed. They tend to prefer habitats that offer protection from desiccation, such as long grass, woodland and scrubland. Newts will over-winter in refugia such as woodpiles and rotting logs, which offer them some protection from the elements.

The drainage canal and attenuation pond at the Avoca River Business Park could potentially provide habitat for Smooth Newt. A survey was carried out of these water features during May 2018 for an adjacent development (Aecom 2020). No newts were recorded in either the attenuation pond or the canal during the May 2018 survey. It was noted that during this survey, observations of fish were recorded which is a negative indicator of Smooth Newt presence.

12.6.4.2 Reptiles

Common Lizard (*Zootoca vivipara*) has been recorded within grid square T27 (NBDC records), Common Lizard is protected under the Wildlife Act 1976, as amended. It is Ireland's only native terrestrial reptile. Unlike the vast majority of reptiles, it has been found that the Common Lizard often frequents damp habitats, as the humidity has a beneficial effect on growth rate and activity. The species is tolerant, to a degree, of habitat disturbance (it may even use artificial habitats, e.g., railway embankments, hedgerows, and gardens). Due to the habitats recorded within or in proximity to the planning boundary, it is possible that Common lizard could occur. However, no habitats of particular significance for this species will be affected by the proposed development.

12.6.5 Birds

The NBDC online data base lists 132 species of bird recorded within grid square T27. Of these species, a number are listed under Annex I of the Birds Directive and are Red Listed Birds of Conservation Concern in Ireland (Colhoun & Cummins, 2013) (**Table 12.7**).

Table 12.7. Bird species listed under Annex I of the Birds Directive and/or classified as Red Listed Birds of Conservation Concern in Ireland recorded within grid square T27 (NBDC)

Species	Birds Directive Annex	BOCCI
	I	Red List
Arctic Tern (*Sterna paradisaea*)	X	
Barn Owl (*Tyto alba*)		X
Black-headed Gull (*Larus ridibundus*)		X
Common Kingfisher (*Alcedo atthis*)	X	
Common Redshank (*Tringa totanus*)		X
Common Tern (*Sterna hirundo*)	X	
European Golden Plover (*Pluvialis apricaria*)	X	X
European Nightjar (*Caprimulgus europaeus*)	X	X
Hen Harrier (*Circus cyaneus*)	X	
Herring Gull (*Larus argentatus*)		X
Little Egret (*Egretta garzetta*)	X	
Little Gull (*Larus minutus*)	X	
Little Tern (*Sternula albifrons*)	X	
Mediterranean Gull (*Larus melanocephalus*)	X	
Merlin (*Falco columbarius*)	X	
Peregrine Falcon (*Falco peregrinus*)	X	
Red-throated Diver (*Gavia stellata*)	X	
Sandwich Tern (*Sterna sandvicensis*)	X	
Yellowhammer (*Emberiza citrinella*)		X

Source: NBDC 16/02/21

12.6.5.1 Breeding Bird Surveys Along Cable Route and Substation Site

Breeding bird surveys were carried by DixonBrosnan in July 2020 and by RPS in July 2019. These surveys focused on habitats within the planning boundary. During the surveys, all birds seen or heard within the proposed development site were recorded. Signs of birds were also noted e.g. nests. The majority of birds utilising the proposed works areas are common in the local landscape. Full details of the breeding bird surveys carried out by DixonBrosnan and RPS are included in **Appendix 12.5 and Appendix 12.6 of Volume 3.** It is noted that the survey area for the DixonBrosnan and RPS surveys differed slightly due to changes in the planning boundary between 2019 and 2020.

Birds species listed in Annex I of the Birds Directive are considered a conservation priority. Certain bird species are listed by BirdWatch Ireland as Birds of Conservation Concern in Ireland (BOCCI). These are bird species suffering declines in population size. BirdWatch Ireland and the Royal Society for the Protection of Birds have identified and classified these species by the rate of decline into Red and Amber lists. Red List bird species are of high conservation concern and the Amber List species are of medium conservation concern. Green listed species are regularly occurring bird species whose conservation status is currently considered favourable. Species recorded during the DixonBrosnan breeding bird surveys within the survey area are shown in **Table 12.8**.

The large assemblage of bird species recorded during the surveys is reflective of the wide range and variety of habitats found within the survey areas and the wider landscape. The species recorded are typical of the species generally present within this type of agricultural landscape.

Overall, much of the area within the planning boundary is intensively managed farmland, both arable and pasture. The majority of breeding birds are therefore restricted to hedgerows and treelines along field boundaries. Kingfisher *Alcedo atthis*, which are listed in Annex I of the Birds Directive, are known to breed on the Avoca River (IFI 2012). This species was recorded outside the planning boundary just upstream of Arklow Bridge during the RPS survey of the site in July 2019.

Less common species including Grey Wagtail *Motacilla cinerea* (Red listed), Yellowhammer *Emberiza citrinella* (Red List), Meadow Pipit *Anthus pratensis* (Red List), Skylark *Alauda arvensis* (Amber List) and Spotted Flycatcher *Muscicapa striata* (Amber List) were also recorded. Red Kite *Milvus milvus* (Amber List) which has been recently reintroduced was recorded during the July 2020 surveys. A Great Spotted Woodpecker nest was recorded in the woodland habitat just north of the planning boundary to the northeast of the substation site. However as this was observed outside the breeding season, breeding could not be confirmed. This species is a recent arrival in Ireland and now breeds within County Wicklow.

Table 12.8: Bird Species recorded during DixonBrosnan 2020 site surveys

Common name	Breeding status within survey area	Highest breeding evidence	Conservation status
Blackbird	Confirmed	Recently fledged young	N/A
Blackcap	Confirmed	Female carrying food	N/A
Blue Tit	Possible	Singing male	N/A
Buzzard	Non breeding		N/A
Chaffinch	Confirmed	Recently fledged young	N/A
Chiffchaff	Possible	Singing male	N/A
Dipper	Possible	Patrolling territory	N/A
Dunnock	Possible	Singing male	N/A
Garden Warbler	Possible	Singing male	N/A
Goldfinch	Possible	Singing male	N/A
Great Spotted Woodpecker	Possible	Nest site noted (outside breeding season)	N/A
Great Tit	Confirmed	Recently fledged young	N/A
Grey Wagtail	Non breeding		N/A
Hooded Crow	Non breeding		N/A
House Sparrow	Possible	Singing male	Amber listed
Jackdaw	Non breeding		N/A
Kestrel	Non breeding		Amber listed
Linnet	Non breeding		Amber listed
Mallard	Possible	Family group	N/A
Meadow Pipit	Possible	Territorial flight display	Red listed
Mistle Thrush	Possible	Suitable habitat	Amber listed
Pheasant	Possible	Suitable habitat	N/A
Pied Wagtail	Possible	Male display flight	N/A
Red Kite	Non breeding		Amber listed
Robin	Confirmed	Recently fledged young	Amber listed
Rook	Possible	Suitable habitat	N/A
Skylark	Possible	Males singing	Amber listed

Common name	Breeding status within survey area	Highest breeding evidence	Conservation status
Song Thrush	Confirmed	Recently fledged young	N/A
Spotted Flycatcher	Probable	Parents with chick	Amber listed
Starling	Possible	Suitable habitat	Amber listed
Swallow	Possible	Suitable habitat	Amber listed
Willow Warbler	Confirmed	Male carrying food	N/A
Woodpigeon	Possible	Suitable habitat	N/A
Wren	Confirmed	Recently fledged young	N/A
Yellowhammer	Possible	Suitable habitat	Red listed

12.6.5.2 Breeding Birds Cliff Survey

On 21 July 2020 an assessment was carried out of cliff habitats in the vicinity of the landfall location, to determine their potential for breeding seabirds. Further details of this survey are included in **Appendix 12.7 of Volume 3**. Cliffs within 300m northeast and 300m southeast of the landfall location were assessed for signs of breeding birds such as staining.

The cliffs within the survey area were relatively low. Ledges and crevices were absent and therefore these habitats do not provide potential nesting sites for sea birds. Given the limited height of the cliffs within the survey area, which are largely vegetated and lack crevices or similar, the potential for breeding seabirds is minimal. A small sea stack within the survey area was used by roosting Cormorant during the survey. However, it is considered of low value as a potential site for seabird breeding. No evidence of breeding bird activity was recorded during the survey and overall, the cliffs are considered of negligible value as breeding bird habitat.

12.6.5.3 Winter Bird Surveys

Winter bird surveys were carried out along the coastal waters near the landfall location. Detailed descriptions of the baseline winter bird surveys are included in **Appendix 12.7 of Volume 3**.

Six surveys were conducted between November 2019 and March 2020. On each visit, counts were taken from three vantage points overlooking the coastal waters On each visit, three counts were made of the coastal waters at Arklow town, Johnstown North and at Johnstown South . At each point, a 180^{o} scan using a 20x telescope and 8x binoculars was made of the inshore waters and all species of wildfowl, waders and gulls were recorded.

Bird usage was dominated by gulls and small numbers of piscivorous bird species such as Common Guillemot (*Uria aalge*), Red Throated Diver (*Gavia stellate*) and Cormorant (*Phalacrocorax carbo*). Red Throated Diver is listed on Annex I of the Birds Directive. Two Red Listed gull species, namely Black-headed Gull (*Chroicocephalus ridibundus*) and Herring Gull (*Larus argentatus*), were recorded during the site surveys.

Overall, the proposed landfall location is not considered of high value for sea birds and lacks the large areas of mudflat habitat which provide high quality feeding habitat for wading birds in winter.

12.6.5.4 Whooper Swan and Curlew Surveys

Following consultation with the NPWS a site to the northeast of the landfall location was identified which could provide potential feeding and roosting grounds for terrestrial waders and waterfowl. This site, located near Ennereilly Beach, is an area of rough grassland which is frequently inundated with water. Between here and the mouth of the Red Cross stream are a number of fields which could potentially provide foraging and roosting habitat for terrestrial wading birds and waterfowl. This area is of particular interest for Whooper Swan and Curlew. No wading birds or waterfowl were recorded at this site on any of the survey dates between November 2020 and February 2021. Further detail on this survey is included in **Appendix 12.7 of Volume 3**.

12.6.5.5 Summary of Bird Data

Overall, the survey area is of a local value for a range of terrestrial bird species that are relatively common in the Irish countryside and the proposed development area is not of significant value for birds.

12.6.5.6 Other Species of Conservation Value

Of particular note are Habitats Directive Annex II species which have been recorded in this area or which could potentially occur.

Marsh Fritillary (*Euphydryas aurinia*) is listed on Annex II of the Habitats Directive. Colonies can occur in a wide variety of habitats including sand dunes, calcareous grassland, fens, bogs and upland heaths and grasslands.

The presence of its foodplant Devil's-bit Scabious, *Succisa pratensis* is an essential habitat component. There are no NBDC records of Devil's-bit Scabious within or near the planning boundary and this species was not recorded during site surveys. During the RPS 2019 survey, two adult Marsh Fritillary butterflies were recorded close to Shelton Abbey in a field east of the M11, on the banks of the Avoca River. While part of this field is within the planning boundary, there will be no habitat removal within this area. No habitats of significant value for this species will be affected and no Marsh Fritillary were recorded during 2020 site surveys.

There are eight species of the whorl snails in Ireland, and three are protected under Annex II of the Habitats Directive, *Vertigo geyeri, V. angustior* and *V. moulinsiana*. These species are all dependant on stable and specific ground water conditions, and as they only live for just over a year, they are vulnerable to the effects of negative changes in wetness conditions and have been lost from many sites both in Ireland and across the EU. There are no records of these Annex II whorl snails within the planning boundary (NBDC). These three species have not been recorded during site surveys and no habitats suitable for this species were recorded.

No other threatened or uncommon species were recorded during site surveys. Given the limited amount of permanent habitat loss associated with the project, the relatively common nature of the habitats recorded and the short-term nature of the impacts, no impact on rare or uncommon species is predicted to occur.

12.7 Characteristics of the Proposed Development

The proposed development will comprise the onshore grid infrastructure including 220kV onshore export cables and fibre optic cables, from the landfall of the offshore export cables at Johnstown North, to a proposed new 220kV substation at Shelton Abbey and overhead line connection from the new substation to the National Electricity Transmission Network (NETN). An overview of the proposed development is shown in **Chapter 5** *Description of Development***, Figure 5.1**.

The proposed development will provide:

- Landfall for two offshore export cable circuits from the High Water Mark (HWM) to two Transition Joint Bays (TJB) at Johnstown North, located approximately 4.5km northeast of Arklow Harbour,
- Connection by two underground 220kV high voltage alternating current cable circuits, and fibre optic cables over a distance of c. 6km, from the landfall to the new onshore 220kV substation,
- A new onshore 220kV substation, to be located at Shelton Abbey, north of the Avoca River, approximately 2.1km northwest of Arklow Town consisting of two connected compounds:
    1. The transmission compound with the infrastructure to physically connect to the NETN, and
    2. The connection compound with the infrastructure to allow the connection of the windfarm in accordance with EirGrid grid code requirements.
- Flood defence improvement works to the existing Avoca River Business Park flood defences located c. 500m west of the substation site;
- A 220kV overhead line connection from the new 220kV substation at Shelton Abbey to the existing 220kV transmission network located c. 200m from the substation site.

12.8 Likely Significant Effects

Annex III of the amended Directive 2014/52/EU requires that the EIAR should assess:

a) The magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected)

b) The nature of the impact

c) The transboundary nature of the impact

d) The intensity and complexity of the impact

e) The probability of the impact

f) The expected onset, duration, frequency and reversibility of the impact

g) The cumulation of the impact with the impacts of other existing and/or approved projects and

h) The possibility of effectively reducing the impact.

The potential impacts of the construction, operational and decommissioning phases of proposed development on terrestrial and aquatic biodiversity include:

- Potential Effects on Terrestrial and Aquatic Habitats During Construction and Operation
- Potential Effects from Non-native Invasive Species During Construction
- Potential Effects on Fish During Construction and Operation
- Potential Effects on Otters During Construction and Operation
- Potential Effects on Bats During Construction and Operation
- Potential Effects on Badgers During Construction and Operation
- Potential Effects on Other Mammals During Construction and Operation
- Potential Effects on Birds During Construction and Operation
- Potential Effects on Other Fauna During Construction and Operation
- Potential Effects on Water Quality and Aquatic Ecology During Construction
- Potential Effects on Water Quality and Aquatic Ecology During Operation
- Potential effects on Air Quality During Construction and Operation
- Potential Effects on Climate Change and Biodiversity
- Potential Effects of Decommissioning

12.8.1 Impact Assessment

When describing changes/activities and impacts on ecosystem structure and function, important elements to consider include positive/negative, extent, magnitude, duration, frequency and timing, and reversibility (CIEEM, 2019).

Section 3.7 of the *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports'*, (EPA 2017) provides standard definitions which have been used to classify the effects in respect of ecology. This classification scheme is outlined below in **Table 12.9.**

Table 12.9. EPA Impact Classification

Impact Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment.
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative	A change which reduces the quality of the environment.
Significance	Imperceptible	An effect capable of measurement but without significant consequences.
	Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging trends.
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound	An effect which obliterates sensitive characteristics.
Duration and Frequency	Momentary Effects	Effects lasting from seconds to minutes.
	Brief Effects	Effects lasting less than a day.
	Temporary Effects	Effects lasting less than a year.
	Short-term	Effects lasting one to seven years.
	Medium-term	Effects lasting seven to fifteen years.
	Long-term	Effects lasting fifteen to sixty years.
	Permanent	Effects lasting over sixty years.
	Reversible Effects	Effects that can be undone.
	Frequency	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect.

Impact Characteristic	Term	Description
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents.
	'Worst Case'	The effects arising from a development in the case where mitigation measures substantially fail.

12.8.2 "Do Nothing" Scenario

Most of the habitats to be affected have been significantly modified from their natural state by human activity. In pockets of semi-natural habitats within the planning boundary, the general pattern of succession from recolonising bare ground to patches of grassland to woodland would be expected to continue. In the absence of development, it is expected that the lands within the planning boundary would largely remain under the same management regimes. No significant changes to the habitats within the boundary are likely to occur, in the "do nothing" scenario.

12.8.3 Potential Effects on Terrestrial and Aquatic Habitats During Construction and Operation

Direct effects on terrestrial and aquatic habitats are generally restricted to direct removal of habitats. Potential indirect effects include the spread of invasive species and impacts on water quality during construction and operation. Based on the classification scheme outlined by EPA, 2017, as described above, the predicted effects in the absence of mitigation are detailed in **Table 12.10.**

It is intended that the land along the cable route will be reinstated and returned to its current use post-construction, although future access for inspection and maintenance purposes will be required. Once construction is completed, the only visible above ground structures along the cable route will be small marker posts to indicate the location of the cables and manhole covers associated with joint bays. However, the Developer will require a permanent wayleave of 15m along the cable route. Within the permanent wayleave where it crosses farmland, the wayleave agreement allows the planting of crops and shallow rooted plants, to facilitate ongoing agricultural use, during operation of the proposed development. Planting of deep-rooted plants, such as tall trees, are precluded within the permanent wayleave. Smaller native trees and hedgerow plants, such as Hawthorn and Blackthorn, will be planted to replace sections of affected treelines and hedgerows within the planning boundary.

The cable corridor crosses a number of watercourses as shown in **Chapter 6** *Construction Strategy*, **Figure 6.14** and **Table 6.6**.

The chosen route minimises the crossings of roads and watercourses, and HDD is being used where necessary to minimise impacts on habitats of greater value such as larger watercourses i.e. Templerainy Stream and the cliffs at the landfall site. The Sheepwalk Stream will be crossed by HDD, if HDD is the method chosen for crossing the M11.

Once felling and site clearance works are complete and subject to the ground conditions encountered, the M11 HDD crossing will require an over-pumping arrangement similar to that described for open-cut cable trench watercourse crossings, which will be over a length of approximately 50m of the Sheepwalk Stream below the HDD bore trajectory and adjacent to a temporary HDD working area on the west of the M11. Therefore, both HDD and open cut trench methods have considered in the potential impacts on Sheepwalk Stream listed in **Table 12.10.** An open cut trench method will be utilised for other watercourse crossings i.e., Kilbride, Johnstown North, Johnstown South, Tiknock, Coolboy and Kilbride Church. It is noted that the existing culvert on the Johnstown South Stream will be increased from 300mm to 900mm in diameter.

During the open cut crossings, temporary works will be required to enable the cable duct installation. A number of techniques have been proposed including over-pumping, culvert/flume pipe, cable trench installation and bridge/bottomless culvert. Further detail on these proposed techniques is included in **Chapter 6** *Construction Strategy*. This will lead to a temporary loss of instream habitat during crossing works. It is noted that mitigation measures outlined in **Section 12.9.1.2**, including reinstatement of stream bed and bank habitats following construction, will ensure that impacts on stream habitats are temporary.

While there will be some loss of river habitat during open cut crossings, this impact will be slight, not significant and temporary. Details of potential impacts on fish are discussed in **Section 12.8.5** 12.8.5and impacts on water discussed in **Chapter 10** *Water***.**

While the planning boundary includes the coastline at the landfall site for the cable, the HDD methodology will avoid cliff and cove habitats. The cable landfall joint bay is located c.100m from cliff and cove habitats and therefore there will be no direct impact on cliff and cove habitats during the construction or operational phase.

The surface water, collected on the substation site, will drain via an attenuation pond to the Avoca River. While the conductors of the new overhead line connection to the NETN will cross the Avoca River, the pilot lines for stringing the new conductors will be taken across the river by boat or drone and therefore there will be no instream river crossing for the Avoca River. Further details on the construction methodology are included in **Chapter 6** *Construction Strategy.* The Avoca River will not be directly affected, and no direct fish surveys were considered necessary.

Table 12.10. Impacts on Habitats

Habitat	Ecological value (NRA guidelines)	Potential impacts
Arable crops (BC1)	Local importance (Lower value)	Negative, slight, temporary impact.
Improved agricultural grassland (GA1)	Local importance (Lower value)	Negative, slight, temporary impact.
Dry calcareous and neutral grassland (GS1)	Local importance (Higher value)	Negative, slight, temporary impact
Treelines (WL2)	Local importance (Higher value)	Negative, moderate, medium-term impact
Hedgerows (WL1)	Local importance (Higher value)	Negative, moderate, medium-term impact
Mixed broadleaved woodland (WD1)	Local importance (Higher value)	Negative, moderate, long-term impact
Buildings and artificial surfaces (BL3)	Local importance (Lower value)	Neutral, not significant, permanent impact
Scattered trees and parkland (WD5)	Local importance (Lower value)	Negative, slight, permanent impact
Recolonising bare ground (ED3)	Local importance (Lower value)	Negative, slight, not significant, permanent impact
Immature woodland (WS2)	Local importance (Higher value)	Negative, moderate, short-term impact
Wet grassland (GS4)	Local importance (Higher value)	Negative, slight, short-term impact
Dry meadows and grassy verges (GS2)	Local importance (Higher value)	Negative, slight, permanent impact
Scrub (WS1)	Local importance (Higher value)	Negative, slight, permanent impact
Depositing lowland rivers (FW2) – Avoca river	County Importance	Negative, not significant, temporary impact
Eroding river (FW1) – Templerainy Stream	County Importance.	Neutral, not significant, temporary impact
Eroding river (FW1) – Kilbride Stream	Local importance (Higher value)	Negative, slight, temporary impact
Eroding river (FW1) – Johnstown North, Tiknock, Coolboy, Kilbride Church and Sheepwalk	Local importance (Higher value)	Negative, slight, temporary impact
Eroding river (FW1) – Johnstown South	Local importance (Higher value)	Negative, not significant, permanent impact
Canal (FW3)	Local importance (Higher value)	Neutral, not significant, temporary impact
Drainage ditches (FW4)	Local importance (Lower value)	Negative, slight, permanent impact
Other artificial lakes and ponds (FL8)	Local importance (Higher value)	Neutral, not significant, temporary impact
Rocky sea cliffs CS1	County Importance	Neutral, imperceptible, temporary impact
Reed and large sedge swamp (FS1)	Local importance (Higher value)	Neutral, not significant, temporary impact

12.8.4 Potential Effects from Invasive Species During Construction

Two high-risk invasive species namely Japanese Knotweed and Himalayan Knotweed were recorded within the proposed development area. Two other invasive species namely the Hottentot Fig and Buddleia were also recorded. Hottentot Fig is classified as a high impact invasive species by the NBDC. It is noted that while Hottentot Fig was recorded within the planning boundary, no works will take place within the cliff habitats and therefore there is no potential for this species to be spread during construction works. Buddleia is classified as a medium impact invasive species by the NBDC. There is potential during the construction phase for invasive species to be spread within the planning boundary, thus impacting negatively on adjoining habitats.

Japanese Knotweed and Himalayan Knotweed are spread by plant and rhizome fragments of plants or in contaminated soil. Mitigation measures during construction will ensure that no movement of soil or plant material potentially containing fragments of these species outside of the currently contaminated area will take place. An Invasive Species Management Plan (ISMP) has been prepared for the project and this is included in **Appendix 6.1,** *Construction Environmental Management Plan (CEMP)*.

Buddleia is spread by seeds as well as stem and root fragments.

Buddleia will be removed from within the planning boundary via mechanical movement and herbicide treatment if required. Therefore, there will be no risk from the spread of these species during the construction phase.

The risk from the spread of invasive species to Natura 2000 sites is negligible due to the limited potential for the spread of invasive species over large distances. Any potential risks from these species will be dealt with during the construction phase as detailed in the Invasive Species Management Plan (ISMP) and therefore, no risk from the spread of invasive species during the operational phase has been identified.

12.8.5 Potential Effects on Fish During Construction and Operation

12.8.5.1 Potential Effects of Fish – Direct Loss of Habitat

The Templerainy Stream will be crossed via HDD. Details on the HDD construction methodology area included in **Chapter 6** *Construction Strategy***.** There will be no direct impact on fish from habitat loss within the Templerainy Stream during construction and no effect on fish from habitat loss in the Templerainy Stream is predicted to occur. The Sheepwalk Stream may also be crossed via HDD, if HDD is used for the M11 crossing. However, as noted in **Section 12.8.3**, an over-pumping arrangement will take place over a length of

approximately 50m of the Sheepwalk Stream to facilitate the temporary HDD working area.

The remaining streams within the planning boundary i.e. Kilbride, Johnstown North, Tiknock, Coolboy, Johnstown South and Kilbride Church will be crossed via an open cut methodology. Details of the open cut methodology are included in **Chapter 6** *Construction Strategy*. Potential impacts on water quality are discussed in **Section 12.8.12**.

The culvert on the Johnstown South Stream will be upgraded from a 300mm to a 900mm culvert. Therefore, the impact on this stream will be negative, slight and permanent.

The Kilbride Stream is a small watercourse but is of sufficient size to support Brown Trout and European Eel where conditions are suitable. It is noted that this is the most significant tributary of the Templerainy Stream, which supports Annex II species River/Brook Lamprey and populations of Sea Trout in its lower reaches. The open cut crossing method could potentially impact on Brown Trout and European Eel in the Kilbride Stream, however the effect will be temporary and slight. Potential impacts on water quality are further addressed in **Section 12.8.12**.

The Johnstown North stream is a small watercourse of limited size and no fish were recorded at the proposed crossing point. It drains intensively managed pasture and tillage land. Given the limited value of the Johnstown North Stream for fish, there will be no significant effect on fish during the open cut crossing.

A number of small streams within the survey area were either dry or lacked sufficient depth within the survey area to be of value for fish (Tiknock, Coolboy, Johnstown South, Kilbride Church and Sheepwalk). Although these streams were of insufficient size to be of value for fish at the crossing points, fish species such as Brown Trout and European Eel may occur in deeper pockets of water lower down the catchment and therefore these species could potentially be affected by works upstream. It is also noted that some of these streams are tributaries of larger watercourses as follows:

- Sheepwalk Stream discharges to the Avoca River
- Tiknock Stream discharges to the Templerainy Stream
- Coolboy Stream discharges to the Tiknock Stream which discharges to the Templerainy Stream
- Kilbride Church Stream to the Sheepwalk Stream

It is noted that these are small streams which are likely to be dry or have low flows during the crossing period. Given the limited size of these streams and the low level of flows, if any, the effects on these watercourses will be not significant.

The proposed cable route does not cross the Avoca River and no instream works will take place here. The conductors of the new overhead line connection to the NETN will cross the river.

A drone or boat will be used to carry the pilot line across the Avoca River. No works will be required for landing/berthing of drone or boat. Therefore, the Avoca

River will not be directly affected and there will be no direct impact on fish species within the Avoca River.

12.8.5.2 Potential Effects on Fish - Noise and Vibration

Noise and vibration associated with the HDD crossing of the Templerainy Stream could potentially create vibration impacts which could impact on lamprey moving through the Templerainy Stream. HDD works will also take place in proximity to the Kilbride Church and under the Sheepwalk Stream. However, it is noted that these streams are small in size and within the study area, lack sufficient depth to provide critical resources for fish. Piling works will also be carried out at the substation site and near the landfall location. However, no potential impact on fish from these works areas has been identified due to the distance from suitable freshwater habitats.

Fish species that lack a gas-filled cavity, and deep-sea species, are not as vulnerable to trauma from extreme sound pressure changes as fish with a gas-filled space. The possible effects of sound upon behaviour include communication between conspecifics and detection of predators and prey. Such effects may have consequences at the population-level and may affect the viability of the species (Hastings and Popper 2005). A range of responses has been observed when the behaviour of wild fish has been studied in the presence of man-made sounds. Some fish have shown changes in swimming behaviour and orientation, including startle reactions (Pearson *et al*. 1992).

There is limited information or standard noise criteria for possible impacts on fish, however the United States National Marine Fisheries Service (NMFS) developed a set of interim injury and disturbance criteria, which have been broadly adopted (Popper *et al*. 2014). Refer to **Table 12.11**. The criteria are based on very sparse information from limited field studies, and as such should be treated with caution, however it is thought that the current criteria are overly conservative, and as such the assessment can be taken as the worst case (Popper *et al*. 2014).

Table 12.11. Auditory injury and disturbance criteria of fish

Effect	Exposure Limit (dB re 1uPa)
Onset of physical injury in fish	206
Onset of behavioural disturbance	150

Source Popper *et al.* (2014)

It is noted that most studies have focused on works such as piling which have the potential to create more noise and vibration disturbance. Nedwell *et al.* (2012) details the findings of underwater noise monitoring conducted during HDD operations in a shallow riverine environment, while drilling was taking place directly below the riverbed.

The environment was quiet, with no other potential noise sources, and the resulting underwater noise levels are reported as 129.5dB re 1µPa on the riverbed. This is below the figure of 150 dB re 1uPa noted above. This would be analogous to the crossing of the Templerainy Stream via HDD although the depth at which drilling will take place will be different. Where other HDD works take place within the planning boundary, these are located further away from watercourses. Therefore this noise level (129.5dB re 1µPa on the riverbed) on the Templerainy Stream is the worst case scenario for HDD works within the planning boundary. Although the impact of underwater noise and vibration will depend on the species and their method of hearing, HDD is not generally considered a significant source of underwater noise and vibration.

It is noted that HDD works are temporary, and it is proposed to use HDD at a depth of more than 10m below the riverbed (at an anticipated maximum depth of approximately 20m). Therefore, no barriers to movement have been identified and there will be no impact on Annex II migratory species such as Sea Trout and River/Brook Lamprey. Overall the impact HDD on fish will be negative, not significant and temporary.

12.8.5.3 Potential Effects on Fish - Operational Phase Effects from Electromagnetic Fields (EMF)

The following details of the proposed development are relevant to potential Electromagnetic Fields (EMF). The nominal HVAC voltage will be 220kV, with maximum export capacity of 520MW. In addition, as part of the onshore cable route it is proposed to use horizontal directional drilling (HDD) under the Templerainy and Sheepwalk Streams, at a depth of more than 10m below the riverbed, in order to avoid any impacts on the river itself. It is noted that at all locations for the proposed development the magnetic field levels are below the EMF Recommendation/ICNIRP 1998 public limit, including directly above the cables. Further detail on EMF at the proposed development is provided in **Appendix 18.1** of the EIAR.

The focus of research on the impacts of EMF on fish has been on sub-sea cabling for windfarms. Reviews of sub-sea cable EMF are provided by CMACS (2003), Gill *et al.* (2005) and Normandeau Associates *et al.* (2011). The following summary is based on these reviews.

There is no evidence that lampreys respond to magnetic B fields (Gill & Bartlett 2011). A number of researchers have shown physiological responses to electric fields (Normandeau Associates 2011). Chung-Davidson *et al.* (2008) examined the behavioural and neuroendocrine responses of adult sea lampreys to weak electric fields. Wild-caught adult Sea Lampreys, captured during the spawning migration, exhibited little active behaviour during exposure to weak electric fields and spent the most time attached to the wall of the testing arena near the cathode. This may suggest attraction. Hormonal responses of males and females differed, and the authors suggested that electroreception may modulate the reproductive systems in adult male Sea Lampreys. They also suggested that electrical stimuli mediate different behaviours from feeding-stage and spawning-stage Sea Lampreys.

Empirical data demonstrating an ability in salmonids to respond to EMFs are sparse. Nevertheless, it has been shown experimentally that Sockeye Salmon *Oncorhynchus nerka*, which have magnetite in their nose area, can respond to DC magnetic fields (Walker *et al.* 1988; Putman *et al*. 2014). If altered magnetic fields are detectable by Atlantic Salmon they may be perceived as attractive, adverse, confusing or neutral stimuli. However, the ability of any organism to sense a stimulus does not necessarily mean it will respond behaviourally to that stimulus in any or all situations. Studies to date suggest that while Atlantic Salmon in laboratory conditions can detect changes in EMF, this does not translate to changes in behaviour is field based studies (Svenson 2004; Armstrong *et al.* 2015).

A number of engineering solutions can be applied to mitigate against the potential impact of EMF on migratory fish. These are outlined in detail in Normandeau *et al.* (2011). There are a variety of aspects of the design and installation of submarine cables that affect magnetic field levels in the cable vicinity.

The proposed development will use a combination of mitigation measures, i.e., burial depth and cable configuration to effectively reduce any EMF emitted from the proposed cabling. Given that these measures will be implemented and the limited time period that migratory fish species will be present within the stream, no significant effect on fish species within the Templerainy Stream is expected to occur.

12.8.6 Potential Effects on Otter During Construction and Operation

No signs of Otter or Otter breeding holts were recorded during site surveys. However, Otter are likely to forage within the streams which pass through the planning boundary and in the surrounding landscape. In particular Otter will be expected to utilise riverine habitats along the Avoca, Templerainy and Kilbride watercourses as all of these rivers support fish populations on which Otter can feed. The proposed cable route will cross the Templerainy and Kilbride streams and this could potentially result in loss of habitat, reductions in water quality and subsequently loss of prey availability for Otter during the construction phase. During construction and operation there will be increased noise and activity associated with the proposed development which could result in disturbance or displacement of Otter.

The overhead line conductors for the connection to the NETN, on the southern side of the substation, will be installed by crossing the Avoca River. The pilot lines for stringing the new conductors will be taken across the river by drone or boat and therefore no instream works will be required. The Templerainy Stream will be crossed via HDD. Therefore, there will no impact on water quality, foraging habitat or prey availability for Otters within the Avoca River or Templerainy Stream.

The Kilbride Stream is a small watercourse but is of sufficient size to support Brown Trout and European Eel where conditions are suitable. This will be crossed using an open cut method.

A fish salvage operation will be carried out during construction and fish captured during the works will be safely relocated (Refer to **Section 12.9.1.9**). This will result in a small loss of potential feeding habitat during the crossing works. Works will be temporary and will be carried out during the July to September period to minimise impacts on fish stocks. Mitigation measures for water quality, lighting and noise will also ensure that impacts on Otter are minimised. Given the temporary nature and timing of work as well as the likely success of proposed mitigation measures, the open cut crossing of the Kilbride will have no significant effect on fish stocks and no significant effect on prey availability for Otter will occur.

The proposed construction activities will result in an increase in noise and disturbance, however it will not be significant in the context of Otter's ability to move away from and/or adapt to short-term disturbance. Construction works will primarily take place during normal working hours which will avoid the largely nocturnal foraging habits of Otter. HDD works will take place over a 24 hour period. However such works will be temporary and mitigation measures for night-time works will ensure light and noise levels will be kept to a minimum. Any disruption of Otter foraging behaviour will be temporary and slight. Noise will return to previous levels following construction along the cable route and Otter are expected to continue to use habitats within the planning boundary following construction. It is noted that a detailed pre-construction Otter survey will be carried out within 150m of the proposed development area.

Based on the absence of Otter breeding sites, the short-term nature of construction works and the likely success of proposed mitigation measures, the effect on Otter during the construction phase will be short-term, slight and not significant.

During the operational phase, noise and activity levels at the substation will be low. With the exception of minimal security lighting, external lighting at the substation will also be turned off during hours of darkness and will be directional to minimise spillage onto surrounding habitats (Refer **to Chapter 5** *Description of Development* for details on operational lighting).

Overall, the effect on Otter is predicted to be temporary and slight along the cable route and permanent and slight at the substation site during operation. The effect will be localised and will not significantly affect overall Otter populations as there will be no significant loss of critical habitat or prey.

12.8.7 Potential Effects on Bats During Construction and Operation

12.8.7.1 Potential Effects on Bat Roosting Habitats

No existing buildings will be affected. Although woodland, treelines and hedgerows along the route corridor will be affected, no significant trees with high potential value as bat roosts were recorded. Generally, the trees to be affected are relatively young and lack the age and structural elements that would provide high value breeding habitat.

However, mitigation measures will be implemented during the tree felling process to ensure the effect on potential bat roosting habitat will be not significant (Refer to **Section 12.9.1.11**).

12.8.7.2 Potential Effects on Bat Foraging Habitats and Commuting Routes

Linear features within the planning boundary, including treelines, hedgerows and streams, have the potential to provide foraging areas, to link roost sites to foraging areas and facilitate the dispersal of bats into the wider landscape. Woodland areas can provide high value feeding resources.

During the construction phase, a number of treelines and hedgerows will be partially removed within the temporary working width (c. 30m) to facilitate the laying of the cable and this has the potential to cause short-term loss of feeding habitat and habitat fragmentation along the cable route. There will also be a loss of woodland habitats.

It is noted that the majority of habitats within the working width will be reinstated following construction. As discussed in **Chapter 5** *Description of Development*, the Developer will require a permanent wayleave of c.15m along the cable route. Within this permanent wayleave planting of shallow-rooted plants will be allowed during operation but planting of deep-rooted plants is precluded. Therefore hedgerows or treelines removed within the permanent wayleave will be replanted with smaller native hedgerow species, such as Hawthorn, following the construction phase. Within the temporary working width, outside the c.15m permanent wayleave, hedgerows and treelines will be reinstated with a range of native tree and hedgerow species. Biodiversity enhancement planting will also be provided at the landfall to ensure that there is no net-loss of habitat as a result of the proposed development.

The loss of semi-natural habitat along the proposed cable route will reduce the feeding area available for bats. The effect will be short term where habitats will be reinstated, however the loss will be permanent and local where habitats such as woodland are permanently removed. Impacts on bats during the construction phase are predicted to be slight to moderate, negative and medium-term.

12.8.7.3 Effects on Bats during Operation

During the operational phase, noise and activity levels at the substation will be low. With the exception of minimal security lighting, external lighting at the substation will also be turned off during hours of darkness and will be directional to minimise spillage onto surrounding habitats. Motion sensor technology will be used to control lighting at access doors and security gates.

Overall, the effect on bats is predicted to be long term and slight. The impacts will be localised and will not significantly affect overall bat populations as there will be no significant loss of critical resources for bats.

12.8.8 Potential Effects on Badgers During Construction and Operation

Both the 2019 and 2020 surveys noted signs of Badger within the planning boundary (**Refer to Appendix 12.4 of Volume 3;** *Sheet 15*). However, no badger setts were recorded within the planning corridor. Although tillage areas are generally of lower value for Badgers there are large areas of grassland and smaller areas of woodland habitat which are of potential value for this species. Badgers could potentially be affected via loss of habitat, increased noise and disturbance.

Based on the survey data, there are Badgers foraging within the survey area and therefore the proposed route will have a short-term effect on feeding resources for Badgers. Badgers utilise different types of setts (Subsidiary, Annexe, Main and Outlier) and usage of these setts varies. From the count of main setts, the mean density of Badger social groups in Ireland has been estimated at 1 group per $2km^2$ (Smal, 1995). A higher density of setts generally occurs on good quality pasture which is grazed by cattle.

As signs of Badger were recorded within the survey area it can be concluded that the proposed project will impact on Badger territories within the survey area. However no setts will be directly affected. Under the NRA guidelines (NRA, 2006a) where loss of habitat is likely to be greater than 25%, the effect may be considered as significant on the affected social group. Given the limited area of habitat potentially affected, the linear nature of the works which means that only a relatively small proportion of the potential territory of a given social group will be affected and short-term impact associated with the project, the impact from loss of Badger habitats will not be significant.

Whilst there will be an increase in noise and disturbance associated with the project, most of the site work will be confined to daylight hours when Badgers are below ground and when levels of disturbance will not be significant. Where HDD works are carried out over a 24 hour period, this effect will be short term.

It is concluded therefore that the removal of habitats within the proposed planning boundary and noise/disturbance associated with construction will not have significant effects on Badger populations although slight, temporary changes in feeding patterns may occur during construction. No Badgers or signs of Badgers were recorded in the vicinity of the substation. Therefore, the impacts on Badger during the operational stage will be neutral and imperceptible. Overall, the effect of the proposed development is predicted to be slight to imperceptible during construction and imperceptible in the long-term.

12.8.9 Potential Effects on Other Mammals During Construction and Operation

Other mammal species which are protected under the Irish Wildlife Act 1976, as amended, such as Pine Marten, Hedgehog, and Red Squirrel could potentially occur within the planning boundary. However, the habitats to be affected are common and there is no evidence to indicate that the proposed development areas are of particular value for these species in the context of the surrounding countryside.

Effects on these species due to loss of habitat, increased noise and disturbance and lighting are predicted to be temporary and slight during construction and imperceptible during operation.

12.8.10 Potential Effects on Birds During Construction and Operation

12.8.10.1 Effects on Birds in Terrestrial Habitats

The terrestrial bird species recorded during the bird surveys are typical of the types of habitat noted within the planning boundary and are generally common. Three red-list species i.e., Yellowhammer, Grey Wagtail and Meadow Pipit were recorded, but no Annex I species were recorded within the planning boundary.

During the construction phase there will be a short term loss (of grassland habitats) to medium term loss (of hedgerows/treelines and woodland habitats). There are semi-natural and highly modified habitats within the planning boundary. The loss of trees and hedgerows/treelines will have a localised effect on nesting and feeding resources for species which are relatively common within the Irish agricultural landscape. Treelines provide important ecological corridors and foraging grounds for birds.

It is noted that tree felling and hedgerow removal will be conducted outside the breeding season to ensure there will be no impact on breeding birds (1st of March to the 31st of August).

Kingfisher could potentially forage along the watercourses within the proposed development site. The proposed cable route will cross the Templerainy and Kilbride streams and this could potentially result in loss of habitat, reductions in water quality and subsequently loss of prey availability for Kingfisher during the construction phase. No instream works will take place within the Avoca River or the Templerainy Stream and therefore no impact on prey availability for Kingfisher will occur within these watercourses. An open cut crossing method will be used for the Kilbride Stream. However, given the temporary nature and timing of the works as well as the likely success of the proposed mitigation measures, the open cut crossing of the Kilbride will have no significant effect on fish stocks and no significant effect on prey availability for Kingfisher will occur (See **Section 12.8.11** for further detail).

It is noted that the majority of habitats within the working width will be reinstated following construction. The Developer will require a permanent wayleave of 15m along the cable route. Planting of deep-rooted plants is precluded, and tall trees will not be replanted within the permanent wayleave of 15m along the cable route. However, smaller native trees and hedgerow plants, such as Hawthorn, will be used to reinstate treelines and hedgerows over the permanent wayleave. Where habitat cannot be reinstated, compensation habitat will be provided at the landfall to ensure that there is no net-loss of habitat as a result of the proposed development. Overall, the impact on terrestrial birds during construction will be negative, slight and temporary to short term.

During the operational phase, with particular reference to the substation site, the levels of activity will stabilise, with only occasional visits for inspection and maintenance which will not create significant levels of noise and disturbance. It is noted that the substation site is proposed within an existing industrial/brownfield site and therefore there is noise derived from human activity in the surrounding landscape. The effects on birds in habitats adjoining the proposed development is therefore predicted to be long term and imperceptible during operation.

12.8.10.2 Effects on Coastal/Shoreline Birds

Bird surveys were carried out during the winter and summer seasons to determine the degree to which the shoreline habitats and waters in proximity to the proposed development site are utilised by birds. A total of 12 bird species were recorded during the winter bird surveys carried out in 2019/2020. One Habitats Directive Annex I species, Red-throated Diver and two Red Listed species were recorded, Black-headed Gull and Herring Gull.

Surveys carried out at the cliffs on and near the landfall location during the breeding season found no evidence of breeding bird activity.

An area c.300m northwest of the landfall location was noted by the NPWS as an area of interest for wading birds and waterfowl, in particular Whooper Swan and Curlew. Monthly surveys were carried out at this site between November 2020 and February. No species of interest were recorded.

Full details of the survey methodologies described above are included in **Appendix 12.7 of Volume 3**.

Overall, the proposed landfall site is not considered of high value for sea birds and lacks the large areas of mudflat habitat which provide high quality feeding habitat for wading birds in winter. Bird usage is dominated by gulls and small numbers of piscivorous bird species such as Common Guillemot and Cormorant. Although Red Throated Diver is listed on Annex I of the Birds Directive, this species is widely distributed around the Irish coasts at low densities.

Effects on coastal birds within and in the vicinity of the planning boundary could potentially arise during construction when levels of noise, vibration, light and disturbance will increase. However, the use of a HDD methodology will significantly reduce the potential for significant effects. It is noted that the launch pit for HDD will be located a considerable distance from the shoreline (c.100m) and will not be visible by birds using marine or shoreline habitats.

The potential effects and impacts of disturbance have been widely recognised in wildlife conservation legislation, as has the need to develop conservation measures for birds whilst taking human activities into account. Optimal foraging theory is a useful basis from which to understand likely effects of disturbance on feeding. Many studies have shown that birds concentrate where feeding is best.

If birds are forced temporarily or permanently to leave these places, then there is an increased risk that their foraging ability will suffer. However, the severity of this type of situation and the way in which birds respond, varies in a very complex way.

The multiplicity of variables underlying the observed interactions between birds and people makes it difficult to assess the cause and implications of a particular instance of disturbance. The magnitude of disturbance to birds may arise from synergistic effects of more than one activity.

Burger (1981), in a study of a coastal bay, found that birds were present 42% of the time when people were present, but birds were present 72% of the time when people were absent. Human activities such as jogging or grass mowing, which involved rapid movement or close proximity to roosting birds, usually caused them to flush (fly away). Slow-walking birdwatchers and clammers did not usually cause birds to flush. Gulls and terns were least affected and usually returned to where they had been; ducks usually flushed and flew to the centre of the pond; and herons, egrets and shorebirds were most disturbed and flushed to distant marshes.

The magnitude and predictability of impacts as a result of disturbance ranges between species, seasons, weather, source and duration of disturbance, degree of previous exposure of the individuals to disturbance and the occurrence of additional disturbances. Most disturbances to wetland birds result in an interruption to normal activity and the displacement of birds over variable distances, often into sub-optimal habitats. This can be critical during severe winters and can lead to a reduction in the carrying capacities of important wintering wetland sites. However, in general studies show that most bird species have the ability to habituate to regular and continual sources of noise and visual disturbance.

Migratory birds generally have to cope with narrow physiological and energetic balances and are often bound to fixed time-schedules (e.g. Piersma, 1994). Hence, they heavily depend on the resources they find at their stop-over sites en route between breeding and wintering areas, and any serious disturbance or other human impact may easily disturb the precarious balance the birds are subject to. Eventually winter survival and breeding success, and thus population levels, might be affected as well (e.g. Fox and Madsen 1997).

No nesting seabirds or waterfowl were recorded in the vicinity of the landfall site and no mudflats habitat suitable for wintering birds was recorded within the zone of influence of the proposed works. Works with the potential to generate the greatest noise and vibration impacts are the piling works at the substation site (2km from coast) and north of the landfall site (100m from coast). While piling works may represent a significant increase from background noise levels, these works will be temporary in nature.

The construction phase of the proposed development, in particular the HDD works, will temporarily increase noise and disturbance in proximity to coastal/marine habitats. However, given the lack of valuable habitats for wintering waterbirds or breeding seabirds, the distance from the launch pit to coastal habitats, visual screening of the construction works, the availability of alternative habitat and the temporary nature of the works, the impact on wintering and coastal birds will be temporary and imperceptible.

If significant effects on water quality were to occur it could impact on fish stocks or macro-invertebrate populations which provide food resources for birds. Following the implementation of the mitigation and monitoring measures outlined in **Chapter 10** *Water* no significant residual effects on water quality are envisaged during the construction phase. Given the dilution provided in the marine environment and the inert nature of bentonite which will be used during the HDD process, the impact on water quality even assuming a worst-case scenario will be negligible and the impact on birds would be imperceptible. Refer also to **Sections 12.8.11 and 12.8.12** below for potential effects on water quality.

Construction works at the landfall site will be temporary (c.10 months) and will avoid impacts to coastal habitats through HDD techniques. Overall, given the scale and temporary nature of the works, the absence of extensive mudflats and the low density of sea birds, the effects on coastal/shoreline birds will be temporary and slight during construction. During the operational phase the impact on birds will be imperceptible.

12.8.10.3 Potential Effects on Other Fauna During Construction and Operation

No signs of amphibians or reptiles were recorded within or in proximity to the planning boundary. No newts were recorded in the canal or the attenuation pond at the Avoca River Business Park during a May 2018 survey (Aecom 2020). However, amphibians could potentially occur in wetland habitats within the planning boundary including the attenuation pond at the Avoca River Business Park.

Maintenance works, including de-silting and jet cleaning may be required at the attenuation pond and the existing drainage network at the Avoca River Business Park. These maintenance works will be temporary and any amphibians which are present are likely to continue to use the pond following these works.

The proposed development area is only likely to support common invertebrate species. Given that the habitats which will be affected are relatively common in the surrounding landscape and, given the limited scale and short-term nature of the construction works, any effect on these species will be slight during construction and imperceptible in the long-term during operation.

12.8.11 Potential Effects on Water Quality and Aquatic Ecology During Construction

HDD drilling has the potential to release drilling fluids into the surface environment through frac-outs, whereby drilling fluids are released through fractured bedrock into the surrounding rock and sand and travels toward the surface. However, as drilling fluids consist of a bentonite clay-water mixture they are not classified as toxic. **Chapter 6** *Construction Strategy* provides more information on the HDD methodology.

Given that bentonite is chemically inert, impacts would generally be restricted to smothering of habitats and macroinvertebrates. Given the dilution provided in the receiving waterbody, the impact of such a spill would be temporary and slight.

The impact of a frac-out on fish such as European Eel, Sea Trout and lamprey which could potentially be moving through the Templerainy Stream would be temporary and slight to negligible as significant direct effects on fish would not occur unless there was a very serious frac-out over a prolonged time period. The implementation of good construction management practices as outlined in **Chapter 6** *Construction Strategy* means that the probability of a prolonged frac-out occurring is extremely low.

The open cut methodology, which will be used on the Kilbride Stream and other minor watercourses, has the potential to generate increased silt levels and there is the potential for minor spills of hydrocarbons from construction machinery. The impact of increased silt and minor spills of hydrocarbons would not have a significant impact in the context of the limited potential for significant accidental discharges and the timing of works outside the peak spawning period for salmonids. **Section 12.9** below describes the mitigation measures proposed in order to avoid water quality impacts.

Brown Trout and European Eel were recorded within the Kilbride Stream, which is a tributary of the Templerainy Stream. There will be temporary displacement of these species from the works area during the open cut crossing and free movement of fish will be prevented during this period. However this will be a temporary impact and standard mitigation measures will be implemented during crossing works to ensure that water quality is not significantly impacted. Overall, it is concluded that the crossing of the Kilbride and Johnstown North Streams will have a temporary, slight effect on water quality and aquatic ecology.

Most of the effects from the construction of the cable route will be within terrestrial habitats and common agricultural habitats such as arable fields and intensively farmed grassland. Minor impacts on water quality could occur due to minor localised run off of surface water during construction, use of concrete and minor contamination of surface water and ground water due to minor leaks of hydrocarbons from machinery. However, it is noted that no direct discharge of water from excavations to streams or rivers is proposed.

The HDD compounds have been located above the flood plain, which is an embedded mitigation which minimises the risk of flood events contributing to uncontrolled run-off of polluted water.

A layer of contaminated soil was encountered in the site investigation of the substation site (Refer to **Chapter 5** *Description of Development*). This could potentially impact on groundwater through leaching to the underlying aquifer. The implementation of the remedial strategy will result in a reduction in the percolation of rainfall through the contaminated made ground. This in turn will reduce leachate generation from the made ground and reduce groundwater contamination on the site. This will result in a slight beneficial impact on the underlying aquifer. (Refer to **Chapter 9** *Land and Soils* for further detail).

The Avoca River Valley pNHA is upgradient and/or too far from the proposed development for there to be a potential impact to either the groundwater regime or groundwater quality for these habitats from the construction phase of the works. The effect of the proposed development on these habitats is considered negligible and will not be considered further.

The Arklow Town Marsh is a pNHA located approximately 750m downstream of the proposed connection to the NETN. The Avoca River forms the southern boundary of this large wetland area. The Arklow Town Marsh is likely to be in hydraulic connection with the both the Avoca River and the connection to the NETN as the area is underlain by gravels.

The Arklow Sand Dunes pNHA is hydrologically connected to the proposed development site via the Templerainey Stream. If contamination enters the Templerainy Stream or the Kilbride Stream, which is a tributary of the Templerainy Stream, during the construction phase it has the potential to enter the Arklow Sand Dunes pNHA.

As described in **Chapter 9** *Land and Soils*, groundwater quality in the gravel aquifer which underlies the connection to the NETN site may be altered in the short term, due to accidental spillage during construction related activities (i.e. fuels or lubricants) or temporarily due to mobilisation of contaminants during the removal of contaminated soil. In addition, the marsh is in hydraulic connectivity with the Avoca River, which is already classed as 'polluted' by the EPA and the recent ground investigation (GII 2020). The magnitude of this potential temporary effect on the water quality of the marsh is considered to be small adverse.

Localised pumping of excavations required as part of the construction phase at structures at the connection to the NETN site or installation of the cable could result in a temporary change in groundwater levels or supply to the habitat area. However, considering the distance from the site (750m to Arklow Town Marsh and 600m to Arklow Sand Dunes, at its closest point), and the temporary and localised nature of the dewatering required, the effect on groundwater supply is considered imperceptible.

There will be two HDD drill bores at the landfall, each is expected to have a maximum outer diameter of approximately 1118mm, and each will contain a duct of approximately 800mm removing a small portion of the bedrock aquifer. Similarly, excavations required for the landfall HDD compounds will also remove or damage localised areas of the underlying bedrock. These activities are localised and considered insufficient to affect the overall integrity of the underlying aquifer. Therefore there will be no significant loss of aquifer due to the HDD drilling and excavations. Overall there will be no significant impact on groundwater quality during construction works. Therefore the impact on the Arklow Town Marsh pNHA and Arklow Sand Dunes pNHA via groundwater will be imperceptible.

A range of mitigation measures have been specified in **Chapter 10** *Water*. Given the likely success of these mitigation measures, negative effects on surface water and groundwater during the construction phase will be negative, temporary and slight to not significant. Impacts on the Arklow Sand Dune pNHA following the implementation of these mitigation measures will be negative, temporary and imperceptible.

The effect on water quality and aquatic ecology during construction is predicted to be short term and not significant to slight.

12.8.12 Potential Effects on Water Quality and Aquatic Ecology During Operation

It is intended that the land along the cable route will be reinstated and returned to its current use post-construction. Once construction is completed, the only visible above ground structures along the cable route will be small marker posts indicating the location of the cables and manhole covers at joint bays. Therefore, operational impacts are in reference to the substation only.

The main hydrological feature in the vicinity of the substation is the Avoca River, which is located approximately 220m southwest of the proposed substation location. A small canal drain, which is connected to the Avoca River, is also located on the southern boundary of the substation site. Part of the Avoca River is also located within the planning boundary (as shown in **Figure 5.1** in **Chapter 5** *Description of Development*). The surface water drainage system for the substation has been designed to accommodate the proposed development. It will use elements of the existing site drainage infrastructure, including the attenuation pond, pumps and outfall to the Avoca River. Maintenance will be carried out and elements such as pumps replaced, if necessary. A hydrobrake will be installed to the existing attenuation pond outfall, limiting the existing gravity fed outfall to a maximum greenfield discharge rate of the existing facilities and planned developments within Avoca River Business Park. Details on drainage at the site are provided in **Chapter 5** *Description of Development*, **Chapter 6** *Construction Strategy* and **Chapter 10** *Water*.

As detailed in these chapters, following attenuation, the proposed surface water system has sufficient capacity to adequately deal with any surface water arising from the site during operation.

There will be infrequent visits by personnel to the substation, therefore, foul wastewater generated will be minimal. Foul wastewater will be collected and stored prior to removal from site by a licensed service provider. Further details are provided in **Chapter 5** *Description of Development.*

Oil, petrol and diesel will be stored at the substation site during operation. The proposed development will be constructed in accordance with the relevant design standards by means of best practice measures under appropriate engineering supervision.

Based on the above it has been concluded that the impact on local water quality and water quality in downstream receptors, including the Arklow Town Marsh pNHA will be imperceptible during operation.

12.8.13 Potential Effects on Air Quality During Construction and Operation

The primary concern in relation to air quality arises from the possible deposition of dust from construction operations on vegetation and within watercourses.

Even taking a worst-case scenario, the impact on aquatic habitat will be temporary and negligible. No rare species or habitat types were recorded in proximity to the proposed route and the impact on flora and habitats is predicted to be temporary and negligible. During operations, there is no potential for dust emissions.

12.8.14 Potential Effects – Climate Change and Biodiversity

The EU Commission guidance document on integrating climate change and biodiversity into environmental impact assessment (EU Commission, 2013) aims to improve the way in which climate change and biodiversity are integrated into Environmental Impact Assessment. Key principles specified by the document when considering impacts include the following:

- Consider climate change at the outset;
- Analyse the evolving environmental baseline trends;
- Take an integrated approach;
- Seek to avoid biodiversity and climate change effects from the start;
- For biodiversity, EIA should focus on ensuring ‘no net-loss’;
- Assess alternatives that make a difference in terms of climate change and biodiversity;
- Use ecosystem-based approaches and green infrastructure as part of the project design and/or mitigation measures; and
- Assess climate change and biodiversity synergies and cumulative effects which can be significant.

It is noted that the majority of habitats within the working width will be reinstated following construction. As not all habitat can be reinstated, biodiversity enhancement planting will be provided to ensure that there is no net-loss of habitat as a result of the proposed development.

The proposed development will be an integral part of a project to transmit 520MW (MEC) of renewably generated electricity from Arklow Bank Wind Park Phase 2 to the NETN. This will further the Irish Government’s objectives with regard to increasing the generation and supply of renewable electricity and reducing the emissions of greenhouse gases. This will be an important contribution to reducing the effects of climate change on biodiversity and the environment.

The potential effects from the proposed development on climate have been specifically addressed by **Chapter 7** *Climate*. No significant interactions between the effects on biodiversity resulting from this development and climate change have been identified.

12.8.15 Potential Effects of Decommissioning

As mentioned in **Chapter 5** *Description of Development*, once the proposed development reaches the end of its useful life, it may be either refurbished and replaced, or it will be decommissioned. The normal asset life of a substation is c. 50 years but may be extended beyond this.

The cables will be decommissioned when the project ceases operation, at the same time as decommissioning of the substation. On decommissioning, the cables and associated ducts will most likely remain in-situ as there would be more environmental impact in removing these than can be justified by the recycle value of cable material and as is standard industry practice. However, all above ground infrastructure will be removed and these areas fully reinstated.

If decommissioned, all buildings and above ground structures on the substation site will be removed.

As the site of the substation is generally of low biodiversity interest, the impact of decommissioning will be temporary and not significant following the implementation of standard mitigation measures.

12.9 Mitigation Measures and Monitoring

The mitigation measures have been drawn up in line with current best practice and include an avoidance of sensitive habitats at the design stage and mitigation measures will function effectively in preventing significant ecological impacts. The following mitigation measures will be implemented:

A Construction Environmental Management Plan (CEMP) has been prepared (included in **Appendix 6.1** of this EIAR). The CEMP contains the construction mitigation measures, which are set out in this EIAR and the NIS.

Mitigation measures (of relevance in respect of any potential ecological effects) will be implemented throughout the project, including the preparation and implementation of detailed method statements. The works will incorporate the relevant elements of the guidelines outlined below:

- *The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*. National Roads Authority, Dublin (2010).
- *Control of water pollution from construction sites. Guidance for consultants and* contractors (C532). CIRIA. H. Masters-Williams et al (2001)
- *Control of water pollution from linear construction projects. Technical guidance (C648).* CIRIA. E. Murnane, A. Heap and A. Swain. (2006)

All personnel involved with the proposed development will receive an on-site induction relating to construction and operations and the environmentally sensitive nature of European sites and to re-emphasise the precautions that are required as well as the precautionary measures to be implemented. Site managers, foremen and workforce, including all subcontractors, will be suitably trained in pollution risks and preventative measures.

All staff and subcontractors have the responsibility to:

- Work to agreed plans, methods and procedures to eliminate and minimise environmental impacts,
- Understand the importance of avoiding pollution on-site, including noise and dust, and how to respond in the event of an incident to avoid or limit environmental impact;
- Respond in the event of an incident to avoid or limit environmental impact;
- Report all incidents immediately to the project manager and the Environmental (Ecological) Clerk of Works (ECoW);
- Monitor the workplace for potential environmental risks and alert the site manager if any are observed; and
- Co-operate as required, with site inspections.

12.9.1 Construction Phase

12.9.1.1 Water quality

As part of the assessment of the required construction mitigation, best practice construction measures which will be implemented for the proposed development were considered. A summary of the measures relevant to hydrology are provided as follows and are in accordance with Construction Industry Research and Information Association (CIRIA) guidance – *Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors* (Masters-Williams *et al*. 2001). Further detail is provided in **Chapter 6** *Construction Strategy*, **Chapter 9** *Land and Soils*, **Chapter 10** *Water*, and in the CEMP included in **Appendix 6.1**.

To minimise the potential for elevated silt levels in surface water run-off, the working area used during construction will be clearly outlined prior to the commencement of works and will be kept to the minimum area necessary to effectively complete the works. Vegetation will be retained where possible.

A set of standardised emergency response procedures will govern the management of emergency incidents, as outlined in **Chapter 19** *Major Accidents and Disasters*. These are provided in the CEMP (which is a live document which will be updated/added to as construction progresses), which includes an Emergency Response Plan.

A detailed spillage procedure will be put in place and all staff on site will be trained with respect to the relevant procedures to be undertaken in the event of the release of any sediment, hydrocarbons into a watercourse. Spill kits will be maintained on-site and relevant staff will be trained in their effective usage. All site personnel will be trained and aware of the appropriate action in the event of an emergency, such as the spillage of potentially polluting substances. In the event of spillage of any polluting substance and/or pollution of a watercourse, Wicklow County Council, IFI and the NPWS shall be notified.

Specific environmental control measures to minimise the effect on the hydrological regime, water quality and flooding as outlined in the CEMP include:

General

- Good housekeeping (site clean-ups, use of disposal bins, etc.) will be implemented on the site;
- No materials will be stored in flood plains or in areas which would impede flood flow paths;
- Where possible, soil excavation will not be completed during periods of prolonged or heavy rain;
- Earthworks operations shall be carried out such that surfaces shall be designed with adequate falls, profiling and drainage to promote safe run-off and prevent ponding and flooding;
- All construction compounds will be in areas that are at low risk of flooding (outside the 1 in 100-year flood zone);
- Secure oil and chemical storage in over-ground bunded areas, limited to the minimum volume required to serve immediate needs with specified delivery and refuelling areas;
- No refuelling or fuel storage within 50m of watercourse and only on a sealed surface;
- Emergency spill kits retained onsite at sensitive locations;
- Cessation of work and development of measures to contain and/or remove pollutant should an incident be identified;
- Silt traps will be employed and maintained in appropriate locations;
- Temporary interception bunds and drainage ditches will be constructed up slope of excavations to minimise surface runoff ingress and in advance of excavation activities;
- Excavation and earthworks will be suspended during and immediately following periods of heavy rainfall to minimise sediment generation and soil damage;
- Weather warnings will be monitored during construction to ensure that there is no flood risk to construction workers installing the cable. A risk assessment will be carried out in the case of a weather warning to determine what works can proceed, and what works need to be postponed;
- The temporary foul drainage at the construction compounds will comprise self-contained sanitary facilities, with wastewater stored and tankered off-site to appropriately licensed treatment facilities;
- Earthworks haulage will be along predetermined routes along existing national, regional and local routes for importation and exportation of materials, in accordance with the Construction Traffic Management Plan (CTMP) included in the CEMP. Haulage along the cable route will be along internal haul roads/access tracks, where practicable.

Where compaction occurs due to truck movements and other construction activities on unfinished surfaces, remediation works will be undertaken to reinstate the ground to its original condition. Where practicable, compaction of any soil or subsoil which is to remain in situ along the sites will be avoided.

- The excavated material storage area will be at least 50m from any watercourse and material side slopes will be commensurate with the type of material, to ensure slope stability and prevent erosion. The stockpile will be surrounded in silt fencing.
- Any existing field drainage present crossing the landfall site will be temporarily diverted or facilities put in place to over-pump to settlement ponds prior to discharge of treated water into the existing surface water drainage system.
- Field drains will be reinstated on completion of the works or new drainage installed to match the drainage characteristics of the ground prior to development. The landowner will be consulted on the proposed drainage provisions prior to any installation.
- Earthworks operations shall be carried out such that surfaces shall be designed with adequate falls, profiling and drainage to promote safe runoff and prevent ponding and flooding. Runoff will be controlled through erosion and sediment control structures appropriate to minimise the water impacts. Care will be taken to ensure that surfaces are stable to minimise erosion.
- Excavated topsoils will be stockpiled using appropriate methods to minimise the impacts of weathering. Care will be taken in reworking this material to minimise dust generation, groundwater infiltration and generation of runoff. Any surplus suitable material excavated that is not required elsewhere for the proposed development, shall be used for other projects where possible, subject to appropriate approvals/notifications.
- In order to reduce the compaction and erosion of topsoil outside the areas of direct construction, haulage routes will be along predetermined routes within and outside the proposed development. Where compaction occurs due to truck movements and other construction activities on unfinished surfaces, remediation works will be undertaken to reinstate the ground to its original condition. Where practical, compaction of any soil or subsoil which is to remain in-situ within the proposed development will be avoided.
- The Contractor will ensure that any topsoil or subsoil is assessed for re-use within the proposed development ensuring the appropriate handling, processing and segregation of the material. Where practical the removal of soil from the proposed development will be avoided. All earthworks will be undertaken in accordance with TII Specification for Road Works (SPW) Series 600 Earthworks and project specific earthworks specifications ensuring that all excavated material and imported material is classified using the same methodology so as to allow maximum opportunity for the reuse of materials on site.

- All excavated material, where possible will be reused as construction fill. The appointed Contractor will ensure acceptability of the material for reuse for the proposed development with appropriate handling, processing and segregation of the material.
- All improvement works will be closely monitored and supervised and will be enclosed by silt barriers (e.g. straw or silt fence) to prevent any runoff into surface water bodies and will be carried out in accordance with the CEMP.
- Horizontal movement monitoring of the sheet piles will be implemented during construction activities to ensure that movement does not exceed the design limitations. Appropriate remedial actions will be implemented should there be any exceedance of design limitations.

Cable Route General Measures

- Any groundwater or rainwater that collects in a trench will be pumped to locations agreed with the landowners and local authorities. Typically, this will be onto adjacent land, not directly into waterways, and through a filter medium, to avoid the build-up of silt, as some granular material will, inevitably, be pumped out with the water. The pump flowrates will match that of the water into the trench, as it must be kept generally free of water. A single pump with a 75mm hose will usually be adequate to deal with rainwater running into a trench. A similar arrangement will apply at joint bays, where a sump will be cast into the concrete base for a pump
- Any bentonite (or similar HDD drilling head lubrication material) will be handled and removed by the drilling contractor. Typically, bentonite is used, which comprises 95% water and 5% bentonite clay which is a non-toxic, natural substance. HDD will be a closed system, with drilling fluid recirculated, the drill cuttings recovered, and drilling fluid reused;
- 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 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 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.
- If damming and over-pumping is adopted for the open cut watercourse crossings the water will be discharged through a filtering medium to limit silt carry over or bed disturbance downstream of the crossing point;
- There will be no tracking of machinery within watercourses other than that related to the temporary works associated with construction of the watercourse crossings for the cable route;

- Silt pollution caused by working in surface water will be minimised or prevented by keeping water out of the works area using appropriate isolation techniques, such as cofferdams, flume pipes and by-pass channels;
- Where short-term over pumping or flume pipes are required, equipment will be sized to accommodate surface water flow that might reasonably be expected over the period in question.
- Dewatering, where required, will incorporate the use of filter media; there will be no direct discharges into the watercourses
- The cables will be installed in ducts, so the only section of trench that will be open is that which is being excavated and in which ducts are being installed. Excavated cable trenches will be backfilled as the works progress, as soon as installation is complete and any cement bound surround material has cured sufficiently.

Substation General Measures

- Any excavations within made ground should follow the criteria outlined in the CEMP. The CEMP will be updated by the Contractor prior to the commencement of construction.
- Excavations in made ground will be monitored by an appropriately qualified person to ensure that any hotspots of contamination encountered are identified, segregated and disposed of appropriately and to ensure soils are consistent with the descriptions and classifications according to the waste acceptance criteria testing carried out as part of the site investigations. Any identified localised areas of contamination will be segregated and stored in an area where there is no possibility of runoff generation or infiltration to ground or surface water drainage. Care will be taken to ensure that the contaminated material does not cross- contaminate clean soils elsewhere throughout the sites.
- Samples of ground suspected of contamination will be tested for contamination during the detailed investigation and ground excavated from these areas will be disposed of to a suitably licensed or permitted site in accordance with the current Irish waste management legislation.
- Any dewatering in areas of contaminated ground will be designed to minimise the mobilisation of contaminants into the surrounding environment. Where dewatering in such areas is unavoidable the water will be adequately treated prior to discharge.
- Where piling is undertaken, it is recommended that this is completed following the placement of the deeper granular gas drainage layer which will also serve as a piling mat. Following this, the barrier layer and upper drainage layer will be placed around the piles and sealed.
- Piling may also be completed after the GCL barrier and drainage layer has been laid, which will require excavation of material and sealing the GCL around piles.

- The geotechnical design will ensure that any future settlement on site does not lead to a disruption of the integrity of the GCL barrier layer that could lead to water ingress.

General Monitoring Measures – Water Quality

- Visual monitoring will be undertaken as part of the regular site audits during the construction of the proposed development to ensure existing surface water drainage runoff and natural infiltration to ground is not affected by the proposed development.
- A monitoring regime/programme for water quality will be put in place. Turbidity monitoring will be carried out while works are underway at the Kilbride River and Johnstown North watercourse crossings to ensure that sediment levels are not significantly elevated above baseline levels.
- The Contractor is required to monitor the weather forecasts to inform the programming of earthworks and stockpiling of materials. Particular regard will be given to trench excavations and other works which may be vulnerable to the generation or conveyance of run-off, and for the protection of site personnel, plant and equipment in flood prone areas.

12.9.1.2 Watercourse crossing

The Kilbride and Johnstown North watercourse crossings will be constructed using open cut trenched techniques. In addition to the general measures described above, the following specific mitigation measures will be implemented for open cut crossings of watercourses:

- Works will comply with The IFI's *Guidelines on protection of fisheries during construction works in and adjacent to waters* (IFI, 2016) and IFI will be consulted with regard to any proposed over-pumping at the watercourse crossing.
- The open cut methodology will require dams to be put in place.
- Appropriate silt control measures such silt barriers (e.g. straw or silt fence) will be employed where required. Once reinstatement of the cable trench is complete, the temporary dams will be removed and over pumping ceased. No haul road is proposed at the watercourse crossing. Plant will utilise existing accesses used by landowners to avoid further works within the watercourse.
- Construction activities will be undertaken during daylight hours only. This will ensure that there is potential for undisturbed fish passage at night. The works will be temporary and will not create a significant long-term barrier to fish movement.
- Works on the Kilbride Stream will take place during the summer period from July to September inclusive, which is outside the most sensitive time for these species. Due to dryer conditions in the summer period, this will also minimise the risk of ground damage, minimises the potential for silt generation and thus minimise the risk of inadvertent ecological impacts.

- Sediment from the stream bed will be stockpiled outside of the flood plain and used to re-create the stream bed.
- Dams will be removed gradually, with silt curtains in place and under ecological supervision to minimise the potential for silt generation.
- The banks of the temporary watercourse crossings will be reformed to their original profile in accordance with both the NPWS, IFI and the landowners' requirements. The bed materials which had been removed for construction will be reinstated to the original profile. The temporary flume pipe, packing and sand-bags will be removed once the bed materials and bank profile are reinstated, ensuring the correct sequencing of substrate reinstatement.
- Final bank reinstatement may require further measures to stabilise the banks and prevent erosion. Geotextiles may be used in conjunction with seeding of an appropriate grass mix. Heavier solutions such as the importation of locally sourced large stones or rocks may also be used. Bank stabilisation works will be discussed with the NPWS/IFI to ensure that suitable materials and methodologies are being used. Any bank protection, where it is required, will be adequately keyed into both the bed and banks. The materials and methods employed will be in keeping with the surrounding environment and comply with any conditions attached to the planning approval.
- Further details on the open cut crossing methods/techniques proposed are included in **Chapter 6** *Construction Strategy*.

12.9.1.3 HDD works

While the bentonite drilling fluid is non-toxic and can be commonly used in farming practices, 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.

A typical procedure for managing a breakout or frac-out on land would include:

- 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.

A typical procedure for managing a breakout or frac-out under water would include:

- 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; and
- 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. 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. For each of the two HDD bores and with an average initial demand of around $10m^3$/hr , the total volume of water required is estimated to be up to $450m^3$ per bore, assuming full drilling fluid returns are maintained. On completion of the operation the drill fluid will be disposed of to an appropriately licensed facility.

Further details on proposed HDD works and mitigation measures are included in **Chapter 6** *Construction Strategy*.

12.9.1.4 Noise

The employment of good construction management practice, as described in **Section 5** of the **CEMP (Appendix 6.1** of **Volume 3)** and in **Chapter 11** *Noise and Vibration*, will minimise the risk of adverse impacts from the noise and vibration during the construction phase.

This section of the CEMP will be updated by the Contractor, prior to construction, to include any specific conditions attached to the approval and other specific construction information, but will at a minimum, include the measures described below.

Mitigation measures will be employed to ensure that potential noise and vibration impacts at nearby sensitive receptors due to construction activities are minimised. The preferred approach for controlling construction noise is to reduce source levels where possible, but with due regard to practicality.

The most effective means of mitigating construction noise are through use of barriers to reduce the levels of noise reaching noise sensitive human receptors. A site hoarding, if suitably impervious, will attenuate noise from construction activities. Where HDD activities will be taking place 24/7 in close proximity, a hoarding will be erected around work sites.

Further noise mitigation and monitoring measures are detailed in the CEMP (Refer to **Appendix 6.1**).

12.9.1.5 Lighting

Potentially lighting associated with the site works could cause disturbance/displacement of fauna. If of sufficient severity and duration, there could be impacts on reproductive success.

Site lighting will typically be provided by tower mounted temporary portable construction floodlights. The floodlights will be cowled and angled downwards to minimise spillage to surrounding properties. Lighting mitigation measures will follow *Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers* (Bat Conservation Ireland, 2010). The following measures will be applied in relation to site lighting:

- Lighting will be provided with the minimum luminosity sufficient for safety and security purposes. Where practicable, precautions will be taken to avoid shadows cast by the site hoarding on surrounding footpaths, roads and amenity areas;
- Motion sensor lighting and low energy consumption fittings will be installed to reduce usage and energy consumption; and
- Lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors and structures used by protected species. The primary area of concern is the potential impact at the Avoca and Templerainy watercourses and its adjacent woodland habitat as well as hedgerows and treelines. There will be no directional lighting focused towards the watercourses or boundary habitats respectively and cowling and focusing lights downwards will minimise light spillage.

Once commenced, the HDD drilling activities are expected to operate continuously over a 24 hour period until each bore is complete. Consequently, lighting will be provided to provide a safe working area. Directional lighting will be employed to minimise light spill onto adjacent areas and the lighting will be configured to meet health and safety requirements.

12.9.1.6 Invasive species

There are a number of management options that may be implemented to control and prevent the spread of invasive species. Detail on these measures are outlined in the ISMP (Refer to **CEMP Appendix 6.1** of **Volume 3**). It may not be possible to completely eradicate the invasive species before or during the construction phase..

Those involved in the application of herbicides/pesticides will be competent to do so and will have sufficient experience and knowledge in the area of herbicides/pesticides application.

All staff involved in the application of herbicides/pesticides will have received appropriate training, which may include achieving competency certification in the safe use of herbicides/pesticides through a National Proficiency Tests Council registered assessment centre or achieving an appropriate FETAC award in this area.

Full details on invasive species control measures are outlined in the Invasive Species Management Plan (**Appendix 12.8 of Volume 3**).

12.9.1.7 Protection of Habitats

- The Wildlife Act 1976, as amended, provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land or such growing in any hedge or ditch from the 1 March to the 31 August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided. Where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the proposed development site boundary.
- To prevent incidental damage by machinery or by the deposition of spoil during site works, hedgerow, tree and scrub vegetation which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation.
- Habitats that are damaged and disturbed will be reinstated and landscaped once construction is complete. Disturbed areas will be seeded or planted using appropriate native grass or species native to the areas where necessary. Natural regeneration of vegetation will also occur.
- There will be a defined working area which will be fenced off with designated haul routes to prevent inadvertent damage to adjoining habitats.
- Any hedgerows, treelines or woodland habitat removed during construction will be replanted using a suitable mix of shallow rooted, native species such as Hawthorn and Blackthorn.
- Tree root systems can be damaged during site clearance and groundworks. Materials, especially soil and stones, can prevent air and water circulating to the roots. No materials will be stored within the root protection area/dripline of mature trees. The ECoW will specify appropriate protective fencing where required. Retention of the existing network of woodland/ treelines/ hedgerows, where possible, will provide natural screening and help to maintain biodiversity. Where tree root systems cannot be avoided the trees will be assessed by an arboriculturist to determine if crown reduction or other measures are required.
- It is intended that the land along the cable route will be reinstated and returned to its current use post-construction. As not all habitat can be reinstated, biodiversity enhancement planting will be provided at the landfall to ensure that there is no net-loss of habitat as a result of the proposed development. The total biodiversity enhancement area will be 16,000m^2 (See **Section 12.9.1.13**).

12.9.1.8 Otters

No signs of Otter or Otter holts were noted within 150m of the planning boundary, although Otter are known to occur along the Avoca River.

This species is also likely to occur along the Templerainy Stream and potentially the Kilbride Stream. A detailed pre-construction survey will be carried out no more than 10-12 months prior to the commencement of construction works to confirm the absence of Otter holts within 150m of the proposed development area.

If Otter holts are recorded at that time, the Environmental (Ecological) Clerk of Works (ECoW) will determine the appropriate means of minimising effects i.e. avoidance, moving works, timing of works etc. If required the ecologist will obtain a derogation licence from the NPWS, to facilitate licenced exclusion from the breeding or resting site in accordance with a plan approved by the NPWS.

Any holts found to be present will be subject to monitoring and mitigation as set out in the NRA Guidelines for the *Treatment of Otter prior to the Construction of National Road Schemes* (2006b). If found to be inactive, exclusion of holts may be carried out during any season. No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, Otter holts. Light work, such as digging by hand or scrub clearance will also not take place within 15m of such holts, except under licence. The prohibited working area associated with Otter holts will be fenced and appropriate signage erected. Where breeding females and cubs are present no evacuation procedures of any kind will be undertaken until after the Otters have left the holt, as determined by the ECoW. Breeding may take place at any season, so activity at a holt must be adjudged on a case by case basis. On occasion, Otter holts may be directly affected by the scheme. To ensure the welfare of Otters, they must be evacuated from any holts present prior to any construction works commencing. The exclusion process, if required, involves the installation of one-way gates on the entrances to the holt and a monitoring period of 21 days to ensure the Otters have left the holt prior to removal.

12.9.1.9 Fish - Crossing of Kilbride and Johnstown North

The Kilbride and Johnstown North watercourse crossings will be constructed using open cut trenched techniques. In addition to the water quality measures outlined in **Section 12.9.1.2** the following mitigation measures will be implemented: The following mitigation measures will be implemented:

- Works will comply with the IFI's Guidelines on *Protection of Fisheries During Construction Works in and Adjacent to Waters* (IFI, 2016) and IFI will be consulted with regard to any proposed over-pumping at the watercourse crossing.
- Construction activities will be undertaken during daylight hours only. This will ensure that there is potential for undisturbed fish passage at night. The works will be temporary and will not create a significant long-term barrier to fish movement.
- During the construction of the crossing of the Kilbride watercourse IFI will be consulted in relation to protecting fish populations. Measures include only undertaking instream works during the period July to September to avoid interference with the spawning migration and spawning process and to protect juvenile fish emerging from the gravels,

- Prior to temporarily damming the Kilbride Stream, a fish salvage operation will be carried out under the provisions of a Section 14 of the Fisheries (Consolidation) Act 1959. Standard biosecurity protocols will be implemented, and fish will be translocated to similar habitat upstream of the works area. This will be carried out following receipt of a Section 14 licence from IFI and in consultation with IFI.

12.9.1.10 Badgers

As a precautionary measure, as Badgers could potentially move into the area prior to the commencement of works, the planning boundary will be surveyed for Badgers no more than 10-12 months prior to the commencement of site works, to confirm the absence of Badgers within the zone of influence of the development. If Badgers are discovered at that time, the mitigation measures outlined in the NRA publication, *Guidelines for the Treatment of Badgers Prior to the Construction of a National Road Scheme* (NRA, 2006a), are to be followed. If necessary, the following measures will be employed for all construction works where badger issues arise:

- Badger sett tunnel systems can extend up to c. 20m from sett entrances. Therefore, no heavy machinery will be used within 30m of badger setts (unless carried out under licence); lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance will not take place within 10m of sett entrances. Based on the results of badger surveys to date the construction works within the planning boundary will not take place within these buffer zones.
- During the breeding season (December to June inclusive), no works will be undertaken within 50m of active setts, and no pile driving within 150m of active setts. Based on the results of badger surveys to date, the construction works within the planning boundary will not take place within these buffer zones.
- Where badger setts are likely to be affected, they will be clearly marked and buffer zones for vehicles clearly marked by fencing and signage;
- Works close to badger setts or removal of badgers from a site will only be carried out under the supervision of a qualified ecologist under license from the NPWS.
- Where affected setts do not require destruction, construction works may commence once recommended mitigation measures to address the badger issues as identified by the ECoW and agreed with NPWS, have been complied with. Such mitigation may include hoarding or visual screens.
- In the unlikely event that destruction of a badger sett is required this can only be carried out under licence from the NPWS. In these circumstances, which are highly unlikely to arise, badgers must have an alternative sett within their territory that can be utilised or an alternative artificial sett will be provided.

12.9.1.11 Bats

During the site works, general mitigation measures for bats will follow the National Road Authority's '*Guidelines for the Treatment of Bats during the Construction of National Road Schemes'* NRA (2005c) and *'Bat Mitigation Guidelines for Ireland: Irish Wildlife Manuals, No. 25*' (Kelleher, C. & Marnell, F. (2006)). These documents outline the requirements that will be met in the pre-construction (site clearance) stage to minimise negative effects on roosting bats, or prevent avoidable effects resulting from significant alterations to the immediate landscape.

No bat roosts were recorded within the proposed planning boundary. The Contractor will take all required measures to ensure works do not harm individuals by altering working methods or timing to avoid bats, if necessary. The following mitigation measures will be implemented:

- The bat specialist will work with the Contractor to ensure that the loss of trees is minimised and that trees earmarked for retention are adequately protected. A preconstruction survey by the bat specialist will be carried out to advise the Contractor on minimising tree loss within the cable route corridor.
- Tree-felling will be undertaken in the period September to late October/early November. During this period bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken.
- Felled trees will not be mulched immediately. Such trees will be left lying several hours and preferably overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. The bat specialist will be on-hand during felling operations to inspect felled trees for bats. If bats are seen or heard in a tree that has been felled, work will cease and the local NPWS Conservation Ranger will be contacted.
- Tree will be retained where possible and no 'tidying up' of dead wood and spilt limbs on tree specimens will be undertaken unless necessary for health and safety.
- Treelines outside the proposed development area but adjacent to it and thus at risk, will be clearly marked by a bat specialist to avoid any inadvertent damage.
- During construction directional lighting will be employed to minimise light spill onto adjacent areas. If night time works are required for HDD works at the Templerainy Stream and at the M11 there will be no directional lighting focused towards woodland habitat and cowling and focusing lights downwards will be utilised to minimise light spillage.
- If bats are recorded by the bat specialist within any vegetation or structure on site i.e. trees, or walls to be removed or impacted on, no works will proceed without a relevant derogation licence from the NPWS.
- Upon completion external lighting will be installed at the substation. The lighting system will provide directional illumination within the substation to allow personnel to move without risk to health and safety and to prevent light spill. See **Section 12.9.1.5** or further details on operational lighting.

12.9.1.12 Birds

The Wildlife Act 1976, as amended, provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land, or any such growing in any hedge or ditch from the 1st of March to the 31st of August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided. Vegetation will only be removed outside of the breeding season.

Retention of the native treelines, hedgerows and woodland where possible will reduce the loss of breeding and nesting habitat for birds. NRA guidelines on the protection of trees and hedges prior to and during construction will be followed (NRA, 2006).

12.9.1.13 Biodiversity and Landscape

Where possible the working width will be managed to minimise the removal of trees and hedgerows. The substation site, Contractors' compounds and temporary work areas will be managed in an orderly manner with security fencing and hoarding kept in good condition, and vehicular access managed to avoid congestion outside the development site. All vehicular traffic leaving work areas will be clean, and the local road network kept clean.

Where trees and hedgerows are to be removed, tree protection fencing in accordance with BS 5837: 2012 will be installed to protect adjacent trees from construction traffic or activity to ensure their integrity and vitality. Excavated topsoil and subsoil will be stockpiled appropriately, for later backfilling and top-soiling.

Following completion of the civil works, all excavations will be backfilled using stockpiled materials, and ground surfaces prepared for seeding. Treelines and hedgerows removed to facilitate construction will be replanted.

It is intended that the land along the cable route will be reinstated and returned to its current use post-construction. As not all habitat can be reinstated, biodiversity enhancement planting will be provided to ensure that there is no net-loss of habitat as a result of the proposed development. The total biodiversity enhancement area will be 16,000m^2.

The objective of the planting scheme within the biodiversity enhancement area is to create a semi-natural habitat with a diverse woodland structure. The soil type in this area is alkaline and the natural woodland type on relatively dry, fertile and alkaline ground is Oak-ash-hazel woodland WN2 (Fossit, 2000). This is a relatively uncommon woodland type. Pedunculate Oak (Quercus robur) has been included within the planting scheme with a view to creating this woodland type. However, it is noted that the planting site is coastal and exposed and therefore a more diverse planting scheme has been utilised. It is also noted that due to the problems associated with ash die-back disease, ash has not been included in the planting scheme.

The objective of the planting scheme therefore is to develop a native woodland which is loosely based on the Oak-ash-hazel woodland WN2, but which is more diverse and better able to survive the prevailing conditions.

This will be achieved by using a mixture of native species to provide a canopy, subcanopy and ground layer as the woodland matures. Native woodlands with this type of structure are generally of higher value for flora and fauna and as it matures it will become a locally important habitat for flora and fauna. Some open areas will be left unplanted to form small glades as the woodland matures. All trees will be of Irish origin. The planting scheme can be broadly categorised as follows:

- Main woodland planting area with Alder, Blackthorn, Hawthorn, Pendunculate Oak *Quercus robur*, Whitebeam, Hazel, Downey Birch *Betula pubescens*, Holly, Rowan *Sorbus* spp. and Scots Pine *Pinus sylvestris*.
- Perimeter Edge Mix with Alder, Blackthorn, Hawthorn, Wild Privet *Ligustrum vulgare*, Holly, Spindle and Guelder Rose *Viburnum opulus*.

A rabbit proof fence will be provided to protect trees during early establishment. Weed control should not be necessary in Years 1 or 2, however in year 3 some hand weeding may be required. A 5-year aftercare programme will be implemented. Any plant which die, are removed or become seriously damaged or diseased within a period of five years from the completion of the development shall be replaced within the next planting season.

Further detail on this is provided in **Chapter 14** *Landscape and Visual*.

12.9.2 Operational Phase

There will be infrequent visits by personnel to the substation, therefore, foul wastewater generated will be minimal. Foul wastewater will be collected independently from the welfare facilities in both the Transmission 220kV GIS substation building and the Connection 220kV GIS substation building.

Foul wastewater will be stored temporarily in respective, appropriately sized, foul wastewater holding tanks and removed from site periodically, by a licensed service provider, to a licensed wastewater treatment facility.

A new surface water drainage network has been designed to accommodate the proposed development. The surface water drainage network has been designed to ensure that no flooding or surcharging of the system will occur for all storm events up to and including the 1 in 30 year return period storm event. All buildings and equipment within the site boundary will be protected against flooding for all storm events up to and including the 1 in 200 year return period storm event. The proposed surface water drainage network design includes an allowance for climate change.

The existing flood defences will be inspected annually for signs of disrepair, together with additional inspections after significant flood events (Events with a return period greater than a 1 in 2 year flood event). Maintenance of embankments includes removal of vegetation to allow for inspection of the embankment.

Appropriately sized hydrocarbon interceptors will be installed at strategic locations along the proposed surface water drainage network to prevent any hydrocarbons from leaving the site of the proposed substation.

Emergency procedures detailing the measures to be undertaken should any accidental spill happen during operation will be developed as part of the operations manual.

The lighting system will provide directional illumination within the substation to allow personnel to move without risk to health and safety and to prevent light spill. Security lighting will be installed against the building and Glass Reinforced Polymer lighting poles of maximum 6m height will be installed for illuminating the external area within the perimeter fencing.

Under normal operating conditions, external lighting would be switched off during the hours of darkness, to avoid creating any unnecessary glare in the night sky. The exception would be for emergency repairs to outdoor equipment, where high-level illumination would be switched on. Motion sensor technology will be used to control lighting at access doors and security gates.

Lighting will be designed to provide minimum lux levels, for security and for safety reasons. The lighting will comply with EirGrid requirements which include for outdoors at ground level horizontal illuminance of not less than 2 lux. Lights will be controlled to automatically switch on at 55 lux and off at 110 lux, with manual override.

For emergency lighting a minimum illumination of not less than 30 lux will be provided in all areas to ensure safe movement of personnel, safe access to, and egress from, any part of the substation building.

12.9.3 Decommissioning Phase

Ecology and invasive species surveys will be carried out prior to decommissioning and appropriate mitigation will be provided based on up-to-date data and in line with up to date guidelines. The original habitats will be restored and levels of noise, lighting and disturbance will return to levels pre-construction. Therefore, no significant effect from decommissioning or the decommissioning process will occur.

12.10 Cumulative Effects

The proposed development forms part of the Arklow Bank Wind Park Phase 2 Project which also includes the Arklow Bank Wind Park Offshore Infrastructure and Operations and Maintenance Facility. Cumulative impacts of these elements, along with other Tier 1 elements (EirGrid Grid Upgrade Works and Irish Water Upgrade Works), are assessed below in **Table 12.12**.

Considering the nature and location of the proposed development as described in **Chapter 5** *Description of Development* no transboundary effects are predicted.

The assessment of cumulative effects has considered likely significant effects that may arise during construction, operation and decommissioning of the proposed development.

The assessment specifically considered whether any of the permitted or relevant proposed developments in the local or wider area have the potential to exacerbate (i.e. alter the significance of) effects associated with the proposed development based on best scientific knowledge. Existing projects, not identified in this report, are included in the baseline or have been assessed as not having the potential to exacerbate effects.

The cumulative effects addressed include the direct and indirect effects, caused by the interaction of environmental effects. These can cause more significant effects when combined with the effects of the proposed development.

The wide range of existing, under construction and permitted projects in the general vicinity of the proposed development were screened to determine if there was a potential for cumulative effects. A source – pathway – receptor model was used in the screening process, with the receptor being the proposed development.

The sources of potential cumulative impacts were considered. Existing and permitted projects and projects under construction were identified. Existing projects, which were operational at the time that the baseline studies were undertaken, were excluded, as their impacts are already included as part of the baseline. Existing projects, which were not operational at the time of the baseline studies, were included. A planning search was conducted to identify permitted projects. Permitted projects, the permits of which had expired, were excluded. Projects which, due to their nature or scale were unlikely to result in a cumulative impact, or to which there was no pathway, were excluded.

A tiered approach to the cumulative assessment has been undertaken, in which the proposed development is considered cumulatively with other projects as follows:

Tier 1 -

- ABWP Phase 2 Offshore Infrastructure;
- ABWP Phase 2 Operations and Maintenance Facility (OMF); and
- EirGrid Upgrade Works and
- Irish Water Upgrade Works

Tier 2 -

- Other relevant projects currently under construction;
- Other relevant projects with consent;
- Other relevant projects in the planning process; and
- Other existing projects that were not operational when baseline data were collected.

This tiered approach was adopted to provide an assessment of the ABWP Phase 2 Project as a whole and cumulatively with other projects.

The cumulative impacts of these projects are assessed below in **Table 12.12**.

Table 12.12 Potential Cumulative Effects

Project	Description	Cumulative Effect
ABWP Phase 2 Offshore Infrastructure	The offshore infrastructure will be located on and around Arklow Bank, in the Irish Sea off the east coast of Ireland. The Foreshore Lease Area covers an area approximately 27 km long and 2.5 km wide. It is located approximately 6 to 13 km from the shore. Refer to **Chapter 5** *Description of Development* for further detail.	Potential effects relate primarily to marine habitats and species. The proposed development will not impact on marine habitats or species. However, if construction activities associated with the proposed development are occurring at the same time as construction activities associated with the ABWP Phase 2 Offshore Infrastructure in proximity to the landfall location, and accidental pollution events were to occur at the same time and in proximity to each other, there is a risk of cumulative accidental pollution effects. With the application of the mitigation measures set out in the CEMP, significant cumulative effects will not occur. Therefore there is no pathway for cumulative impacts on biodiversity.
ABWP Phase 2 Operations and Maintenance Facility (OMF)	The Arklow Bank Wind Park Phase 2 will require an Operations and Maintenance Facility (OMF) for servicing the offshore wind farm, and as a base for employees working on its operation. Refer to **Chapter 5** *Description of Development* for further detail.	Given the nature and location of this project, no significant cumulative effects will occur.
EirGrid Grid Upgrade Works	In order to connect 520MW of offshore wind generation to the National Electricity Transmission Network in the Arklow area, it will be necessary to change the operating voltage of the existing Arklow-Ballybeg-Carrickmines	If works are concurrent with the bulk excavation works on the site of the substation, there is potential for cumulative effects, as parts of each project are located close to each other. Should this situation arise, construction activities will be planned and phased, in consultation with the construction management team for the EirGrid Grid Upgrade Works.

Project	Description	Cumulative Effect
	overhead 110kV circuit to 220kV. Refer to **Chapter 5** *Description of Development* ffor further detail.	Given the location of these projects (in areas of relatively low habitat and species value), together with the implementation of best practice standard construction environmental measures and the CEMP for the proposed development as detailed, no significant cumulative effects on biodiversity will result.
Irish Water Upgrade Works	To connect the proposed development to Irish Water's water network approximately 2.3km of existing 2inch watermain is required to be upsized to 100mm. The watermain runs from Arklow town in a north-westerly direction towards Shelton Abbey. The works will be carried out by Irish Water.	If works are concurrent with the bulk excavation works on the site of the substation, there is potential for cumulative effects, as the sites are located close to each other. Should this situation arise, construction activities will be planned and phased, in consultation with the construction management team for the scheme. Given the location of these projects (in areas of relatively low habitat and species value), together with the implementation of best practice standard construction environmental measures and the CEMP for the proposed development as detailed, no significant cumulative effects on biodiversity will result.
Arklow Wastewater Treatment Plant	The Arklow Waste-Water Treatment plant has received planning permission (Planning Reference SI201801) in the town of Arklow to provide foul water treatment in the town of Arklow. Refer to **Chapter 5** *Description of Development* for further detail.	The proposed new Arklow WWTP will discharge the treated effluent to sea, via a 900m long sea outfall. Given that no significant effect on water quality is predicted from the proposed project, no significant cumulative effects on water quality, habitats and species will occur.
Crag Digital Avoca Limited, Avoca River Park , Shelton Abbey & Kilbride , Arklow	Crag Digital Avoca Ltd (Planning Reference 18940) has received planning permission for a data centre adjacent to the proposed development. Another application has been made by Crag Digital Avoca Ltd for this site (Planning Reference 201285). If the proposed development is granted	If works are concurrent with the bulk excavation works on the site of the substation, there is potential for cumulative effects, as the sites are located close to each other. Should this situation arise, construction activities will be planned and phased, in consultation with the construction management team for the scheme.

Project	Description	Cumulative Effect
	approval, one data hall, located on the substation site, will not be built. Refer to **Chapter 5** *Description of Development* for further detail.	Discharges from both this project and the proposed development are governed by strict limits to ensure compliance with quality standards. No long-term cumulative impact on water quality will occur. Given the location of these projects (in areas of relatively low habitat and species value), together with the implementation of good practice standard construction environmental measures and the CEMP for the proposed development as detailed, no significant cumulative effects on biodiversity will result.
Crag Digital Avoca Limited Data Centre new application	Demolition of existing industrial building units totalling (c.2784.4m^2) comprising of a c.7.lm high Overall Main Building (c.2460m^2), a c.4.2m high Substation (c. 107.3m^2), a c.3.6m high Guardhouse (c.106.2m^2), a c.3.6m high East-Building (c.39.1m^2), c.5m high Water Tank (c.56.8m^2) &c.2.6m high Pump House Building (c.15.1m^2), associated works. Refer to **Chapter 5** *Description of Development* for further detail.	If works are concurrent with the bulk excavation works on the site of the substation, there is potential for cumulative effects, as the sites are located close to each other. Should this situation arise, construction activities will be planned and phased, in consultation with the construction management team for the scheme. Discharges from both this project and the proposed development are governed by strict limits to ensure compliance with quality standards. No long-term cumulative impact on water quality will occur. Given the location of these projects (in areas of relatively low habitat and species value), together with the implementation of good practice standard construction environmental measures and the CEMP for the proposed development as detailed, no significant cumulative effects on biodiversity will result.
Crag Digital Avoca Ltd 110kV Substation	Crag Digital Avoca Ltd have submitted an application for a 110kV gas insulated switchgear (GIS) substation, double circuit 110kV underground transmission line and associated site works within the Avoca	If works are concurrent with the bulk excavation works on the site of the substation, there is potential for cumulative effects, as the sites are located close to each other. Should this situation arise, construction activities will be planned and phased, in consultation with

Project	Description	Cumulative Effect
	River Park, next to the permitted data centre facility. Refer to **Chapter 5** *Description of Development* for further detail.	the construction management team for the scheme. Discharges from both this project and the proposed development are governed by strict limits to ensure compliance with quality standards. No long-term cumulative impact on water quality will occur. Given the location of these projects (in areas of relatively low habitat and species value), together with the implementation of good practice standard construction environmental measures and the CEMP for the proposed development as detailed, no significant cumulative effects on biodiversity will result.
Pre-application Consultation Request to An Bord Pleanála Arklow Flood Relief Scheme	The Arklow Flood Relief Scheme is proposed by Wicklow County Council and the Office of Public Works (OPW) to address recurrent flooding in the town of Arklow. This scheme is still in the planning stages but if permitted also has the potential to give rise to cumulative effects with the proposed development. Refer to **Chapter 5** *Description of Development* for further detail.	The flood relief scheme has sufficient physical separation from the site of the proposed development to reduce the potential for cumulative noise and vibration effects and surface water effects to a negligible level. If the flood relief works are concurrent with the bulk excavation works on the site of the substation, there is potential for cumulative effects, as the sites are located close to each other. Should this situation arise, construction activities will be planned and phased, in consultation with the construction management team for the flood relief scheme. Given the location of these projects (in areas of relatively low habitat and species value), together with the implementation of best practice standard construction environmental measures and the CEMP for the proposed development as detailed, no significant cumulative effects on biodiversity will result.
Maintenance and/or repair of Avoca Business	The entire Avoca River Business Park relies on the existing embankment for fluvial flood protection. As a result,	The construction duration will not overlap with the construction of the proposed development, with any repair works done in advance of the development

Project	Description	Cumulative Effect
Park Flood Embankment	these embankments need to be appropriately inspected, maintained and repaired, to prevent the risk of flooding. Investigations are to be undertaken to confirm the existing embankment composition, permeability and stability, so as to inform the required inspection, maintenance and repair programme. Should this investigation determine that works are required to maintain or reinforce the existing embankments, these works will be undertaken in advance of the substation construction, with ongoing maintenance and repair thereafter, subject to regular inspection and monitoring. While a range of approaches could be applied and a targeted approach (where only certain areas of the embankment might require works), in a reasonable worst case scenario, the full length of the embankment may require to be reinforced, similar to the works proposed as part of the proposed development (localised reinforcement of the embankment, using either cohesive soils, placed and suitably compacted in layers and/or sheet piling). If the proposed development is granted approval, one data hall, located on the substation site, will not be built.	construction and ongoing maintenance and repairs thereafter (during the operation of the proposed development). Therefore, there will be no in-combination effects with the proposed development from noise and/or vibration. Given the location of these projects (in areas of relatively low habitat and species value), together with the implementation of best practice standard construction environmental measures and the CEMP for the proposed development as detailed, no significant cumulative effects on biodiversity will result.

12.11 Residual Effects

12.11.1 Residual Effects - Habitats

The proposed development will have effects on habitats that are primarily of limited local ecological value and there will be no perceptible effect on habitats listed as qualifying interests for the Buckroney-Brittas Dunes and Fen cSAC (Annual vegetation of drift lines [1210], Perennial vegetation of stony banks [1220], Mediterranean salt meadows (*Juncetalia maritimi*) [1410], Embryonic shifting dunes [2110], Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120], Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130], Atlantic decalcified fixed dunes (Calluno-Ulicetea) [2150], Dunes with *Salix repens* ssp. argentea (*Salicion arenariae*) [2170], Humid dune slacks [2190], Alkaline fens [7230]). No pathway exists by which the proposed development could impact on any other Natura 2000 site due to the distances involved and/or the lack of any significant hydrological, hydrogeological or any other relevant connection pathways.

Following the implementation of mitigation measures outlined above the impacts on the Arklow Sand Dunes pNHA, Arklow Town Marsh pNHA and Buckroney-Brittas Dunes and Fen pNHA will be negligible and imperceptible.

High value habitats, including the Avoca River, the Templerainy Stream and cliff habitats, have been avoided at the design stage. The area of treelines/hedgerows, scrub and woodland which will be removed within the working width has been quantified and is included in **Chapter 16** *Resource and Waste Management***, Table 16.3**. It is noted that the majority of habitats within the working width will be reinstated following construction. As not all habitat can be reinstated, biodiversity enhancement planting will be provided to ensure that there is no net-loss of habitat as a result of the proposed development. Further detail on habitat reinstatement and habitat compensation are provided in **Chapter 14** *Landscape and Visual*.

Treelines and hedgerows removed during the construction phase will be replanted following construction using a mix of native species. It is noted that although native species will be used, deep rooted species such as Ash or Alder, will not be utilised. Replacement planting, albeit with smaller tree species, will maintain the linear features or hedgerows and treelines and ensure that connectivity to the wider landscape is not impacted. These trees will also provide foraging and nesting habitat as new planting matures.

However, in the longer term there will be an absence of mature and over-mature trees which provide additional resources for bats and other fauna.

Frac-out, i.e. the loss of drilling fluid from the HDD operation, could potentially impact on vegetated sea cliffs at the landfall location at Johnstown North or at the Templerainy Stream, however no significant effects on vegetation will occur due to the non-toxic nature of the drilling fluids and the low risk of frac-out occurring. The levels of dust generated by construction works will be low and the impact on vegetation outside the works area will be temporary and imperceptible.

While there will be a temporary to medium term loss of common terrestrial habitats, no significant long-term effect on commuting routes for fauna or habitat fragmentation will occur. The proposed development will have temporary to short-term effects on common terrestrial habitats. Long term impacts on habitats are not significant. No particular difficulties in the effective implementation of the prescribed environmental mitigation measures have been identified.

12.11.2 Residual Effects – Designated Sites

Noise, lighting, vibration during construction will not have a significant effect, as it will be temporary in nature, will be subject to detailed mitigation and due to the distance from the boundary of Natura 2000 and proposed Natural Heritage Sites (pNHAs), the effects will be imperceptible. As detailed below no significant effects on water quality, fish, mammals or birds or significant effects from the spread of invasive species will occur. No significant effects will arise during operation and decommissioning. It is concluded therefore that there will be no significant effect on Natura 2000 sites or proposed Natural Heritage Areas (pNHAs).

12.11.3 Residual Effects – Aquatic Ecology

Impacts on water quality could potentially arise from elevated silt and hydrocarbon levels in surface water run-off and hydrocarbon contamination of surface and ground water. The use of HDD methodology at sensitive locations i.e. Templerainy Stream, will effectively prevent any such effects from occurring. Based on an assessment of potential risks, a range of detailed mitigation measures have been specified in line with appropriate guidelines for each element of the project, to prevent any significant effect on water quality from occurring. These include measures in relation to hydrocarbon usage and storage, methodologies for silt control, measures in relation to the discharge of surface water arising within the works area and measures in relation to stockpiling excavated material. Based on the above no significant effect on water quality will occur. Therefore, there will be no significant effect on aquatic habitats and no knock-on effect on protected or common mammal and fish species.

The Kilbride will be crossed via an open cut method. A fish salvage operation will be carried out by the ECoW to ensure that fish mortality is prevented. The instream works will create a barrier to fish movement, however this is a temporary impact. No significant effect on fish will occur.

There will be no direct discharges of surface water runoff to watercourses along the route and silt control measures will be utilised in relation to any other discharge. The impact on water quality from construction in relation to potential effects on small drains and watercourses will be temporary and not significant.

The potential effect from siltation due to frac-out will not be significant due to the frac-out contingency plan and the inert nature of bentonite used during the HDD process. Any impact from frac-out during HDD will be temporary and not significant.

In the absence of significant impacts on water quality the impacts on piscivorous species such as Otter and Kingfisher will be temporary and not significant. The overall impact on water quality and fish is considered a temporary and not significant impact.

12.11.4 Residual Effects – Noise, vibration, lighting and disturbance

Levels of vibration, lighting, noise and disturbance will increase during construction and a range of mitigation measures have been specified to minimise such impacts. The construction of the substation will include pile driving and certain activities, including HDD, may take place 24/7. This is likely to lead to short-term disturbance and displacement of common bird and mammal species during the construction period. The proposed substation location is on a brownfield site with heavily modified habitats which are not of significant value for fauna. The proposed cable route has been chosen to avoid high value habitats. The buffer zone between the HDD sites and higher value coastal and riverine habitats provides sufficient buffer zones to prevent significant effects mammal or bird species which use this habitat. Any residual effect will be temporary and imperceptible. The overall effect on bats will be temporary and not significant in the long term.

Otter was not recorded within the planning boundary, although they could potentially occur at watercourses which support fish populations. The use of HDD on the Templerainy Stream will prevent any significant effect from occurring with respect to fish, mammal and bird populations utilising the stream.

12.11.5 Residual Effects – Cumulative

Other permitted and proposed projects relevant to the proposed development and potential cumulative impacts were assessed and where necessary mitigation measures specified. This included an assessment of the offshore infrastructure and operations and maintenance facility of the Project. No significant cumulative effects will occur during the construction, operational or decommissioning phase.

12.11.6 Residual Effects – Operation

In relation to the substation where operational effects could potentially occur, no significant effects have been found due to noise from the operational phase and the level of human activity will be low.

With the exception of minimal security lighting, external lighting at the substation will also be turned off during hours of darkness and will be directional to minimise spillage onto surrounding habitats.

During operation surface water run-off from the substation site will be discharged to an attenuation pond before discharging to a tidal section of the Avoca River. The use of a hydrocarbon interceptor will prevent any potential effects from hydrocarbons. This is considered a long-term and not significant impact.

Levels of ongoing noise, lighting and disturbance associated with the operation of the substation will not be significant and fauna would be expected to habituate to the prevailing conditions in a relatively short time period.

Mitigation measures which have been specified in relation to water quality effects including the use of a hydrocarbon interceptor and discharge via an attenuation pond ensuring that there will be no significant effect on water quality during operation.

12.11.7 Residual Effects - Decommissioning

The normal asset life of a substation is c. 50 years but may be extended beyond this. When the proposed development reaches the end of its useful life, it may be either refurbished and replaced, or it will be decommissioned.

The cables will be decommissioned when the project ceases operation, at the same time as decommissioning of the substations.

On decommissioning, the cables and associated ducts will most likely remain in-situ as there would be more environmental impact in removing these than can be justified by the recycle value of cable material and as is standard industry practice. However, all above ground infrastructure will be removed and these areas fully reinstated.

If decommissioned, all buildings and above ground structures on the substation site will be removed. All above ground structures along the cable route will be removed. It is likely that the ducts and cables will be left in place, as to remove them would be likely to cause a more substantial environmental impact than leaving them in-situ.

Ecology and invasive species surveys will be carried out prior to decommissioning and appropriate mitigation will be provided based on up-to-date data and in line with up to date guidelines. The original habitats will be restored and levels of noise, lighting and disturbance will return to levels pre-construction. Therefore, no significant effect from decommissioning or the decommissioning process will occur.

12.12 Conclusions

All potential ecological constraints were identified and incorporated into the project design and appropriate mitigation specified. Overall, it has been concluded that the project will not have a significant effect on ecological receptors and no significant effect on ecology has been identified.

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