White Hill Wind Farm Electricity Substation & Electricity Line

Environmental Impact Assessment Report

Chapter 5: Biodiversity

White Hill Wind Limited

Galetech Energy Services
Clondargan, Stradone, Co. Cavan Ireland
Telephone: +353 (0)49 555 5050
www.galetechenergyservices.com

Contents

5.1 Introduction

5.1.1 Background & Objectives

This chapter presents an assessment of the likely significant effects of the project on the receiving environment focusing specifically on Biodiversity.

This chapter provides:-

- A baseline study of the receiving ecological environment, including survey methodology and results;
- An assessment of the likely significant effects of the project during construction, operation and decommissioning phases;
- An assessment of cumulative effects;
- Mitigation measures to avoid or reduce the likely significant effects anticipated;
- Residual effects; and,
- Enhancement measures.

5.1.2 Overview of the Project

The project site is located in rural County Kilkenny and County Carlow, approximately 11 kilometres (km) northeast of Kilkenny City, c. 15km southwest of Carlow Town, c. 3km west of Muine Bheag and c. 1km north of Paulstown. In summary, the project comprises the following main components as described in full at **Chapter 3**:-

- A 110kV 'loop-in/loop-out' electricity substation;
- Approximately 320 metres (m) of 110kV underground electricity line between the electricity substation and the Kellis-Kilkenny overhead transmission line and the provision of 2 no. interface masts;
- An electrical control unit at the permitted White Hill Wind Farm site;
- Approximately 8.8km of underground electricity line between the electricity substation and the electrical control unit; and,
- All associated and ancillary site development, access, excavation, construction, landscaping and reinstatement works, including provision of site drainage infrastructure.

The project site traverses the administrative boundary between counties Kilkenny and Carlow; with the electricity substation and c. 3.3km of the underground electricity line located in County Kilkenny and c. 5.5km of the underground electricity line and the electrical control unit located in County Carlow. Electrical equipment suppliers, construction material suppliers and candidate quarries which may supply aggregates are located nationwide.

5.1.3 Statement of Authority

The chapter has been prepared by Dr. Jonathon Dunn who is an associate ornithologist and undertook scoping surveys for the project. He also coordinated the breeding bird, mammal and extended habitat surveys for the project. Jonathon has worked in the environmental sector since 2014 and joined SLR in 2021. Prior to working in environmental consultancy, he undertook research at Newcastle University on avian ecology and conservation. He holds a PhD in avian ecology from Newcastle University, a MSc in Ecology, Evolution and Conservation from Imperial College London and a MA (Cantab.) in Natural Sciences from the University of Cambridge. Jonathon has prepared a wide variety of ecological reports, including Environmental Impact Assessment Report (EIAR) chapters, Ecological Impact Assessment (EcIA) reports, Natura Impact Statements (NIS), reports to inform Appropriate Assessment

(AA) screenings, bird and bat reports, and collision risk modelling reports. Jonathon has worked on a wide variety of projects with a focus on renewable energy projects.

Jake Matthews BSc, MSc undertook the mammal surveys. Jake is a senior ecologist with a diversified skillset and has worked on a range of projects; including key infrastructure projects, large housing developments, wind farms and quarries; andhas experience of undertaking a wide range of species-specific surveys.

Alice Magee BSc, MSc undertook the extended habitat survey. Alice is a senior field ecologist with experience of a wide range of bird surveys, along with bat and preliminary ecological appraisal surveys.

Hugo Brooks BSc undertook the extended habitat survey. Hugo is a project ecologist with experience of a wide range of bird surveys, bat surveys and preliminary ecological appraisal surveys.

Deirdre McCarthy BSc undertook the extended habitat survey. Deridre is a graduate ecologist with experience of preliminary ecological appraisal, surveys for invasive plants and Annex I habitat surveys.

Adrian Allen undertook the bird surveys. Details of Adrian's background are contained within **Annex 5.2.**

This chapter has been reviewed by Andrew Torsney BSc, MRes, PhD, ACIEEM. Andrew has undertaken EcIA and prepared EIARs for projects of various sizes including large scale wind energy developments and linear infrastructure projects such as the Nenagh Greenway. Andrew is a technical specialist in ecological assessments and contributed to the Environmental Protection Agency's *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (2022). Additionally, Andrew has undertaken review processes for competent authorities such as the Department of Public Expenditure and Reform and several local authorities such as Dun Laoghaire-Rathdown County Council and Kilkenny City & County Council. Andrew has undertaken several technical assessments for projects such as a large-scale pharmaceutical development in Raheen, County Limerick where there was a requirement for technical derogation licence applications for floral protection order species and other protected species such as badgers.

5.1.4 Relevant Guidance

Guidance documents consulted included the following[1]:-

- *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Local Authorities (DoEHLG, 2010);*
- *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2018);*
- *Bat Surveys for Professional Ecologists: Good Practice Guidelines 4th edition (Collins (ed.), 2024);*
- *Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022);*
- *Assessing Connectivity with Special Protection Areas (SPAs)(SNH, 2016);*
- *Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU) (EC, 2017);*

[1] A complete list of references is included at the end of this chapter.

- *Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014);*
- *A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (IAQM, 2019);*
- *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016);*
- *Guidance on 'Control of Water Pollution from Linear Construction Projects' CIRIA Report No. C648. (CIRIA, 2006);*
- *Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532 (CIRIA, 2006); and,*
- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, 2018).*

5.1.5 Legislation & Policy

This chapter has been prepared having regard to the following legislation and policy, with details of relevant local policy as pertains to biodiversity provided at **Annex 5.4**.

5.1.5.1 International Legislation

- *The UN Convention on Biological Diversity (CBD);*
- *The Berne Convention on the Conservation of European Wildlife and Natural Habitats;*
- *The Bonn Convention on the Conservation of Migratory Species of Wild Animals;*
- *The Ramsar Convention on Wetlands of International Importance;*
- *The Berne Convention on the Conservation of European Wildlife and Natural Habitats;* and,
- *The Ramsar Convention on Wetlands of International Importance.*

5.1.5.2 European Legislation

- *European Communities (Environmental Liability) Regulations, 2008;*
- *EIA Directive (2014/52/EU);*
- *European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, as amended;*
- *EU Habitats Directive (92/43/EEC);*
- *EU Birds Directive (2009/147/EC);*
- *EU Water Framework Directive 2000/60/EC;*
- *Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species, as amended, together with Commission Implementing Regulation (EU) 2016/1141 and Implementing Regulation (EU) 2019/1262;*
- S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations, 1988; and,
- S.I. No. 477/ 2011 - Regulation 49 and 50 of European Communities (Birds and Natural Habitats) Regulations 2011.

5.1.5.3 National Legislation

- *The Wildlife Act (1976, as amended);* and,
- *The Flora (Protection) Order 2022.*

5.1.5.4 National Policy

- *National Heritage Plan 2030;*
- *National Biodiversity Action Plan 2023;*
- *Project Ireland 2040 - National Planning Framework;* and,
- *Regional and Spatial Economic Strategy (RSES) – Southern Region Spatial and Economic Strategy 2020 - 2032.*

5.1.5.5 Local Policy

- *Kilkenny City and County Development Plan 2021-2027; and*
- *Carlow County Development Plan 2022-2028.*

5.1.6 Limitations

The survey and assessment are subject to a number of limitations as set out below.

5.1.6.1 Bats, Terrestrial Mammals and Habitats

No access was possible to third party lands near the on-road component of the underground electricity line. Therefore, the potential bat roost assessment could only be undertaken for trees and structures that intersected the route that could be viewed from public roads. This is not considered to be a significant limitation as data from Bat Conservation Ireland (BCI) were examined to locate previously identified roosts within the receiving environment. The same applies for other terrestrial mammals and habitats i.e. only areas that were immediately adjacent to the in-road component of the route could be surveyed. Desktop data and satellite images were used to supplement the field survey results and given the small scale of the proposed works at any location along the route, any lack of access is not considered to be a significant limitation. No activity surveys were undertaken for bats; therefore, the assessment was undertaken following a habitat suitability assessment focusing on a worst-case scenario approach. This was identified to be sufficient as there will be limited reduction of linear connectivity as a consequence of the project. Overall, the approach taken provides a good indication of the potential of the site for bats and anticipated effects.

Extended habitat and breeding bird surveys were completed in summer 2024 prior to the finalisation of the project design process, so a small section of the off-road component of the underground electricity line that was surveyed no longer forms part of the project with an alternative in-road route being followed. This new in-road section was subject to an extended habitat survey in January 2025, which is not an optimal period for botanical or habitat surveys. This is not considered to be a significant limitation, as public roads are highly artificial in nature and roadside verges are unlikely to contain highly valuable habitats, plant or animal species.

5.1.6.2 Birds

Breeding bird surveys were conducted at the control unit, electricity substation site and along the off-road component of the underground electricity line. As detailed above, a small section of the off-road component is no longer part of the project; however, this is not considered a significant limitation as the section is now within public roads, which are highly artificial in nature and not a habitat typically used by breeding birds.

5.1.7 Consultations

Consultation requests were issued to several consultees. **Table 5.1** details the responses received to-date that are relevant to Biodiversity. The responses are enclosed at **Annex 1.7**.

Consultee	Date of Consultation	Response	How and Where Response Has Been Addressed
Carlow County Council	2 May 2024	Regard must be given to relevant case law (O'Grianna V. An Bord Pleanála ([2016] IEHC 632): there is a requirement for EIAR to consider the cumulative effects of the proposed turbines with the proposed grid connection. This follows that the proposed grid connection is an integral part of an entire wind farm project and therefore must be included in the EIAR when examining cumulative effects.	The permitted White Hill Wind Farm has been assessed as part of cumulative effect assessment (**Section 5.5.5**).
Department of Agriculture, Forestry and the Marine (DAFM)	1 May 2024	If the proposed development will involve the felling or removal of any trees, the developer must obtain a Felling Licence from this Department before trees are felled or removed.	A tree felling licence will be obtained prior to the removal of any treelines.
		The developer should take note of the contents of the Felling and Reforestation Policy document which provide a consolidated source of information on the legal and regulatory framework relating to tree felling; gov.ie-Tree Felling Licences (www.gov.ie). As this development is within forest lands, particular attention should be paid to deforestation, turbulence felling and the requirement to afforest alternative lands. It is important to note that when applying to a Local Authority, or An Bord Pleanàla, for planning permission where developments are: a) subject to an EIA procedure (including screening in the case of a sub-threshold development) and any resulting requirement to produce an EIAR; and/or b) subject to an Appropriate Assessment procedure (including screening) and any resulting requirement to a Natura Impact Statement	This chapter forms part of an EIAR and is accompanied by an NIS. Hedgerows and treelines (and various mosaic habitats) will be removed to accommodate the provision of site entrances, access tracks and the electricity substation but will be replaced with 'like for like' native species to ensure there is no net loss of hedgerow or treeline habitats (or various mosaics) (**Section 5.7**).

		(NIS); and c) the proposed development in its construction or operational phases, or any works ancillary thereto, would directly or indirectly involve the felling and replanting of trees, deforestation for the purposes of conversion to another type of land use, or replacement of broadleaf high forest by conifer species, 1.that there is a requirement inter alia under the EIA Directive for an overall assessment of the effects of the project or the alteration thereof on the environment to be undertaken, including the direct and indirect environmental impact of the project; and 2.pursuant to Article 2(3) of the EIA Directive, the Department of Agriculture, Food and the Marine strongly recommends that, notwithstanding the fact that a parallel consent in the form of felling licence may also have to be applied for, any EIAR and/or NIS produced in connection with the application for planning permission to the Local Planning Authority or An Bord Pleanàla, should include an assessment of the effect of and measures, as appropriate, to prevent, mitigate or compensate for any significant adverse effects direct or indirect identified on the environment arising from such felling and replanting of trees, deforestation for the purposes of conversion to another type of land use, or replacement of broadleaf high forest by conifer species. 3.Please note that there must be absolute spatial consistency between the felling licence areas submitted to DAFM (second authority) and all related planning documents submitted to the first authority in respect of the felling area(s).	
Irish Wildlife Trust (IWT)	2 April 2024	We do not have the staff capacity to be respond to this consultation at the moment but we will endeavour to	None required.

		respond if possible.	
Inland Fisheries Ireland (IFI)	18 April 2024	Article 5 of the Surface Water Regulations (SI 272 of 2009) states that there should be no deterioration in Ecological Status of surface water bodies. Article 28 (2) of the Regulations states that a surface water body whose status is determined to be less than Good shall be restored to at least Good status. The proposed surveys / reports must demonstrate how this project would cause no deterioration to the above surface water bodies and is consistent with their restoration or maintenance at Good Ecological Status or better.	As outlined in **Chapter 7**, there will be no deterioration to the Ecological Status of surface water bodies and the works and mitigation associated with the project are consistent with their restoration or maintenance at Good Ecological Status or better.
		IFI requests that the following assessments be provided: 1. Baseline ecological assessments of water courses potentially affected by the proposed development, including fish species as well as other biological and physico-chemical surveys; 2. Maps of all aquatic habitats potentially affected by the project, including all drainage channels (temporary and permanent) potentially affected by the proposed development; 3. An assessment of the potential adverse effects on the proposed works on all relevant aquatic receptors, including fish. Assessments should cover area of the proposed development and the potential upstream and downstream effects; 4. An assessment of the cumulative effects of the proposed development along with other existing or approved projects; 5. An assessment of the effect on the conservation objectives of species listed as qualifying interests in the Barrow – Nore SAC, which includes lamprey species and Atlantic salmon; 6. The proposed mitigation measures to prevent erosion from soil disturbance in excavation areas and areas where there is significant	1. Baseline assessments were undertaken for aquatic species focusing primarily on desktop data available. The key species for the streams and the chemical composition are well known and monitored nationally. There was no requirement for in stream surveys as there were no direct sources for effects to the stream due to the absence of in-stream works. The assessment focuses on hydrological pathways and avoiding potential effects through mitigation which is appropriate for the assessment. 2. All aquatic habitats within the project footprint are mapped in **Figure 4A** to **4E** at **Annex 5.1**. 3. A full assessment of potential adverse effects on all aquatic receptors (including upstream and downstream habitats) has been provided at **Sections 5.5.2.7** and **5.5.3.7.** 4. Cumulative effects have been assessed at **Section 5.5.5**. 5. This EIAR is accompanied by an NIS which assesses the effects of project alone and in combination on the conservation objectives and site integrity of European sites. The qualifying interest species of the River Barrow and River Nore have been assessed at **Sections 5.5.2.7** and **5.5.3.7** of

		movement of plant and machinery.	the current chapter. 6. Mitigation measures are provided to prevent erosion from soil disturbance at **Sections 5.6.1.1** and **5.6.2.1.**
		During the construction and operational phases, the applicant should adhere to the recommendations and guidelines outlined in IFI's *'Guidelines on protection of fisheries during construction works in and adjacent to waters (2016)'*.	IFI (2016) guidelines form part of the mitigation measures provided at **Sections 5.6.1.1** and **5.6.2.1.**
		Existing watercourse crossings for the proposed grid connection route must be utilised where possible. Crossings must be accompanied by a site-specific method statement provided to IFI. The applicant should provide these at least ten working days before works commence. Written approval from IFI should be obtained before works proceed. Where existing crossings must undergo alteration, IFI request that these are upgraded in the interests of habitat improvement and biodiversity enhancement. Crossings should be designed to meet IFI's Fisheries Construction Guidelines referred to above. IFI should be consulted at the design phase to maximise favourable outcomes for fisheries habitats.	HDD will be used to cross 5 no. watercourses and a bottomless culvert will be installed to accommodate a stream crossing by an access track. Prior to the commencement of drilling operations, the appointed contractor will prepare a detailed Method Statement outlining the precise methodology to be implemented, which will be shared with IFI as requested.
		The storage, management and conveyance of materials must not permit any deleterious matter to reach surface water systems either directly or indirectly. Watercourses must be maintained in their original state, their bankside vegetation preserved, and the existing line of the watercourse left unaltered. There should be no interference with the bed, gradient, profile or alignment of watercourses without the prior notification and the agreement of Inland Fisheries Ireland. Instream works may only take place during the period 1 July to 30 September.	No deleterious matter will be allowed to reach surface water systems directly or indirectly as outlined at **Sections 5.6.1.1** and **5.6.2.1.** As mentioned previously, HDD will be used to cross 5 no. watercourses with launch pits a minimum of 10m away from the watercourse and the bore will be at a minimum depth of 2.5 m below the stream channels. A bottomless culvert will be used to accommodate a crossing of a watercourse by an access track. These methodologies will ensure watercourses, bankside vegetation and the existing line of the watercourses will be

			left unaltered.
		SuDS principles should be incorporated into surface water management plans to attenuate any run-off of suspended solids or other deleterious matter. Natural flow paths should not be interrupted or diverted in a manner that would increase the risk of erosion. Drainage infrastructure should be installed during dry ground conditions.	SuDS principles have been incorporated into surface water management plans, natural flow paths will not be diverted, and drainage infrastructure will be installed during dry ground conditions as outlined at **Sections 5.6.1.1** and **5.6.2.1** and the CEMP in **Annex 3.5**
		Before works commence the applicant or the appointed contractor should appoint a suitably qualified person to oversee and implement environmental mitigation measures. Contact details should be provided to Inland Fisheries Ireland. In the event of an environmental incident which threatens an aquatic zone IFI must be informed immediately at the contact details below.	An Environmental Manager (EM) will be appointed by the selected contractor to ensure the environmental protective measures to be implemented are suitable and to the required standard. Their contact details will be provide to IFI and will inform IFI in the event of any environmental incident that threatens an aquatic zone as requested.
		At all times the precautionary principle should be applied throughout the development. Records should be kept of biological and chemical monitoring undertaken before and during the construction phase and operational phase for the development. Records should also be kept of inspections of surface water mitigation measures. These records should be made available upon request to any authorised person as defined under the Local Government (Water Pollution) Act.	The monitoring and record-keeping requested will be implemented.

Table 5.1: Consultation Responses

5.2 Methodology

5.2.1 Study Area

The various study areas applied in this assessment are detailed at **Annexes 5.1** and **5.2**.

5.2.1.1 Habitats, Flora, Terrestrial Mammals (including Bats) & Other Protected Fauna

The survey area for habitats, flora, terrestrial mammals (including bats) and other protected fauna included lands within the electricity substation and electrical control unit site boundaries plus 50m either side of the electricity line, except for the areas that

could not be accessed along the off-road component of the electricity line route (see **Section 5.1.6** for details).

5.2.1.2 Birds

The survey areas used for the ornithological impact assessment differ according to receptor as recommended by relevant good practice survey guidance (e.g. Bird Survey & Assessment Steering Group, 2024). These are summarised at **Section 5.2.3.2** below and are described in more detail within the baseline survey report (**Annex 5.2**).

5.2.1.3 Fisheries & Aquatic Ecology

The survey area used for the fisheries and aquatic ecology impact assessment was the bankside 150m either side of the watercourse crossing where the underground electricity line route spans the Paulstown Stream, Moanmore 14 and unnamed tributary, Shankill 14 and an unnamed watercourse.

No in-stream surveys were necessary, as no direct effects were expected in the absence of in-stream works.

5.2.2 Desk Study

A desk study was carried out to inform the biodiversity input to the scoping report for the project. The desk study involved using online resources to collate information on areas designated for nature conservation and previous ecological studies undertaken for other projects in the wider local area.

The following online and other resources were accessed as part of the desk study, searching for all relevant records up to 20km radius of the project boundary:-

- Satellite imagery[2];
- Environmental Protection Agency (EPA) maps[3];
- National Biodiversity Data Centre (NBDC) database[4];
- Environmental Sensitivity Mapper[5];
- Geological Survey Ireland Spatial Resources[6];
- National Parks and Wildlife Services (NPWS)[7];
- NPWS data request (request made on 29/05/2024 but no response received to date);
- BCI data request (results accurate as of 04/06/2024);
- The Irish Wetland Bird Survey (I-WeBS)[8]; and,
- Birds of Conservation Concern in Ireland 4 (BoCCI4): 2020-2026 (Gilbert at al., 2021).

For NBDC data, a 1km grid square resolution was used for the electricity substation site (S6560), electrical control unit (S6064), along off-road areas for the electricity line

[2] www.google.ie/maps (Last accessed 03/03/2025)

[3] https://gis.epa.ie Last accessed 03/03/2025

[4] https://maps.biodiversityireland.ie/ Last accessed 03/03/2025

[5] https://airomaps.geohive.ie/ESM/ Last accessed 03/03/2025

[6] https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228 Last accessed 03/03/2025

[7] www.npws.ie/ Last accessed 03/03/2025

[8] www.birdwatchireland.ie/our-work/surveys-research/research-surveys/irish-wetland-bird-survey/ Last accessed 03/03/2025. Data were supplied by the Irish Wetland Bird Survey (I-WeBS), a scheme coordinated by BirdWatch Ireland under contract to the National Parks and Wildlife Service of the Department of Housing, Local Government and Heritage

(S6561, S6562, S6463, S6363, S6264, S6164 and S6064), and where the underground electricity line intersects with the Paulstown stream (S6264), Moanmore 14 and unnamed tributary (S6562), Shankill 14 (S6561), and an unnamed watercourse (S6560). The remainder of the underground electricity line will be located within existing public roads.

For some species, population estimates are absent. Where NPWS has geographical range size, this has been used as a proxy for population size, with the number of individuals substituted for the number of occupied 1km grid squares.

5.2.2.1 Nature Conservation Sites

The following websites were accessed for information on nature conservation sites in the vicinity of the project:-

- NPWS; and,
- NBDC.

As a starting point, all European and national sites within 15km surrounding the project were identified, with the search distance extended to 20km for SPAs, and potentially further for nature conservation sites with downstream hydrological connectivity. International sites considered included Special Areas of Conservation (SACs), candidate SACs (cSACs), Special Protection Areas (SPAs), proposed SPAs (pSPAs), Important Bird Areas (IBAs) and Ramsar sites. National sites considered included Natural Heritage Areas (NHAs), proposed Natural Heritage Areas (pNHAs) and nature reserves. The rationale for the search distances is described at **Section 5.2.4**.

5.2.3 Field Surveys

Ecological surveys were carried out to yield sufficient data to support this assessment. A brief description of the surveys undertaken, and survey dates, is presented at **Table 5.2** below.

Survey	Brief Description	Timing
Scoping survey	An initial survey to identify any major constraints.	27 March 2024 28 March 2024
Mammal dwelling surveys	Further investigation (physical inspection and trail cameras) of potential mammal dwellings identified during scoping survey.	18 April 2024 2 May 2024
Bird surveys	Breeding bird surveys within the substation site and along the electricity line corridor plus 500m surrounding same. Full details of the survey methodology are described at **Annex 5.2.**	24 April 2024 24 May 2024 11 June 2024
Extended habitat survey	A survey to map the habitats present within the electricity substation site, electrical control unit site and along the electricity line route; along with other ecological features such as terrestrial mammals (including bats), invertebrates, amphibians, reptiles and plants (including invasive and non-native species or 'INNS'). Proposed watercourse crossings were also examined for signs/sightings of otter and other aquatic features within 150m of each crossing.	22 August 2024 23 August 2024 13 January 2025

Table 5.2: Survey Dates

5.2.3.1 Habitats & Flora

Terrestrial habitats and flora (including invasive plant species) were mapped

according to Fossitt (2000) and the good practice measures outlined in Heritage Council guidance (Smith et al., 2011). The locations of any rare or invasive plant species were recorded using a hand-held GPS.

Plant species nomenclature follows Rose et al. (2006). A list of the dominant and notable plant species was prepared for each habitat type.

Habitat surveys were conducted during an optimal time of year.

5.2.3.2 Bird Surveys

Baseline ornithology surveys were conducted during the period of April to July 2024 (breeding season).

Baseline Survey Methodologies

Surveys were informed by Bird Survey & Assessment Steering Group (2024) guidance. Further details of the breeding season surveys are provided at **Annex 5.2** with a summary provided below. The scoping visit identified that the habitats present were likely to be most important to birds during the breeding season as most of the survey area comprised of heavily grazed agricultural fields with some areas of wetter grassland and scrub that could support breeding waders. The predominance of heavily modified agricultural grassland habitats and often steep terrain indicated that the project site would be largely unsuitable for aggregations of sensitive wintering birds such as wildfowl or roosting raptors.

Breeding Bird Surveys

The survey methodology for breeding birds followed the survey methodology for lowland waders (O'Brien and Smith, 1992), although all bird species were recorded. This comprised a walked survey to identify potential nesting birds within the control unit site, substation site and within wet grassland and agricultural fields along the underground electricity line route that had higher proportions of rushes and some scrub. This level of survey effort was judged as proportionate given the small amounts of suitable vegetation present offering limited nesting opportunities for birds.

3 no. survey visits were undertaken, monthly, in April, May and June 2024. Surveys started at dawn and continued for 3-hours thereafter and started again 3-hours before dusk finishing when visibility was restricted due to darkness. The transect direction and order was reversed between surveys.

Full details of the survey methodology are provided at **Annex 5.2**.

In addition, the survey area was searched for evidence of breeding birds again as part of the extended habitat survey in August 2024.

5.2.3.3 Terrestrial Mammals (including bats)

Following the scoping visit, several burrows were identified near the electricity substation site. Further physical inspection was undertaken along with the deployment of a trail camera. The aim of these surveys was to establish the mammal species present. The camera was deployed for 15-days.

Searches for mammals were also carried out as part of extended habitat surveys in August 2024. The focus of these surveys was to search for mammal resting/breeding places, which are most vulnerable to disturbance and habitat loss. In addition, any other signs/sightings were recorded and mapped using a hand-held GPS. Survey methodology followed that outlined in Cresswell et al. (2012) with a particular focus

on badger *Meles meles* and other species on the Irish red-list (Marnell et al., 2019).

Otter *Lutra lutra* signs and sightings were searched for within 150m of each watercourse crossing.

A desk study was used to compile information on potential bat roosts and foraging habitats within and nearby the project site. The survey area was walked in August 2024 to search for potential bat roost features and to undertake an initial site risk assessment for bats which included an assessment of potential commuting features.

All potential bat roost features identified on site were of low suitability with no active roost field signs recorded and, therefore, no additional bat surveys were undertaken. Any features of greater suitability were outside the project footprint.

5.2.3.4 Other Protected Fauna

Invertebrate species were recorded on an ad hoc basis during all surveys.

No specific surveys for reptiles were conducted and were searched for on an ad hoc basis during other surveys, as NRA (2009) guidance states that direct observation is an effective survey technique.

Amphibians were surveyed for on an ad hoc basis during other surveys.

5.2.4 Evaluation Criteria for Ecological Assessment

5.2.4.1 Assessing Impact/Effect Significance

CIEEM guidelines state that ecological receptors which are important (i.e., Important Ecological Features or 'IEFs') and potentially affected by the project should be subject to detailed assessment. It is not necessary to carry out detailed assessment of receptors that are sufficiently widespread, unthreatened and resilient to project effects and would remain viable and sustainable. However, the EU *Biodiversity Strategy 2020* and Irish *National Biodiversity Action Plan 2023-2030* emphasise the need to achieve no net loss and an enhancement of biodiversity.

5.2.4.2 Determining the Zone of Influence

Determining whether an IEF has the potential to be affected by the project relates to the concept of the Zone of Influence (ZoI). The ZoI relates to the nature of the project, its likely effects and the presence of connections or pathways between ecological receptors and the project. Thus, ecological receptors that lack a connection to the project are considered outside the ZoI, even if they are directly within the project site. Conversely, receptors that are considerably removed from the project can still be considered within the ZoI if a pathway for effects exists.

All connections (ecological, hydrological and hydrogeological) which provide pathways for effects between the project and ecological receptors in the surrounding area are identified and described in **Section 5.3.1**.

For all receptors that are not designated nature conservation sites, the initial ZoI for the construction and decommissioning phases is as follows:-

- Direct effects: up to a 50m area surrounding permanent and temporary site infrastructure for the electricity substation and control centre and an up to 5m area along the electricity line; and,
- Indirect effects: dependent on the type of works and the published sensitivities of the ecological receptor.

For all receptors that are not designated nature conservation sites, the ZoI for the operational phase is dependent on the published sensitivities of the ecological receptor.

Regarding designated nature conservation sites, DoEHLG (2010) guidelines suggest that a 15km study area is adopted as a starting point when assessing the potential for source-receptor connectivity between a project and European sites. However, this is an arbitrary distance and, in some cases, could be much smaller or larger depending on whether there is hydrological, hydrogeological or ecological connectivity present. A 20km study area has been used initially for SPAs, which is slightly larger than the 15km recommended, in recognition that 20km is the maximum distance SPA Qualifying Interests (QI) bird species typically travel (NatureScot (formerly SNH), 2016). These 15km and 20km initial search areas were then reappraised during impact assessment where all hydrologically or hydrogeologically connected sites were considered.

5.2.4.3 Determining Importance

Ecological features can be important for a variety of reasons. The importance of ecological receptors should be considered within a defined geographical context and, for this project, the following geographic frame of reference is used:-

- International (i.e. Europe);
- national (i.e. Ireland);
- regional/county (i.e. County Kilkenny and County Carlow combined / County Kilkenny[9]);
- local higher value (i.e. the townlands containing the project); and,
- local lower value (i.e. the project site).

Habitat importance is determined through an assessment of the species composition, diversity, complexity and condition of a site. This is assessed in accordance with the relative abundance or rarity of a species or habitat at the geographic scales indicated above. The presence of Floral Protection Order species and/or Annex I habitats would increase the overall value. Similarly, habitat connectivity corridors such as complex treelines or riparian zone increase the habitat importance of value. These same considerations are placed on suitable habitats for species such as bats, otter, amphibians etc.

Where appropriate, the value of resident or regularly occurring species populations has been determined using the standard '1% criterion' method (Percival, 2003; Holt, et al., 2012). Using this, the presence of >1% of the international population of a species is considered internationally important and >1% of the national population is considered nationally important.

For breeding birds, where detailed regional or county-level species population data was absent, we have estimated regional-level and county-level populations for County Kilkenny and County Carlow (regional), and County Kilkenny (county) by multiplying the Republic of Ireland (ROI) population totals by 0.04 and 0.03, respectively. These correction factors reflect the land area taken up by the region (Kilkenny plus Carlow) or county (Kilkenny) as a proportion of the ROI total land area. This assumes that species populations are evenly distributed, which may not be

[9] Please note that the counties referred to here are to provide a geographical frame of reference. It should not be inferred that County Kilkenny has been assessed only in any impact assessment; rather, County Kilkenny has been named as an example to demonstrate the size of a typical Irish county.

realistic; however, in the absence of detailed spatial data this is considered a reasonable approximation. Where this approach has been undertaken, it is termed 'inferred'.

Data collected from the surveys for the project are at the local scales.

This information, combined with baseline survey results, was utilised to evaluate each ecological receptor recorded within the ZoI in terms of its importance. Habitats were evaluated regarding their characteristics and the surrounding landscape to interpret factors such as connectivity, stepping stone/isolated resource availability, local rarity etc. Additionally, the species assemblages of each habitat were considered regarding species richness and/or diversity to understand their value as well as regarding their use as resources for foraging, commuting, breeding etc.

Key ecological receptors (for assessment) are those deemed to be above the 'Local – Lower Value' importance evaluation. Evaluation criteria are outlined below at **Table 5.3.**

Resource Evaluation	Defining Criteria (adapted from NRA, 2009)
International Importance	'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA), candidate Special Area of Conservation (cSAC) or proposed Special Protection Area (pSPA). Sites that fulfil the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). Features essential to maintaining the coherence of the Natura 2000 Network. Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). World Heritage Site (Convention for the Protection of World Cultural and Natural Heritage, 1972). Biosphere Reserve (UNESCO Man and The Biosphere Programme). Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). Biogenetic Reserve under the Council of Europe. European Diploma Site under the Council of Europe. Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).
National Importance	Site designated or proposed as a Natural Heritage Area (NHA). Statutory Nature Reserve. Refuge for Fauna and Flora protected under the Wildlife Acts. National Park. Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA). Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.
County Importance	Area of Special Amenity.

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

Table 5.3: Evaluation Criteria

5.2.4.4 Impact/Effect Assessment

The main purpose of an EIAR is to identify, describe and present an assessment of the likely significant effects of a project on the environment.

The CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018, updated 2022) (hereafter referred to as 'the CIEEM guidelines') form the basis of the impact/effect assessment presented in this chapter. Reference has also been made to other relevant guidance, as appropriate.

The assessment process involves the following steps:-

- Identifying and characterising likely effects and their effects;
- Incorporating measures to avoid and mitigate negative effects;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects; and,
- Identifying opportunities for ecological enhancement.

The description of the likely significant effects on the receiving environment should

cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project. This description takes into account the environmental protection objectives established at EU or Member State level which are relevant to the project.

When describing effects, reference has been made to specific characteristics, as appropriate. Using CIEEM (2018) guidelines, effects have been described in terms of:-

- Quality e.g. Positive/neutral/negative;
- Extent e.g. Spatial area;
- Context e.g. Conform/contrast with baseline conditions;
- Magnitude e.g. Size/amount/intensity/volume;
- Probability e.g. Likely/unlikely;
- Duration e.g. Temporary/short-term/medium-term/long-term/permanent;
- Frequency e.g. Once/rarely/occasionally/frequently/constantly;
- Timing e.g. Critical life-stage or season; and,
- Reversibility e.g. Reversible/irreversible.

The assessment will describe those characteristics that are relevant to understanding the ecological effect and determining the significance, and as such does not need to incorporate all stated effects.

5.2.4.5 Significant Impacts/Effects

The concept of ecological significance is addressed in paragraphs 5.24 through to 5.28 of the CIEEM guidelines. Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of Ecological Impact Assessment (EcIA), a 'significant effect' is an effect that is sufficiently important to require assessment and reporting so that the competent authority is adequately informed of the environmental consequences of permitting a project. Effects can be considered significant at a wide range of scales from international to local, and the scale of significance of an effect may or may not be the same as the geographic context in which the feature is considered important.

The nature of the identified effects on each assessed feature is characterised in accordance with the process at **Section 5.2.4.4**. This is considered alongside available research and professional judgement about the sensitivity of the feature affected; and professional judgement about how the effect is likely to affect the site, habitat, or population's structure and continued function. Where it is concluded that an effect would be likely to reduce or increase the importance of an assessed feature, it is described as significant.

5.2.4.6 Cumulative Impacts/Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects can occur where a project results in individually insignificant effects that, when considered in-combination with effects of other proposed or permitted plans and projects, can result in significant effects.

Other plans and projects (refer to **Chapter 1**) that should be considered when establishing cumulative effects include:-

- Proposals for which consent has been applied but which are awaiting determination;

- Projects which have been granted consent, but which have not yet been started or which have been started but are not yet completed (i.e. under construction);
- Proposals which have been refused permission, but which are subject to appeal, and the appeal is undetermined.
- Constructed developments whose full environmental effects have not yet manifested and therefore cannot be accounted for in the baseline; or,
- Developments specifically referenced in a national policy, a national plan or a local plan.

5.2.4.7 Avoidance, Mitigation, Compensation & Enhancement

Where likely significant effects have been identified, the mitigation hierarchy has been applied, as recommended in the CIEEM guidelines. The mitigation hierarchy sets out a sequential approach beginning with the avoidance of effects where possible, the application of mitigation measures to minimise unavoidable effects and then compensation for any remaining effects. Once avoidance and mitigation measures have been applied, residual effects are then identified along with any necessary compensation measures, and incorporation of opportunities for enhancement.

It is important to clearly differentiate between avoidance mitigation, compensation and enhancement and these terms are defined here, as follows:-

- Avoidance is used where an effect has been avoided, e.g. through changes in scheme design;
- Mitigation is used to refer to measures to reduce or remedy a specific negative effect in situ;
- Compensation describes measures taken to offset residual effects, i.e. where mitigation in situ is not possible; and
- Enhancement is the provision of new benefits for biodiversity that are additional to those provided as part of mitigation or compensation measures, although they can be complementary.

5.2.4.8 Residual Impacts/Effects

Where likely significant effects have been identified, the mitigation hierarchy has been applied, as recommended in the CIEEM guidelines. The mitigation hierarchy sets out a sequential approach beginning with the avoidance of effects where possible and followed by the application of mitigation measures to minimise unavoidable effects. The remaining effects are termed 'residual effects. If significant residual effects remain, then compensation for any remaining effects may be undertaken.

5.3 Description of Existing Environment

This section presents a description of the general context of the receiving (baseline) environment associated with the project.

For all receptors, other than nature conservation sites, the results of both the desktop studies and field surveys are presented together. Full details of the sources for desktop data (including when the data searches were made) are presented at **Annex 5.3**. Full details of the field surveys (including when the surveys were made) are described at **Section 5.2.3**.

5.3.1 Nature Conservation Sites

European sites are assessed in the Appropriate Assessment (AA) Screening and Natura

Impact Statement (NIS) which accompanies the planning application for the project. Nationally designated sites are discussed in the following sections.

Site synopses are provided at **Annex 5.5.**

5.3.1.1 International Sites

The project is not situated within any internationally designated site.

There are 2 no. SACs and 1 no. SPA within 15km and 20km of the project. There are no additional SACs or SPAs with a remote, downstream hydrological connection. There are no Ramsar sites within 20km of the project.

These international sites are illustrated at **Annex 5.1** (**Figure 2A** to **2C**).

Table 5.4 provides a list of the designated sites and identifies any source-receptor pathways. These can be considered to be within the ZoI of the project. Qualifying features with connectivity to the project are highlighted in bold. The NIS concludes:-

> "*With the identified mitigation measures in place, it can be concluded, beyond all reasonable scientific doubt that the project, either alone or in combination with other plans or projects will not undermine the conservation objectives of any European sites. It can therefore be concluded that the Project would not have an adverse effect on the integrity of any European site*".

Site Name	Code	Qualifying Interests	Value	Distance (km) from Proposed Project	Source – Pathway – Receptor as identified in the NIS
SACs and cSACs					
River Barrow and River Nore cSAC	002162	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Reefs [1170] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] **Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]** European dry heaths [4030] **Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]** Petrifying springs with tufa formation (*Cratoneurion*) [7220] Old sessile oak woods with *Ilex* and *Blechnum*	International	2.7	<u>Hydrological & hydrogeological</u> Downstream hydrological connectivity via Paulstown Stream (10km instream distance), Moanmore 14 (5km instream distance) and unnamed tributary (5km instream distance), Shankill 14 (4km instream distance), and unnamed watercourse (3.7km instream distance). Sensitive QIs recorded or likely to occur downstream of the project include otter, freshwater pearl mussel, water courses of plain to montane levels, white-clawed crayfish, Desmoulin's whorl snail, Twaite shad, hydrophilous tall herb fringe communities, Atlantic salmon, brook lamprey, river lamprey, sea lamprey, and alluvial forests. For all other habitats or species, they are either terrestrial or estuarine and/or are not mapped as downstream of the project site; therefore, there is no pathway for effects. On the basis of the assessment at **Chapter 7**, it is considered that a hydrogeological connection may exist between the project and this cSAC via shared Bagenalstown Lower, Castlecomer and Shanragh groundwater bodies. However, no Annex I groundwater dependent terrestrial ecosystem (GWDTE) habitats have been mapped in the same catchments as the project (NPWS, 2011), so there is no pathway for effects. <u>Air</u> There is no strong connection for airborne emissions and dust due to distance and screening by natural features such as hedgerow and treelines. <u>Ecological</u> There is a downstream hydrological connection between the project site and cSAC, which could provide a pathway for mobile ex-situ QI species. Such QIs include otter, white-clawed crayfish, Twaite shad, Atlantic salmon, brook lamprey, river lamprey and sea lamprey. Freshwater pearl mussel are mobile also during part

		in the British Isles [91A0] **Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]** **Desmoulin's whorl snail *Vertigo moulinsiana* [1016]** **Freshwater pearl mussel *Margaritifera margaritifera* [1029]** Nore pearl mussel *Margaritifera durrovensis* [1990] **White-clawed crayfish *Austropotamobius pallipes* [1092]** **Sea lamprey *Petromyzon marinus* [1095]** **Brook lamprey *Lampetra planeri* [1096]** **River lamprey *Lampetra fluviatilis* [1099]** **Twaite shad *Alosa fallax fallax* [1103]** **Salmon *Salmo salar* [1106]** **Otter [1355]** Killarney fern *Trichomanes speciosum* [1421]			of their life cycle when the glochidia are present in mobile salmonid hosts. According to the CO document for this cSAC (NPWS, 2011), there are no Nore pearl mussel downstream of the project. Desmoulin's whorl snail and Killarney fern either have extremely limited mobility or are sessile; therefore, there is no pathway for effects on these species. <u>Invasive species</u> Invasive plant species were present adjacent to the proposed electricity line and nearby watercourses that are hydrologically connected to the cSAC. Of particular concern is Himalayan balsam, which is spread along watercourses.
Blackstairs Mountains SAC	000440	Northern Atlantic wet heaths with *Erica*	International	14.8	<u>Hydrological & hydrogeological</u>

		tetralix [4010] European dry heaths [4030]			No downstream hydrological connectivity. No hydrogeological connection as SAC within different groundwater bodies (New Ross and Ballyglass vs. Castlecomer, Shanragh and Bagenalstown Lower). Therefore, no pathway for effects. <u>Air</u> There is no strong connection for airborne emissions and dust due to distance. <u>Ecological</u> No ecological connectivity as the designated features are habitats which do not occur on the project site, therefore, no pathway. <u>Invasive species</u> There are no hydro-, hydrogeological, airborne or ecological pathways for the spread of invasive species.
SPAs (no proposed SPAs were present)					
River Nore SPA	004233	Kingfisher *Alcedo atthis* [A229] - resident population	International	11.9	<u>Hydrological and hydrogeological</u> No downstream hydrological connectivity. There is a c.55 km upstream connection between the project and the SPA. No hydrogeological connection as SPA within different groundwater bodies (Rathdowney, Castletown Gravel, Poormansbridge Gravels, Durrow, Lisdowney, Kilkenny-Ballynakill Gravels, Ballingarry, Clifden, Kilkenny, Stoneyford Gravels, Bennettsbridge, Clifden Northwest, Clifden South, Thomastown and Inistioge vs. Castlecomer, Shanragh and Bagenalstown Lower). Therefore, no pathway for effects. <u>Air</u> There is no strong connection for airborne emissions and dust due to distance. <u>Ecological</u> The only SCI species, kingfisher, was not recorded during surveys and so cannot be significantly affected by disturbance/displacement. The watercourses were considered unsuitable for foraging or nesting kingfisher (e.g. very shallow flows, highly modified, lack of suitable perches and banks, and presence of disturbances such as cattle).

					Kingfisher are predominantly riparian and territory size is 1–3.5km long (Fry, et al., 1999). There is a c. 55 km upstream hydrological connection between the project and the SPA, which is considerably larger than maximum kingfisher territory size. Therefore, no strong pathway for effects. Invasive species There are no hydro-, hydrogeological, airborne or ecological pathways for the spread of invasive species.

Table 5.4: International Sites

5.3.1.2 National Sites

There are 14 no. national nature conservation sites within 15km of the project (i.e. one no. NHAs, and 13 no. pNHAs).

These are all presented at **Annex 5.1** (**Figure 3A** to **3D**).

None of the NHAs or pNHAs described at **Table 5.5** are nature reserves.

There are 5 no. pNHAs within 15km of the project that overlap with European sites and for which no site synopsis is available. There are also 5 no. pNHAs that overlap with European sites located beyond 15km that have remote, downstream hydrological connectivity.

The European site designation supersedes that of the pNHA, and effects on these have been assessed in the NIS and are not considered further in this chapter.

For each of these European sites, the NIS concluded "*with the identified mitigation measures in place, it can be concluded, beyond all reasonable scientific doubt that the Project, either alone or in combination with other plans or projects will not undermine the conservation objectives of any European sites. It can therefore be concluded that the Project would not have an adverse effect on the integrity of any European site*".

As such, the same conclusion applies for these pNHAs.

Table 5.5 provides a list of the designated sites and identifies any source-receptor pathways. These can be considered to be within the ZoI. Qualifying features with connectivity to the project are highlighted in bold

Site Name	Code	Qualifying Interests	Value	Distance (km) from Proposed Project	Connectivity
NHAs					
Coan Bogs NHA	002382	Peatlands	National	7.5	Hydrological & hydrogeological No hydrological connectivity. No hydrogeological connectivity as NHA is in different groundwater body (Newtown) to the project (Castlecomer, Shanragh and Bagenalstown Lower). Air There is no strong connection for airborne emissions and dust due to distance. Ecological No ecological connectivity as the designated features are habitats which do not occur on the project site, therefore, no pathway. Invasive species There are no hydro-, hydrogeological, airborne or ecological pathways for the spread of invasive species.
pNHAs					
Whitehall Quarries pNHA	000855	**Flora of acidic habitats**, unnamed raptors	National	0.5	Hydrological & hydrogeological No hydrological connection. Potential hydrogeological connection, as within same Shanragh groundwater body as project. However, the qualifying feature species are not sensitive to groundwater impacts so there is no pathway for effects. Air There is no strong airborne connection for air pollution according to IAQM (2019) guidance, as the distance between the pNHA and the project is greater than 200m. According to IAQM (2014) guidance, dust effects from road projects are only like to be important for sensitive habitats up to 500m from the project. Raptors are not especially sensitive to air pollution or dust. While there is no strong airborne connection, there is a potential pathway for dust-related effects on flora of acidic habitats for this pNHA.

					Ecological According to the site synopsis, unnamed raptors use the quarry for breeding. These are likely to be peregrine falcon *Falco peregrinus*. However, no peregrine falcon were recorded within the project site or its immediate environs during breeding bird surveys so there are no pathways for disturbance/displacement. Flora are non-mobile, so there is no pathway for effects. Invasive species There are no hydro-, hydrogeological, airborne or ecological pathways for the spread of invasive species.
Mothel Church, Coolcullen pNHA	000408	Nursery roost of Natterer's bat *Myotis nattereri*	National	4.3	Hydrological & hydrogeological No hydrological connection. Potential hydrogeological connection, as within same Castlecomer groundwater body as project. However, the qualifying feature species are not sensitive to groundwater impacts so there is no pathway for effects. Air There is no strong connection for airborne emissions and dust due to distance and lack of sensitive qualifying features. Ecological The core sustenance zone for Natterer's bat is 4km (BCT, 2023), which is less than the distance between the pNHA and the project site. Therefore, there is no strong ecological connectivity between the two and disturbance/displacement effects on bats from the pNHA can be excluded. Invasive species There are no hydro-, hydrogeological, airborne or ecological pathways for the spread of invasive species.
Ballymoon Esker pNHA	000797	Esker habitats, two plants named in site synopsis that were previously on Flora Protection Order	National	6.6	Hydrological & hydrogeological No downstream hydrological connection. No hydrogeological connection as pNHA in different groundwater body (New Ross) to project (Castlecomer, Shanragh and Bagenalstown Lower). Air There is no strong connection for airborne emissions and dust

		but not currently			due to distance. Ecological The qualifying features are non-mobile habitats and plants, therefore, there is no pathway for effects. Invasive species There are no hydro-, hydrogeological, airborne or ecological pathways for the spread of invasive species.
Cloghristick Wood pNHA	000806	Overlaps with River Barrow and Rier Nore cSAC; no site synopsis available.	National	8.0	Considered under River Barrow and River Nore cSAC
Dunmore Cave pNHA	000401	Nursery roost of Natterer's bat *Myotis nattereri*	National	9.9	Hydrological & hydrogeological No hydrological connection. No hydrogeological connection as pNHA in different groundwater body (Ballingarry) to project (Castlecomer, Shanragh and Bagenalstown Lower). Air There is no strong connection for airborne emissions and dust due to distance and lack of sensitive qualifying features. Ecological The core sustenance zone for Natterer's bat is 4km, which is less than the distance between the pNHA and the project site. Therefore, there is no strong ecological connectivity between the two and disturbance / displacement effects on bats from the pNHA can be excluded. Invasive species There are no hydro-, hydrogeological, airborne or ecological pathways for the spread of invasive species.
Esker Pits pNHA	000832	Range of vegetation types, plant named in site synopsis that was previously on Flora Protection Order	National	10.7	Hydrological & hydrogeological No hydrological connection. No hydrogeological connection as pNHA in different groundwater body (Ballingarry) to project (Castlecomer, Shanragh and Bagenalstown Lower). Air There is no strong connection for airborne emissions and dust

		but not currently			due to distance. Ecological No ecological connectivity as qualifying features are habitats and plants, which are located outside the project site. Invasive species There are no hydro-, hydrogeological, airborne or ecological pathways for the spread of invasive species.
Red Bog, Dungarvan pNHA	000846	Floating fen, great fen sedge *Cladium mariscus*, unnamed wintering waterfowl	National	10.8	Hydrological & hydrogeological No hydrological connection. No hydrogeological connection as pNHA in different groundwater body (Bennettsbridge and Clifden South) to project (Castlecomer, Shanragh and Bagenalstown Lower). Air There is no strong connection for airborne emissions and dust due to distance. Ecological No ecological connectivity for qualifying feature habitats and plants, which are located outside the project site. No waterfowl were recorded during breeding season surveys. While no non-breeding surveys were undertaken, the project site is not considered suitable for wintering wildfowl due predominance of heavily grazed pasture, often steep terrain and lack of large waterbodies. Therefore, no strong ecological connection for wintering waterfowl. Invasive species There are no hydro-, hydrogeological, airborne or ecological pathways for the spread of invasive species.
Dunmore Complex pNHA	001859	Overlaps with River Barrow and Rier Nore cSAC; no site synopsis available	National	11.5	Considered under River Barrow and River Nore cSAC
Newpark Marsh pNHA	000845	Semi-natural fen vegetation	National	11.7	Hydrological & hydrogeological No hydrological connection. No hydrogeological connection as pNHA in different

					groundwater body (Kilkenny-Ballynakill Gravels) to project (Castlecomer, Shanragh and Bagenalstown Lower). Air There is no strong connection for airborne emissions and dust due to distance. Ecological No ecological connectivity as qualifying features are habitats, which are located outside the project site. Invasive species There are no hydro-, hydrogeological, airborne or ecological pathways for the spread of invasive species.
Archersgrove pNHA	002051	Overlaps with River Barrow and Rier Nore cSAC; no site synopsis available	National	12.5	Considered under River Barrow and River Nore cSAC
Lough Macask pNHA	001914	Wetland vegetation	National	13.6	Hydrological & hydrogeological No hydrological connection. No hydrogeological connection as pNHA in different groundwater body (Kilkenny-Ballynakill Gravels) to project (Castlecomer, Shanragh and Bagenalstown Lower). Air There is no strong connection for airborne emissions and dust due to distance and lack of sensitive qualifying features. Ecological No ecological connectivity as qualifying features are habitats, which are located outside the project site. Invasive species There are no hydro-, hydrogeological, airborne or ecological pathways for the spread of invasive species.
Ardaloo Fen pNHA	000821	Overlaps with River Barrow and River Nore cSAC; no site synopsis available	National	13.8	Considered under River Barrow and River Nore cSAC
Blackstairs Mountains	000770	Overlaps with	National	14.8	Considered under Blackstairs Mountains SAC

pNHA		SAC of same name; no site synopsis available			
pNHAs with remote, downstream hydrological connection					
Clohastia pNHA	000830	Overlaps with River Barrow and River Nore cSAC; no site synopsis available	National	16.2	Considered under River Barrow and River Nore cSAC
Barrow River Estuary pNHA	000698	Overlaps with River Barrow and River Nore cSAC; no site synopsis available	National	26.3	Considered under River Barrow and River Nore cSAC
Ballyhack pNHA	000695	Overlaps with River Barrow and River Nore cSAC; no site synopsis available	National	49.7	Considered under River Barrow and River Nore cSAC
Duncannon Sandhills pNHA	001738	Overlaps with River Barrow and River Nore cSAC; no site synopsis available	National	52.6	Considered under River Barrow and River Nore cSAC
Waterford Harbour pNHA	000787	Overlaps with River Barrow and River Nore cSAC; no site synopsis available	National	50.3	Considered under River Barrow and River Nore cSAC

Table 5.5: Nationally Designated Sites

5.3.2 Habitats & Flora

5.3.2.1 Desktop Study Habitat Results

There are no previously mapped Annex I habitats present within the project site (NPWS, 2019). Similarly, there are no records of Floral Protection Order species, protected bryophytes or important habitats such as semi-natural grasslands or ancient woodlands (AW) within the NPWS data sources. There are also no tree preservation orders mapped within the study area (Kilkenny County Council, 2021).

Habitat contribution to ecological networks has been assessed *sensu* Parker et al. (2016). Those areas that contribute most to ecological networks (i.e. those that contribute to 3 no. ecological networks) are considered to have the highest biodiversity value. Most of the project contributes to no ecological networks *sensu* Parker et al. (2016). Some sections of the route of the underground electricity line contribute to 1 no. and occasionally 2 no. ecological networks. Thus, most of the land at the project site, barring one or two exceptions, has low biodiversity value in this regard.

No records of threatened, protected or non-native flora were yielded from the data search.

5.3.2.2 Field Survey Results

No threatened or protected flora were recorded within the study area during surveys.

The following describes the habitats recorded within the project site (including electricity line route). These, along with non-native species locations, are also presented at **Annex 5.1** (**Figures 4A–4E**, **5B.1–5B.5**) and **Table 5.6**.

Flower Beds and Borders (BC4)

Flower beds and borders were present as part of gardens nearby to the underground electricity line. A variety of non-native and native plant species are likely present; however, it was not possible to obtain a species list and photo, as the habitat type could be viewed via satellite images only.

Stone Walls and Other Stoneworks (BL1)

Stone walls and other stoneworks were present at property entrances and as field boundaries adjacent to the underground electricity line. This habitat also formed a mosaic with hedgerows along field boundaries adjacent to the electricity line. Lichens were mostly present on the stone walls, along with occasional ivy-leaved toadflax *Cymbalaria muralis* and maidenhair spleenwort *Asplenium trichomanes*.

Photo 1: Stone Walls and Other Stoneworks BL1

Earth Banks (BL2)

Earth banks were present in a number of locations adjacent to roads along the route of the underground electricity line. The habitat type was dominated by scrub vegetation including dominant bramble, abundant European gorse and frequent hawthorn.

Photo 2: Earth Banks BL2

Buildings and Artificial Surfaces (BL3)

Buildings and artificial surfaces were present as roads along the route of the underground electricity line, at buildings adjacent to same and in the environs of the electricity substation site. This highly artificial habitat type was generally species poor, with lichens and brown mosses typically present.

Photo 3: Buildings and Artificial Surfaces BL3

Spoil and Bare Ground (ED2), Mosaic of Spoil and Bare Ground x Recolonising Bare Ground x Scrub (ED2 x ED3 x WS1)

Spoil and bare ground were present in 2 no. forestry track locations along the underground electricity line route. Species recorded included occasional creeping buttercup *Ranunculus repens* and perennial rye grass *Lolium* species.

A mosaic of this habitat type with recolonising bare ground and scrub was recorded. Species recorded in the recolonising bare ground or scrub components of this mosaic are given in the constituent habitat types below.

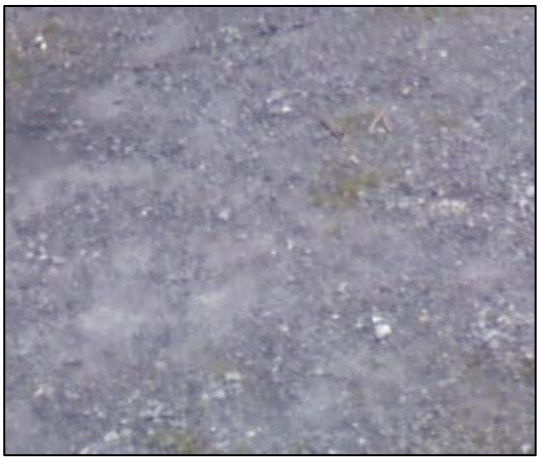

Photo 4: Spoil and Bare Ground ED3

Recolonising Bare Ground (ED3)

Recolonising bare ground was found along and adjacent to part of the underground electricity line route shared with forestry tracks. Species recorded included abundant coltsfoot *Tussilago farfara*, common cat's ear *Hypochaeris radicata*; frequent selfheal *Prunella vulgaris*, spear thistle *Cirsium vulgare*, greater plantain *Plantago major*; occasional *Epilobium* spp., foxglove *Digitalis purpurea*, *Senecio* spp., and soft rush *Juncus effusus*.

Photo 5: Recolonising Bare Ground ED3

Other Artificial Lakes and Ponds (FL8)

Other artificial lakes and ponds were present in the form a small, flooded, abandoned quarry adjacent to a public road. It was not possible to discern the plant species present within the water from this distance.

Photo 6: Other Artificial Lakes and Ponds

Eroding/Upland Rivers (FW1)

Eroding/upland rivers were present in the form of the Paulstown Stream, Shankill 14, Moanmore 14 and unnamed tributary, and another unnamed watercourse, all of which intersect the route of the underground electricity line. Species recorded along the bank edges included ivy *Helix hedera*, brooklime *Veronica beccabunga*, creeping buttercup, perennial rye grasses and other species typical of improved agricultural grassland habitats. Abundant brambles R*ubus fruticosus* agg. and nettles *Urtica dioica* were also seen, suggesting nutrient enrichment. INNS Himalayan balsam and montbretia were present along certain sections also.

The Paulstown Stream and Shankill 14 watercourses were generally overgrown, shallow (5cm depth) and slow-flowing. The Moanmore 14 and unnamed tributary were both overgrown and shallow. The other unnamed watercourse was dry at the time of survey and appeared to be heavily modified. Sections of the Paulstown Stream and Shankill 14 were heavily poached by cattle.

Photo 7: Eroding/Upland Rivers FW1

Drainage Ditches (FW4), Mosaic of Drainage Ditches x Hedgerows (FW4 x WL1), Mosaic of Drainage Ditches x Treelines (FW4 x WL2)

Drainage ditches were found within the verge along the underground electricity line, as well as alongside field margins, where they often formed a mosaic with hedgerow or treeline habitats. There was an extensive network of drainage ditches in the field margins at the site of the electricity substation; however, these were dry at the time of survey and there was no obvious connection to the nearby unnamed watercourse.

Plant species recorded included abundant common water starwort *Callitriche stagnalsis*; locally abundant brooklime; frequent *Juncus* spp.; and occasional *Epilobium* spp. and creeping buttercup. Species recorded in nearby hedgerows or treelines are provided in the relevant sections below.

Photo 8: Drainage Ditches FW4 x Hedgerow WL1 Mosaic

Improved Agricultural Grassland (GA1), Mosaic of Improved Agricultural Grassland x Scrub (GA1 x WS1)

Improved agricultural grassland was found along much of the underground electricity line and at the control unit and electricity substation locations. These areas were predominantly used for grazing by cattle. Perennial rye grass dominated this habitat type, with abundant creeping buttercup and locally abundant meadow buttercup *Ranunculus acris*. Frequently recorded species included white clover *Trifolium repens*, common sorrel *Rumex acetosa*, nettles, spear thistle and creeping thistle *Cirsium arvense*. Red clover *Trifolium pratense* was also locally frequent. Occasional species included Yorkshire fog *Holcus lanatus*, crested dog's tail *Cynosurus cristatus* and

common ragwort *Jacobaea vulgaris*. Marsh woundwort *Stachys palustris* and selfheal *Prunella vulgaris* were all rare, and marsh ragwort *Jacobaea aquatica* and meadow vetchling *Lathyrus pratensis* were recorded in wetter areas only.

There were also mosaics of this habitat type with scrub, with the scrub component described in the relevant section below.

Photo 9: Improved Agricultural Grassland GA1

Amenity Grassland (Improved) (GA2)

Amenity grassland (improved) comprised of lawns and mown verges near to the underground electricity line. This habitat was dominated by a mixture of grass species and daisy *Bellis perennis*.

Photo not shown due to its presence within a private garden.

Dry Meadows and Grassy Verges (GS2)

Dry meadows and grassy verges were found adjacent to much of the section of the underground electricity line within public roads. Species recorded included abundant cocksfoot *Dactylis glomerata*, false oat grass *Arrhenatherum elatius*; frequent yarrow *Achillea millefolium*, common hogweed *Heracleum sphondylium*, great willowherb *Epilobium hirsutum*, bent *Agrostis* spp., perennial rye grasses, bush vetch *Vicia sepium*, common knapweed *Centaurea nigra*, cow parsley *Anthriscus sylvestris*, nettles, dandelion *Taraxacum* agg, and daisy *Bellis perennis*; occasional meadowsweet *Filipendula ulmaria* and redshank *Persicaria maculosa*; and rare *Hypericum* spp.

Non-native montbretia was present in some sections of verges adjacent to the underground electricity line.

Photo 10: Dry Meadows and Grassy Verges GS2

Wet Grassland (GS4), Mosaic of Wet Grassland x Scrub (GS4 x WS1)

Wet grassland, and a mosaic of wet grassland and scrub, were found in wetter sections of agricultural fields where the underground electricity line is to be located. Species recorded included abundant creeping bent *Agrostis stolonifera*; dominant soft rush, sharp-flowered rush *Juncus acutiflorus*, tufted hair-grass *Dechampsia cespitosa*; frequent Yorkshire fog, meadow buttercup, common bent *Agrostis capillaris*, spear thistle; and occasional perennial rye grass, cock's foot, crested dog's tail, tormentil, marsh cudweed *Gnaphalium uligonosum*, common birdsfoot trefoil *Lotus corniculatus*, redshank and small-flower bittercress *Cardamine parviflora*.

Most sections had been heavily grazed by cattle.

Scrub species are provided in the relevant section below.

Photo 11: Dry Meadows and Grassy Verges GS2

(Mixed) Broadleaved Woodland (WD1)

(Mixed) broadleaved woodland was found in a small section to the west of the underground electricity line and comprised a plantation of silver birch *Betula pendula*.

It was not possible to obtain a clear photo of this habitat as it was within third-party lands and was obscured by other habitat types.

Conifer Plantation (WD4)

Conifer plantation habitats were recorded north of the control unit and adjacent to the route of the underground electricity line. Species recorded included dominant Sitka spruce *Picea sitchensis* and locally dominant larch *Larix* sp. At the edge of plantations; hawthorn, ash, hazel and willow species were frequent. Undergrowth included frequent bracken *Pteridium aquilinum*, bramble, thistles, angelica *Angelica sylvestris*, rushes and hard fern *Blechnum spicant*, although these were all mostly confined to the edges or open spaces within the habitat type.

Photo 12: Conifer Plantation WD4 in background

Scattered Trees and Parklands (WD5)

Scattered trees and parkland habitat consisted of a garden adjacent to the underground electricity line where apple *Malus* spp. trees were a prominent visual feature but comprised less than 30% of the total area under consideration.

Photo not shown due to its presence within a private garden.

Hedgerows (WL1), Mosaic of Hedgerows x Treelines (WL1 x WL2)

Hedgerows were present along most of the underground electricity line route, control unit and electricity substation sites acting as boundaries to fields and properties. Species recorded included dominant gorse *Ulex europeus*, hawthorn; abundant ivy, blackthorn *Prunus spinosa*, bramble; frequent thistles, holly *Ilex aquifolium*, pedunculate oak, hazel, ash, hedge bindweed *Calystegia sepium*, bracken; occasional foxglove, herb-robert *Geranium robertianum* and common knapweed. Non-native hedges comprised of box honeysuckle and salmonberry.

Some hedgerows had started to turn into treelines and such mosaics contained species found in both component habitat types.

In general, hedgerows within the project footprint were often gappy (individual gaps <5m), low (1.5 – 2.5m), relatively narrow (1-3m) and many were semi-translucent to semi-opaque. Overall, many hedgerows were in 'adequate' condition according to Foulkes et al. (2013).

Photo 13: Hedgerows WL1 in foreground

Treelines (WL2)

Treelines were present adjacent to the underground electricity line route and comprised a variety of tree species including abundant ash, willows, pedunculate oak; frequent sycamore; and occasional horse chestnut *Aesculus hippocastanum*. Ivy was present on many trees.

Photo 14: Treelines WL2

Scrub (WS1)

Scrub was found nearby to parts of the underground electricity line comprising of dominant European gorse and bramble. While there were some denser patches with extensive coverage, most was sparsely distributed.

Photo 15: Scrub WS1

Recently-Felled Woodland (WS5)

Recently felled woodland was found along part of the underground electricity line. There was no evidence of re-planting or conversion to another land use. Species recorded included brown mosses, soft rush and foxglove.

Photo 16: Recently-Felled Woodland WS5

Fossitt Code	Fossitt Name	EU Annex I Affiliation?	Area (ha)/Length (m)	Occurrence within Proposed Project[10]
BC4	Flower beds and borders	No	0.03ha	Adjacent to the underground electricity line.
BL1	Stone walls and other stonework	No	76.22m	Forms field boundaries and property entrances adjacent to the underground electricity line.
BL2	Earth banks	No	0.15ha	Adjacent to the underground electricity line.
BL3	Buildings and artificial surfaces	No	1.20ha/3,370.06m	Roads and buildings adjacent to the underground electricity line.
ED2	Spoil and bare ground	No	0.05ha	Adjacent to the underground electricity line.
ED2 x ED3 x WS1	Spoil and bare ground x recolonising bare ground x scrub mosaic	No	0.44ha	Adjacent to the underground electricity line.
ED3	Recolonising bare ground	No	0.73ha/42.67m	Adjacent to the underground electricity line.
FL8	Other artificial lakes and ponds	No	0.01ha	Adjacent to the underground electricity line.
FW1	Depositing/lowland rivers	No	1,624.50m	Crossed by underground electricity line.
FW4	Drainage ditches	No	0.16ha/660.00m	Adjacent to the underground electricity line.
FW4 x WL1	Drainage ditches x Hedgerows mosaic	No	707.80m	Near substation and underground electricity line.
FW4 x WL2	Drainage ditches x Treelines mosaic	No	150.19m	Near substation and underground electricity line.
GA1	Improved agricultural grassland	No	66.40ha	Adjacent to the underground electricity line and at control centre and substation locations.
GA1 x WS1	Improved agricultural grassland x Scrub mosaic	No	0.17ha	Adjacent to the underground electricity line.
GA2	Amenity grassland	No	1.26ha	Adjacent to the underground electricity line.

[10] Also presented at **Annex 5.1**

	(improved)			
GS2	Dry meadows and grassy verges	No	0.05ha/74.62m	Adjacent to the underground electricity line.
GS4	Wet grassland	No	4.71ha	Adjacent to the underground electricity line.
GS4 x WS1	Wet grassland x Scrub mosaic	No	0.07ha	Adjacent to the underground electricity line.
WD1	(Mixed) broadleaved woodland	No	2.29ha	Adjacent to the underground electricity line.
WD4	Conifer plantation	No	5.61ha	Near control centre and electricity line.
WD5	Scattered trees and parklands	No	0.03ha	Adjacent to the electricity line.
WL1	Hedgerows	No	9,438.53m	Adjacent to all elements of the project.
WL1 x WL2	Hedgerows x Treelines mosaic	No	387.48m	Adjacent to the substation.
WL2	Treelines	No	2,960.48m	Adjacent to the underground electricity line and substation.
WS1	Scrub	No	1.90ha	Adjacent to the underground electricity line.
WS5	Recently-felled woodland	No	0.44ha	Adjacent to the underground electricity line.

Table 5.6: Habitat Types Within Project site

Invasive Plant Species

Invasive Himalayan balsam *Impatiens glandulifera* and salmonberry *Rubus spectabilis* were recorded during field surveys. Himalayan balsam was located near a tributary of the Shankill 14 (unnamed watercourse) just north of the electricity substation site. Salmonberry was recorded within hedgerows adjacent to the proposed electricity line route (local road L7117). Both species are listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011-2021 (S.I. 477/2011) and the risk of them having effects are 'high' and 'medium', respectively (Kelly et al., 2013).

Non-native box honeysuckle *Lonicera pileata* was located along hedgerows adjacent to the proposed electricity line route (local road L7117). Non-native snowberry *Symphoricarpos albus* was located near hedgerows near where salmonberry was located. Non-native montbretia *Crocosmia* x *crocosmiiflora* was located within verges adjacent to the electricity line route (unnamed local road and adjacent to Shankill 14 first-order watercourse, north of the proposed substation site). The risk these three species having effects are 'not-assessed', 'low' and 'low', respectively (Kelly et al., 2013).

5.3.3 Birds

5.3.3.1 Desktop Study

The data search yielded no records of threatened or protected birds at the project site (see **Annex 5.3** for details of data sources). This included opportunistic data and data collected for other purposes.

5.3.3.2 Field Survey

The following sections present seasonal summaries of the breeding bird surveys undertaken. Full details of the breeding bird survey results (including figures) are provided at **Annex 5.2** and the locations of birds recorded during extended habitat surveys is provided at **Annex 5.1** (**Figure 5B.1-5B.5**).

12 no. species were recorded during bird surveys: none are listed under Annex I of the Birds Directive; and 3 no. are red-listed, 4 no. are amber-listed and 5 no. are green-listed under the latest BoCCI 4 scheme.

Table 5.7 summarises the peak numbers of birds recorded during baseline breeding bird surveys undertaken during April to June, and August 2024.

In the breeding season, confirmed breeding was identified for linnet *Linaria cannabina* present along the route of the electricity line in wet grasslands, hedgerows and scrubby areas; and probable breeding for meadow pipit *Anthus pratensis* along the route and in adjacent fields, especially in wet grasslands and scrubby areas. During the extended habitat survey, juvenile common buzzard *Buteo buteo* were heard calling in nearby conifer plantation.

The watercourses surveyed lacked suitability for waterbirds such kingfisher, grey heron and mallard, as they were shallow, narrow and often overgrown with vegetation.

Species Name	Peak Count	Locations	Breeding Status
Common buzzard	2	Observed regularly along the route of the electricity line; circling in	Confirmed breeding

		coniferous forest c. 100m south of electricity line; circling c. 400m southwest of electricity line; perched in trees in field within substation; and heard calling juvenile c. 250m west of electricity line during extended habitat survey in August 2024.	
Common crossbill *Loxia curvirostra*	2	Observed flying over fields once c. 150m from route of the electricity line in April 2024.	Non-breeding
Common kestrel *Falco tinnunculus*	1	Single birds observed in May, June and August 2024 flying over substation fields and c. 350m from the route of the electricity line.	Possibly breeding
Common linnet	18	Observed consistently from April to June 2024 along the route of the electricity line and adjacent fields; recently fledged birds recorded with adults on multiple instances.	Confirmed breeding
Common snipe *Gallinago gallinago*	2	Observed twice in April 2024, flushed c. 125m and c. 50m south of the route of the electricity line. No drumming or display behaviours observed.	Possibly breeding
Common starling *Sturnus vulgaris*	27	Observed in April and June 2024 flying over the route of the electricity line and in a field c. 250m south.	Possibly breeding
Cuckoo *Cuculus canorus*	1	Heard singing in June 2024 c. 125m south of the route of the electricity line. Suitable host species such as meadow pipits present in area.	Possibly breeding
Eurasian sparrowhawk *Accipter nisus*	1	Observed once as single bird in June 2024 in suitable habitat.	Possibly breeding
Goldcrest *Regulus regulus*	2	Pair observed in April 2024 in coniferous plantation c.400 m south of the route of the electricity line.	Possibly breeding
Meadow pipit	1	Single birds observed from April to June, and August 2024 along the route of the electricity line and in adjacent fields exhibiting agitated behaviours.	Probably breeding
Northern raven *Corvus corax*	2	Observed twice in April 2024 with pair c. 200m west of the route of the electricity line and a single bird c. 300m northwest of the control centre.	Possibly breeding
Willow warbler *Phylloscopus trochilus*	1	Single birds observed and heard singing consistently from April to June 2024 typically within c. 50m of the route of the electricity line and in the fields of the electricity substation.	Possibly breeding

Table 5.7: Summary of Bird Species Recorded by Season

5.3.4 Terrestrial Mammals (Excluding Bats)

5.3.4.1 Desktop Study

The data search yielded records of 6 no. species of threatened and/or protected mammal (see **Annex 5.3**) namely Eurasian badger *Meles meles*, otter *Lutra lutra*, west European hedgehog *Erinaceus europaeus*, Irish stoat *Mustela erminea subsp. hibernica*, Eurasian red squirrel *Sciurus vulgaris* and pine marten *Martes martes*.

There is potential for these species to be present within hedgerows, scrub and nearby woodland habitats, and in the case of otter, riparian habitats.

There were no records of invasive or non-native mammals.

5.3.4.2 Field Survey

Evidence of 3 no. species of non-volant mammals was recorded during the field surveys with details provided below.

No evidence of otter signs or sightings were recorded within 150m of the watercourse crossings. The survey area was considered to provide limited foraging and commuting habitat due to the very shallow water depths, while the unnamed watercourse was dry at the time of survey.

Badger

A badger latrine was recorded during the scoping survey c. 290m northwest of the route of the electricity line in a field. No evidence of badgers was recorded within 50m of any aspect of the project.

Bank vole *Myodes glareolus*

There were several burrows suspected to belong to bank voles made within the base of a treeline adjacent to the route of the electricity line.

Brown rat *Rattus norvegicus*

There were several burrows within hedgerows bounding the electricity substation site of unknown provenance. Trail camera recordings showed they were used by brown rats.

Rabbit *Oryctolagus cuniculus*

Rabbit burrows and droppings were recorded along the northern section of the route of the electricity line in hedgerows bounding agricultural fields.

5.3.5 Bats

5.3.5.1 Desktop Study

Potential Roost Feature Assessment

Online satellite images, and the Environmental Sensitivity Mapper, identified very few structures that could be used by roosting bats within or adjacent to the footprint of the project during the desk study. Conversely, online imagery suggested there could be mature trees that could act as bat roosts within treelines or hedgerows.

Bat Landscapes

The mean bat landscapes suitability index across all bat species differs across the project site, with most of the control unit site and northern sections of the underground electricity line less suitable for bats than the southern sections of the electricity line and electricity substation. For most of the electricity line and substation, the score is 29.33 (out of a maximum score of 100). For the control unit and northern sections of the electricity line the score is 22.22 (out of a maximum score of 100).

The electricity substation site and most of the route of the electricity line has a high bat landscapes suitability index for brown long-eared bat *Plecotus auritus*, common pipistrelle *Pipistrellus pipistrellus*, Leisler's bat *Nyctalus leisleri* and soprano pipistrelle *Pipistrellus pygmaeus*. There is moderate suitability for Daubenton's bat *Myotis daubentonii*, Natterers' bat *Myotis nattereri* and whiskered bat *Myotis mystacinus.* There is low suitability for Nathusius' pipistrelle *Pipistrellus nathusii* and no suitability for lesser horseshoe bat *Rhinolophus hipposideros*.

The control unit and northern section of the electricity line route has a high bat suitability for common pipistrelle; moderate bat landscapes suitability index for brown long-eared bat, Leisler's bat, and soprano pipistrelle; it has a lower suitability for Daubenton's bat, Natterers' bat and whiskered bat. There is no suitability for lesser horseshoe bat and Nathuisus' pipistrelle.

NBDC Data

There are records of Leisler's bat, unknown species of pipistrelle and soprano pipistrelle within the 1km grid squares overlapping the electricity line only. There are no records for the control unit, electricity substation or any of the watercourse crossings.

Bat Conservation Ireland Data

Bat Conservation Ireland (BCI) data show that 11 no. recorded bat roosts are located within the 10km hectads overlapping the project site (**Annex 5.1 Figure 5A**). The closest roosts are c. 2km northwest and c. 2.2km northwest of the control unit, respectively. Both are roosts for Daubenton's bat.

The first of these roosts could have ecological connectivity to the project site i.e., the 2km core sustenance zones (CSZ) for Daubenton's bat, as measured from the roost, could slightly overlap with the project site. By the same token, the second roost is unlikely to have any connectivity.

The remaining 9 no. roosts are located beyond 4.5km from the project, which is the maximum CSZ for any Irish bat species. Therefore, none of these roosts have any connectivity to the project site.

BCI had desktop records on all Irish bat species exception for lesser horseshoe and Nathusius' pipistrelle in the wider search area.

5.3.5.2 Field Survey

No evidence of roosting bats was observed in any of the trees or structures surveyed.

There were 3 no. structures evaluated has having low suitability for roosting bats. None were located within the project footprint. PRF9 is a farm shed with a corrugated roof associated with a smaller stone-built slate roofed building; however, only the corrugated shed component of PRF9 is within the project footprint and proposed to be demolished while the smaller stone structure will be retained. The small stone

building has a low suitability rating and the farm shed with the corrugated roof is of negligible suitability for roosting bats.

There were 5 no. trees evaluated as having PRF-I suitability (i.e. only suitable for individual bats or a very small number of bats due to size or lack of suitable surrounding habitats) for roosting bats (poplar, oak, poplar, ash and oak) and 1 no. cluster of ash trees with the same level of suitability.

Details on these structures and trees are provided at **Annex 5.6**.

In consequence of the scoping and design process, all these trees are located outside the project footprint (the closest is 20m from the electricity line and separated by a road and another treeline).

According to BCT (2023) guidance, no further surveys are required for such trees.

All other trees along the route of the underground electricity line or within field boundaries at the control unit or electricity substation were classified as having no bat PRF suitability.

There are no bridges or culverts along the Paulstown Stream, Moanmore 14 and unnamed tributary, or Shankill 14 watercourse crossings. There was a very shallow culvert nearby the unnamed watercourse crossing, but this had no suitability for roosting bats due to its low height and lack of suitable crevices.

5.3.6 Other Protected Flora

5.3.6.1 Desktop Study

There was a desktop record of endangered Gooden's nomad bee *Nomada goodeniana* along the route of the electricity line.

No other records of amphibian, reptile or other invertebrates were yielded from the data search.

5.3.6.2 Field Survey

Amphibians

Common frog *Rana temporaria* was recorded during scoping surveys in the damp field containing the electrical control unit. However, suitable habitat for common frog and smooth newt *Lissotriton vulgaris* is present in the form of wet grasslands, damp patches in fields and drainage ditches, particularly in the wider environs of the control unit, electricity substation and near the 5 no. watercourse crossings.

Reptiles

No reptiles were recorded during surveys. Common lizard *Zootoca vivipara* can utilise a variety of habitats. As such, south-facing habitats including sunny stone walls near hedgerows within the project site could support common lizard.

Other Invertebrates

No threatened and/or protected species were recorded during surveys. The highly modified, intensely farmed agricultural landscape at the electricity substation affords low suitability for invertebrates. Some of the habitats (grassy verges, hedgerows, flower beds and scrub) adjacent to the underground electricity line offer foraging and breeding habitats, particularly for pollinators.

5.3.7 Aquatic Ecology

5.3.7.1 Desktop Study

There are no desktop records for any threatened or protected aquatic receptors within 1km any of the watercourse crossings; however, there are desktop records for threatened or protected aquatic receptors downstream of watercourse crossings.

White-clawed Crayfish *Austropotamobius pallipes*

There are desktop records of white-clawed crayfish c. 4.5km downstream of the nearest watercourse crossing (unnamed stream).

Lampreys

Desktop records exist of juvenile brook *Lampetra planeri* or river lamprey *Lampetra fluviatilis* ammocetes and a small sample of sea lamprey *Petromyzon marinus* c. 8km downstream (King, 2006), and brook or river lamprey c. 11.5km downstream (IFI, 2002) from the nearest watercourse crossing (unnamed stream).

Twaite Shad *Alosa fallax*

Desktop records exist c. 32km downstream of the nearest watercourse crossing (unnamed stream).

Salmon *Salmo salar*

This species has been recorded c. 11km downstream of the nearest watercourse crossing (unnamed stream) (Delanty et al., 2017; IFI, 2002).

Freshwater Pearl Mussel

Article 17 data (NPWS, 2019) exists for this species c. 15km downstream of the nearest watercourse crossing (unnamed stream).

Water Quality

Biological water quality (Q-values) sampling has not been undertaken for the Paulstown Stream, Moanmore 14 and unnamed tributary, Shankill 14 and unnamed watercourses (EPA, 2024). The nearest downstream samples are:-

- Barrow – Fenniscourt Lock station. Q-value of 3-4 (moderate) c. 5.5km and c. 5km downstream of the Shankill 14 and unnamed watercourse crossings, respectively; and
- Monefelim – Bridge downstream of Monefelim Bridge. Q value of 3-4 (moderate). C.10.2km of Paulstown Stream crossing.

5.3.7.2 Field Survey

The locations of surface water features are illustrated at **Annex 5.1** (**Figures 2B** and **4A-4E**.

Habitats

The watercourse and aquatic survey sites were semi-natural, upland eroding watercourses (FW1).

The Paulstown Stream and Shankill 14 had evidence of poaching by cattle and were

very shallow (c. 10cm and 5cm, respectively).

The Paulstown Stream was c. 30cm wide, had a moderate flow and was very overgrown with bramble and European gorse on the steep, 'V'-shaped banks, with wet grassland either side of the banks. The substrate was rocky, with some small cobbles.

The Shankill 14 was c. 40cm wide, had a moderate flow, and had either treeline or hedgerow vegetation on one side and improved agricultural grassland habitat on the other. The substrate was muddier, although small cobbles were also present.

The Moanmore 14 was between the boundaries of two improved agricultural fields but had no evidence of poaching. It was c. 20cm deep and c. 40cm wide. It had moderate flow and was overgrown with bramble, trees and ivy present. The banks were steep and 'V'-shaped. The substrate consisted of small cobbles. The unnamed tributary of the Moanmore was similar to the main watercourse itself. It was not possible to obtain a picture of the unnamed tributary due to obscuring vegetation.

The unnamed watercourse was dry at the time of extended habitat surveys and had been heavily modified, with steep, artificial banks bounding a hedgerow and roadside verge. It was c. 40cm wide and has cobbles present in the substrate. At the time of the scoping visit, it was fast flowing and was c. 15cm deep.

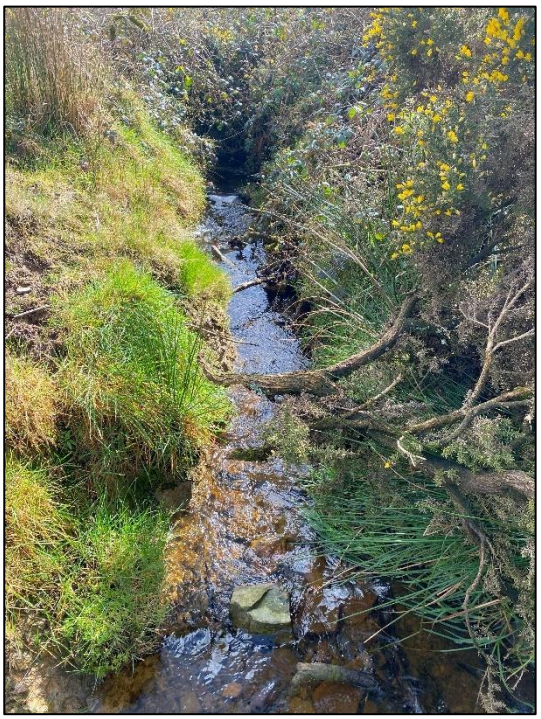

Photo 17: Paulstown Stream

Photo 18: Shankill 14

Photo 19: Moanmore 14

Photo 20: Unnamed watercourse (dry at time of survey)

White-clawed crayfish

There was no evidence of white-clawed crayfish within 150m of any watercourse crossing. There was some limited habitat suitability present in terms of instream refugia (i.e. small cobbles) for all watercourses. The unnamed watercourse was dry at the time of survey and is limited in its potential to provide suitable habitat for crayfish in this regard.

Invasive aquatic species

No non-native or invasive aquatic species were recorded.

5.4 Evaluation of Ecological Features

An evaluation of ecological features within the ZoI is provided at **Table 5.8**.

Only those evaluated as an Important Ecological Feature (IEF) are brought forward for impact assessment and include those protected by law or policy. It should be noted that all recorded habitats have been brought forward for assessment to facilitate a fuller assessment of any net changes to biodiversity because of the project.

Feature Type	Feature	Feature Information	Value	Justification for Evaluation	Important Ecological Feature? Y/N
International Nature Conservation Sites	River Barrow and River Nore cSAC 002162	Protected under the Habitats Directive, derived domestic legislation, and national, regional and local planning policy. NIS determined potential hydrological/hydrogeological/ecological connectivity.	International	Part of European Natura 2000 network.	Y
National Nature Conservation Sites	Whitehall Quarries pNHA 000855	Protected under local planning policy and licensing procedures, and under section 19 of the Wildlife Amendment Act, 2000. There is a potential pathway for dust-related effects on flora of acidic habitats for this pNHA.	National	Non-statutory designated Irish conservation site.	Y
Habitats	FW1, FW4, FW4 x WL1, FW4 x WL2, GS4, GS4 x WS1, WD1, WL1, WL1 x WL2, WL2, WS1	See **Section 5.3.2**	Local (Higher)	Habitats are of greater importance as they either provide breeding, foraging and resting habitat for a variety of animal and plant species; or act as ecological corridors, providing connectivity between habitats of higher biodiversity value.	All habitats have been assessed via a balance sheet of losses and gains regardless of importance
	BC4, BL1, BL1 x WL1, BL2, BL3, ED2, ED2 x ED 3 x WS1, ED3, FL8, GA1, GA1 x WS2, GA2, GS2, WD4, WD5, WS5		Local (Lower)	Habitats are either artificial, highly modified or over lower value for biodiversity.	
Birds	Common kestrel	BoCCI 4: Red list (qualifying criteria: severe decline in breeding population of 53% over short time period). ROI population: 36 no. territorial pairs (Wilson-Parr & O'Brien, 2019) but this is likely to	Local Higher (breeding only)	Breeding peak counts are 0.007% of the ROI population, so are not significant within this context. The peak count is 0.19% and 0.25% of the regional and county	Y

		represent a massive underestimate as the Countryside Bird Survey 2011-2016 (Lewis, et al., 2019) estimates an ROI population of 13,500 no. individuals, so this is the more likely estimate for the breeding population. Regional (breeding population: 540 no. individuals (inferred). County breeding population: 405 no. individuals (inferred). Baseline surveys: peak count 1 no. individual (breeding season only).		populations. On this basis, the breeding population is of local - higher importance, acknowledging the poor conservation status of the species.	
	Goldcrest	BoCCI 4: Amber list (qualifying criteria: unfavourable conservation status in Europe and global population concentrated in Europe). ROI breeding population: 601,806 no. individuals (Lewis et al., 2019). Regional breeding population: 24,072 no. individuals (inferred). County breeding population: 18,054 no. individuals (inferred). Baseline surveys: peak count 2 no. individuals (breeding season only).	Local Higher (breeding only)	Breeding season peak counts are 0.0003%, 0.008% and 0.001% of the ROI, regional and county populations, respectively. Therefore, they are not significant in this context. On this basis, the breeding population is of local - higher importance, acknowledging the conservation status of the species.	Y
	Linnet	BoCCI 4: Amber list (qualifying criteria: unfavourable conservation status in Europe and global population concentrated in Europe). ROI breeding population: 459,892 no. individuals (Lewis et al., 2019). Regional breeding population: 18,396 no. individuals (inferred). County breeding population: 13,797 no. individuals (inferred). Baseline surveys: peak count 18 no. individuals (breeding season only); confirmed breeding.	Local Higher (breeding only)	Breeding season peak counts are 0.004%, 0.097% and 0.13% of the ROI, regional and county populations, respectively. Therefore, they are not significant in this context. On this basis, the breeding population is of local - higher importance, acknowledging the conservation and breeding status of the species.	Y

	Meadow pipit	BoCCI 4: Red list (qualifying criteria: global conservation concern). ROI breeding population: 1,351,995 no. individuals (Lewis et al., 2019). Regional breeding population: 54,080 no. individuals (inferred). County breeding population: 40,556 no. individuals (inferred). Baseline surveys: peak count of 1 no. individual (breeding season only).	Local Higher (breeding only)	Breeding season peak counts are 0.00007%, 0.0018% and 0.002% of the ROI, regional and county populations, respectively. Therefore, they are not significant in this context. On this basis, the breeding population is of local - higher importance, acknowledging the conservation status of the species.	Y
	Snipe	BoCCI 4: Red list (qualifying criteria: decline of 50% and 78% in breeding population over short and longer time periods, respectively. ROI breeding population: 8,550 no. individuals (NPWS, 2022). Regional breeding population: 342 no. individuals (inferred). County non-breeding and breeding population: 257 no. individuals (inferred). Baseline surveys: Peak count of 2 no. individuals (breeding season).	Local Higher (breeding only)	Breeding peak counts are 0.02%, 0.58% and 0.78% of the ROI, regional and county populations, respectively. On this basis, the non-breeding population is of local higher importance, acknowledging the poor conservation status of the species.	Y
	Starling	BoCCI 4: Amber list (qualifying criteria: unfavourable conservation status in Europe and global population concentrated outside Europe). ROI breeding population: 2,066,904 no. individuals (Lewis et al., 2019). Regional breeding population: 82,676 no. individuals (inferred). County breeding population: 62,007 no. individuals (inferred). Baseline surveys: peak count 27 no. individuals (breeding season only).	Local Higher (breeding only)	Breeding peak counts are 0.0013%, 0.032% and 0.044% of the ROI, regional and county populations, respectively. On this basis, the non-breeding population is of local higher importance, acknowledging the poor conservation status of the species.	Y

	Willow warbler	BoCCI 4: Amber list (qualifying criteria: unfavourable conservation status in Europe and global population concentrated outside Europe). ROI breeding population: 1,721,483 no. individuals (Lewis et al., 2019). Regional breeding population: 68,859 no. individuals (inferred). County breeding population: 51,644 no. individuals (inferred). Baseline surveys: peak count 5 no. individuals (breeding season only).	Local Higher (breeding only)	Breeding peak counts are 0.00006%, 0.0015% and 0.002% of the ROI, regional and county populations, respectively. On this basis, the non-breeding population is of local higher importance, acknowledging the poor conservation status of the species.	Y
	Buzzard, crossbill, cuckoo, sparrowhawk and raven	BoCCI 4: Green-listed, so detailed population data not presented.	Local Lower	Green-listed and/or not listed under Nelson et al. (2019), so do not require further assessment.	N
Terrestrial Mammals	Badger	Wildlife Act (1976, as amended). Red list: Least Concern; ROI population: 84,000 no. individuals (Marnell et al., 2019). Regional population: 3,360 no. individuals (inferred). County population: 2,520 no. individuals (inferred). Baseline surveys: latrine present so likely 1 no. sett nearby (typical badger family size 3.8 individuals per sett; Byrne et al. 2012)	Local Higher	Assuming one average-sized badger family nearby, the number individuals present are 0.0045%, 0.11% and 0.15% of the ROI, regional and county populations, respectively. On this basis, the badger population is of local higher importance.	Y
	Eurasian otter	Annex II and IV Habitats Directive; Wildlife Act (1976, as amended). Red list: Least Concern; ROI population: 16,000-22,000 no. individuals (Marnell et al., 2019). Regional population: 640–880 no. individuals (inferred). County population: 480 – 660 no. individuals	Local Higher importance (population downstream of project only)	The downstream otter population is of local higher importance, acknowledging the strict legal protection afforded this species.	Y

		(inferred). Baseline surveys: no signs or sightings within 150m of the watercourse crossings. Desktop records available for wider area.			
	Bat Assemblage (all Irish bats but lesser horseshoe bat could be present)	All Irish bats listed under Annex IV Habitats Directive; Wildlife Act (1976, as amended); Red list: Least Concern (Marnell et al., 2019). Baseline surveys: No moderate to high potential roosts were recorded for this species within the development footprint. The project is on the edge of the CSZ for a known roost of Daubenton's bat.	Local Higher	Hedgerows, tree lines, watercourses and drainage ditches are all likely to afford commuting and foraging opportunities. Based on the above, the bat assemblage within the study area is of local higher importance, acknowledging the strict legal protection afforded bats.	Y
	Bank vole, brown rat, rabbit	Least concern and non-native, so detailed population data not presented.	Local Lower	Least concern and/or not not listed under Nelson et al. (2019), so do not require further assessment.	N
Other protected fauna	Common lizard	Annex V Habitats Directive; Wildlife Act (1976, as amended); Red list: Least Concern (King et al, 2011). ROI population: No estimates available. Regional and County populations: No estimates available. Baseline surveys: not recorded during surveys; however, there was some suitability along south-facing stone walls that are near hedgerow habitats.	Local Higher	While no common lizard were recorded during surveys, they could be present in some habitats. This species has the best possible conservation status. Based on the above, the population within the study area is of local higher importance, acknowledging the lack of population estimates.	Y
	Common frog	Annex V Habitats Directive; Wildlife Act (1976, as amended); Red list: Least Concern (King et al, 2011). ROI population: 150,000,000 no. (King, et al., 2011). Regional population: 600,000 no. individuals (inferred). County population: 450,000 no. individuals (inferred). Baseline surveys: 1 no. individual recorded	Local Higher	Peak counts are 0.000000676%, 0.000017% and 0.000025% of the ROI, regional and county populations, respectively. On this basis, and the legal protection afforded this species, the frog population is of local higher importance.	Y

		during surveys; suitability for frogs at drainage ditches, watercourses and wetter grassland habitats.			
	Smooth newt	Wildlife Act (1976, as amended); Red list: Least Concern (King et al., 2011). ROI population: no estimates available but thought to be stable (King, et al., 2011). Regional and County populations: No estimates available. Baseline surveys: not recorded during surveys, but wetter habitats could provide suitability.	Local Higher	Not recorded during surveys. However, it is likely suitable foraging and breeding habitat is available within the study area. Based on the above, the population within the study area is of local higher importance.	Y
	Gooden's nomad bee	Red list: Endangered (FitzPatrick, et al, 2006); ROI, regional and county populations: no estimates available. Baseline surveys: not recorded during surveys but can live in a variety of habitats.	Local Higher	Not recorded during surveys. However, suitable foraging habitat is likely available in the wider area. Based on the above, the population within the study area is of local higher importance.	Y
Aquatic Ecology	Atlantic salmon	Annex II and V of Habitats Directive (freshwater population only); Red list status: Vulnerable (King et al., 2011). ROI population: 250,000 no. individuals (King, et al., 2011). Regional population: 10,000 no. individuals (inferred). County populations: 7,500 no. individuals (inferred). Baseline surveys: not recorded at the survey sites; desktop records c. 11km downstream of the project.	Regional (downstream population)	Based on the strict legal protection afforded this species and conservation status, the downstream population is of regional importance.	Y
	Brook lamprey	Annex II of Habitats Directive; Red list status: Least Concern (King et al., 2011). ROI population: no estimates available (King, et al., 2011). Regional and County populations: No estimates available.	County (downstream population)	Considering their legal and conservation status, the species is of county importance.	Y

		Baseline surveys: not recorded at survey sites; desktop records c. 8km and c. 11.5km downstream of the project.			
	Freshwater pearl mussel	Annex II and V of Habitats Directive; Wildlife Act (1976, as amended); Red list status: Critically Endangered (Byrne et al., 2009). ROI population: 151 no. x occupied 10km^2 grid squares (NPWS, 2019). Regional population: 13 no. x occupied 10km^2 grid squares (NPWS, 2019). County population: 5 no. x occupied 10km^2 grid squares (NPWS, 2019). Baseline surveys: not recorded at survey sites; desktop records c. 15km downstream of the project.	Regional (downstream population)	Considering their legal and conservation status, the species is of regional importance.	Y
	River lamprey	Annex II and V of Habitats Directive; Red list status: Least Concern (King et al., 2011). ROI population: no estimates available (King, et al., 2011). Regional and County populations: No estimates available. Baseline surveys: not recorded at survey sites; desktop records c. 8km and c. 11.5km downstream of the project.	County (downstream population)	Considering their legal and conservation status, the species is of county importance.	Y
	Sea lamprey	Annex II of Habitats Directive; Red list status: Near Threatened (King et al., 2011). ROI population: no estimates available (King, et al., 2011). Regional and County populations: No estimates available. Baseline surveys: not recorded at survey sites; desktop records c. 8km and c. 11.5km downstream of the project.	Regional (downstream population)	Considering their legal and conservation status, the species is of regional importance.	Y

	Twaite shade	Annex II and V of Habitats Directive; Red list status: Vulnerable (King et al., 2011). ROI population: no estimates available (King, et al., 2011). Regional and County populations: No estimates available. Baseline surveys: not recorded at survey sites; desktop records c. 32km downstream of the project.	Regional (downstream population)	Considering their legal and conservation status, the species is of regional importance.	Y
	White-clawed crayfish	Annex II and V of Habitats Directive; Wildlife Act (1976, as amended). ROI population: 402 no. x occupied 10km^2 grid squares (NPWS, 2019). Regional population: 38 no. occupied 10km^2 grid squares (NPWS, 2019). County population: 31 no. occupied 10km^2 grid squares (NPWS, 2019). Baseline surveys: no recorded at survey sites; desktop records c. 4.6km downstream of nearest watercourse crossing.	County (downstream population)	Consider their legal status, this species is of county importance.	Y

Table 5.8: Evaluation of Ecological Features within ZoI

5.5 Description of Likely Effects

5.5.1 Do-Nothing Scenario

The project site encompasses existing public roads and agricultural lands that are currently subject to intensely managed agricultural practices, including commercial forestry. If the project does not proceed, the area is likely to continue to be used for similar activities.

Taking the above into account, the likely significant effects are described in the following sections.

5.5.2 Construction Phase

The construction phase will mainly result in habitat loss/disturbance to facilitate construction of the electricity substation, control unit and associated infrastructure, including excavation of trenches during the installation of the underground electricity line. There will be some minor felling of trees at the substation site entrance and along the underground electricity line. Existing hedgerow will be removed to accommodate the footprint of the substation compound and its associated site entrance and access track, and the site entrance and access track to the control unit. There will also be some trimming of hedgerows as necessary to ensure visibility splays are maintained.

Timing of construction works affects the level and type of effect, especially if undertaken during a critical life stage or season for an ecological feature.

The duration of any construction phase effects for non-habitat features is likely to be no greater than short-term as the construction phase is anticipated to take 15-18 months.

Likely sources of direct effects during the construction phase are as follows:-

- Clearance of vegetation and soil for access tracks, electricity substation, control unit and ancillary infrastructure;
- Trimming of hedgerows/treelines, and removal of hedgerows to facilitate electricity substation, control unit, site entrances and access tracks;
- Creation of temporary infrastructure e.g. site compound;
- Excavation of trenches for electricity line ducting; and,
- Placement of materials required for infrastructure works.

Likely sources of indirect effects during the construction phase are as follows:-

- Stockpiling of materials on-site;
- Dust and changes in air quality;
- Collection/drainage of surface water runoff;
- Pollution and changes in hydrology;
- Spreading non-native/invasive plants; and,
- Construction activity (including noise, light and the presence of construction workers) disturbing birds and mammals.

5.5.2.1 Nature Conservation Sites

European sites are assessed fully in the NIS. The NIS concludes that, with mitigation measures, the project, either alone or in combination with the other projects, would not undermine the conservation objectives or have an adverse effect on the integrity of any European site. It follows that there is no significant effect in EIA terms on European sites identified which require additional mitigation measures not contained

within the NIS.

The NHAs or pNHAs that overlap with SACs or SPAs are either located within the boundaries of European sites and/or there are no additional qualifying features. Therefore, the NHAs and pNHAs have been indirectly, but fully, assessed within the NIS with the conclusions of same also being applicable (see **Section 5.3.1.2**).

The assessment of likely effects in this EIAR is therefore restricted to NHAs or pNHAs that do not overlap with SACs or SPAs. Those with connectivity to the project, and which therefore require consideration, are:-

- Whitehall Quarries pNHA 000855.

Direct Effects

The project is not located within any national nature conservation site (NHA or pNHA). Therefore, construction works will not directly affect on any of these sites.

Indirect Effects

Whitehall Quarries pNHA 000855 is sufficiently close to the project that dust-related effects could occur, although given the small-scale nature of the project, it is unlikely that dust production will reach levels that will have a discernible effect on plant growth. Similarly, there are multiple hedgerows, treelines and wooded areas between the project and the pNHA that provide natural barriers to the spread of dust. Therefore, in the absence of mitigation (see **Section 5.5.2.2** below), indirect, negative effects of dust are not considered likely for Whitehall Quarries pNHA.

5.5.2.2 Habitats & Flora

Direct Effects

The construction of project infrastructure will result in direct habitat loss that is assessed as being permanent. Some habitats will also be temporarily lost due to the construction of infrastructure e.g., construction compound, substation and access tracks. For details of habitat loss, see **Table 5.9**.

There will be no direct loss of any legally protected habitats. There are no rare or threatened plant species within the study area and none are assessed as likely to be lost.

There will be permanent loss of improved agricultural grassland GA1 and buildings and artificial surfaces BL3. There will also be some permanent loss of some hedgerows WL1 (including hedgerow trees but not treelines themselves) and drainage ditches x treelines mosaic FW4 x WL2 to accommodate the entrance to the substation and the substation itself.

Temporary loss will also occur for areas of recolonising bare ground ED3, drainage ditches x treelines mosaic FW4 x WL2, improved agricultural grassland GA1, wet grassland GS4, hedgerows WL1, hedgerows x treelines mosaic WL1 x WL2, treelines WL2, scrub WS1 and recently-felled woodland WS5, although these habitat types will be reinstated once construction has ceased.

Recolonising bare ground ED3, improved agricultural grassland GA1 and recently-felled woodland WS5 habitats are of low biodiversity value as they are either highly modified/artificial or do not provide important habitat for animals.

No aquatic (FL8 or FW1) habitats will be lost. Likely effects on ecology relating to water

quality within watercourses are detailed below (**Section 5.5.2.7**).

The overwhelming majority of habitats within the project site occur as large, contiguous areas that are also part of the wider landscape. Therefore, the project is not likely to significantly affect any habitats which could be acting as ecological stepping-stones or corridors for mobile species given their widespread abundance both inside and outside of the project footprint.

The exceptions are linear hedgerows WL1, treelines WL2, watercourses FW1 and drainage ditches FW4 (or mosaics of these habitat types), all of which act as ecological corridors. As explained above there will be no loss of these FW1 habitats and, there will either only be temporary loss of the other habitat types, or small amounts of permanent loss with compensation. There will be c. 4-5 m sections lost where hedgerows or treelines (or mosaics of the same) intersect with the underground electricity line, which will be reinstated following construction. There will also be replacement of the same (including associated drainage ditches) for any permanently lost at the electricity substation and control unit.

Accordingly, it is assessed that there will be no significant effect on their ability to act as ecological corridors.

Therefore, in the absence of mitigation, enhancement or compensation, the negative, permanent loss of improved agricultural GA1 and buildings and artificial surfaces BL3 habitats is only likely to be significant at the local lower value scale. There same is true for drainage ditches x hedgerow mosaic FW4 x WL1 and hedgerows WL1 at the local higher value scale.

Unmitigated negative, temporary loss of wet grassland GS4, hedgerows WL1, hedgerows x treelines mosaic WL1 x WL2, treelines WL2, recently-felled woodland WS5, and scrub WS1 is only likely to be significant at the local higher value scale.

Fossitt Code	Fossitt Name	Potential EU Annex I or PAW Affiliation?	Area (ha)/Length (m)			Where Loss Will Occur
			Total (baseline)	Permanent Loss	Temporary Loss	
BC4	Flower beds and borders	No	0.03ha	-	-	No loss
BL1	Stone walls and other stonework	No	76.22m	-	-	No loss
BL2	Earth banks	No	0.15ha	-	-	No loss
BL3	Buildings and artificial surfaces	No	1.20ha/3,370.06m	0.004ha	-	There will be permanent loss of a corrugated shed near the substation site entrance. Any loss of this habitat due to trenches in public roads will be immediately reinstated following electricity line installation.
ED2	Spoil and bare ground	No	0.05ha	-	-	No loss
ED2 x ED3 x WS1	Spoil and bare ground x recolonising bare ground x scrub mosaic	No	0.44ha	-	-	No loss
ED3	Recolonising bare ground	No	0.73ha/42.67m	-	0.42ha	There will be temporary loss to accommodate the trench for the electricity line; however, this will be reinstated.
FL8	Other artificial lakes and ponds	No	0.01ha	-	-	No loss
FW1	Depositing/lowland rivers	No	1,624.50m	-	-	No loss
FW4	Drainage ditches	No	0.16ha/660.00m	-	-	No loss
FW4 x WL1	Drainage ditches x Hedgerows mosaic	No	707.80m	150m	-	There will loss to accommodate the substation compound; however, this will be compensated for via replacement planting / reinstating of drainage ditches.

Fossitt Code	Fossitt Name	Potential EU Annex I or PAW Affiliation?	Area (ha)/Length (m)			Where Loss Will Occur
			Total (baseline)	Permanent Loss	Temporary Loss	
FW4 x WL2	Drainage ditches x Treelines mosaic	No	150.19m	-	-	No loss
GA1	Improved agricultural grassland	No	66.40ha	1.60ha	12.44ha	There will be permanent loss to accommodate the electricity substation compound, control unit, access tracks and interface masts. There will be temporary loss to accommodate the construction compound and the trench for the electricity line; however, this will be reinstated.
GA1 x WS1	Improved agricultural grassland x Scrub mosaic	No	0.17ha	-	-	No loss
GA2	Amenity grassland (improved)	No	1.26ha	-	-	No loss
GS2	Dry meadows and grassy verges	No	0.05ha/74.62m	-	-	No loss – some trimming required only
GS4	Wet grassland	No	4.71ha	-	1.25ha	There will be temporary loss to accommodate the trench for the electricity line; however, this will be reinstated.
GS4 x WS1	Wet grassland x Scrub mosaic	No	0.07ha	-	-	No loss
WD1	(Mixed) broadleaved woodland	No	2.29ha	-	-	No loss
WD4	Conifer plantation	No	5.61ha	-	-	No loss
WD5	Scattered trees and parklands	No	0.03ha	-	-	No loss
WL1	Hedgerows	No	9,438.53m	44.43m	103.50m	There will be temporary loss to accommodate the trench for the electricity line at intersections with hedgerows, the site entrance and

Fossitt Code	Fossitt Name	Potential EU Annex I or PAW Affiliation?	Area (ha)/Length (m)			Where Loss Will Occur
			Total (baseline)	Permanent Loss	Temporary Loss	
						access track to the electricity substation, and the control unit entrance and access track; however, this will be reinstated. There will be some permanent loss to accommodate the site entrances to the substation and crossing private laneways.
WL1 x WL2	Hedgerows x Treelines mosaic	No	387.48m	-	4.5m	There will be temporary loss to accommodate the trench for the electricity line; however, this will be reinstated.
WL2	Treelines	No	2,960.48m	-	18m	There will be permanent loss to accommodate the trench for the electricity line; however, this will be reinstated.
WS1	Scrub	No	1.90ha	-	0.33ha	There will be temporary loss to accommodate the trench for the electricity line; however, this will be reinstated.
WS5	Recently-felled woodland	No	0.44ha	-	0.02ha	There will be temporary loss to accommodate the trench for the electricity line; however, this will be reinstated.

Table 5.9: Habitat Loss

Indirect Effects

Likely indirect effects on habitats include smothering of habitats due to sediment wash-out from cleared areas, deposition areas or dewatering of excavations. The effects of this on water quality of aquatic habitats is assessed below under 'Aquatic Ecology' at **Section 5.5.2.7**.

Compaction and excavation of soil adjacent to hedgerows WL1 or treelines WL2 habitats (and mosaics of the same) may cause damage to and disease of plants. Dust can also smother photosynthetic activity, although it is unlikely that dust production will reach levels that will have a discernible effect on plant growth. While some compaction and excavation of soil near hedgerow WL1 and treeline WL2 habitats (and mosaics of the same) will occur, this will be small in scale and no significant effects are assessed as likely.

In the absence of biosecurity measures, invasive or non-native plants (Himalayan balsam, salmonberry, snowberry, montbretia and box honeysuckle) could spread to the project site via plant machinery and vehicles which could have a negative effect on sensitive habitats.

Himalayan balsam is frequently found along banks of watercourses and damp habitats such as flushes and mires. It spreads primarily via seed dispersal, with each plant producing c. 2,500 seeds. Its seeds float, making watercourses a key pathway for the spread of this species (Kelly et al., 2008).

Himalayan balsam is known to outcompete native waterside vegetation and competes for pollinators from these species. Autumn dieback leaves banks bare and vulnerable to erosion (Kelly et al., 2008).

Salmonberry is frequently found in woodlands, hedgerows, riverbanks, parks and demesnes. It can reproduce vegetatively once established via rhizomes, suckering and layering or arching stems (Invasive Species Northern Ireland, 2024).

Salmonberry forms dense thickets and can cause a loss of native biodiversity through competition and inhibiting regeneration of companion plant species, such as native trees (Invasive Species Northern Ireland, 2024).

There is a high and medium risk of effects on native flora if Himalayan balsam and salmonberry are spread, respectively (Kelly et al., 2013).

Other non-native species such as snowberry, montbretia and box honeysuckle are also at risk of being spread by construction activity. While these are not subject to the same legal restrictions as Himalayan balsam and salmonberry, it is good practice to avoid their spread.

Snowberry and montbretia are classed as having a low risk of impact (Kelly et al., 2013) and are mainly found within hedgerows and verges adjacent to the underground electricity line, respectively. Box honeysuckle was found within hedgerows adjacent to the underground electricity line and its invasiveness effect has not previously been assessed. Snowberry can form dense thickets, outcompeting native plants. It is spread predominantly through vegetative growth in its roots. Montbretia can spread into grasslands, roadsides, forests and riparian areas where it can compete with native understory or ground vegetation. It mainly spreads vegetatively by corms and rhizomes.

In the absence of mitigation, accidental spread of Himalayan balsam, salmonberry, snowberry, montbretia and box honeysuckle could have significant negative permanent effects at the local higher scale for habitats that are in the same general area as them e.g. eroding/upland watercourses FW1, drainage ditches FW4, improved agricultural grassland GA1, amenity grassland GA2, hedgerows WL1, and treelines WL2.

5.5.2.3 Birds

Direct Effects

Likely direct construction effects include nest damage or destruction, habitat loss and disturbance/displacement.

Nest Damage or Destruction

IEF linnet was recorded as 'confirmed breeding' during the surveys undertaken. No nests were recorded; however, it is likely that they were breeding within scrub habitats along the underground electricity line. Therefore, there is a possibility that direct nest damage/destruction could occur during the construction phase. This effect would only be temporary as any scrub habitats lost would be reinstated following construction.

Other bird species could also begin nesting within the project footprint prior to construction, especially within scrub, hedgerows or treelines adjacent to the underground electricity line. Damage or destruction to active bird nests of any species could contravene Section 22 of the Wildlife Acts (1976, as amended).

In the absence of mitigation, there could be significant negative temporary effects at the local higher scale for nesting linnet.

Habitat Loss of Suitable Habitats for Birds

Habitat loss will occur due to the development as described in **Section 5.5.2.2**. The breeding bird survey results illustrate that there was evidence of confirmed or probable breeding for the following sensitive IEF bird species:-

- Adult and juvenile linnet were recorded on multiple occasions in scrub habitats along the underground electricity line route and in adjacent fields; and,
- Agitated meadow pipits were recorded along the underground electricity route.

These IEF species were confirmed to be close enough to the project footprint to suffer direct habitat loss. However, the loss of improved agricultural grassland and scrub is unlikely to result in any significant loss of breeding bird territories, as the footprint of the underground electricity line trench is very narrow (c. 2.2m in width) and these habitats will be reinstated following installation of the electricity line. Most of the sightings of linnet and meadow pipit were outside the works footprint, suggesting they preferentially used adjacent areas as breeding territories.

No significant habitat loss effects during construction are assessed as likely for the other sensitive receptors identified in **Section 5.3.3.2** namely IEFs common kestrel, common snipe, common starling, goldcrest and willow warbler.

On this basis, no significant direct effects related to suitable habitat loss are assessed as likely for birds.

Disturbance/Displacement

The likely effects of noise and visual disturbance could lead to temporary displacement or disruption of foraging/roosting/breeding birds. The significance of the effect depends on the timing of potentially disturbing activities, the extent of spatial/temporal displacement and the availability of suitable displacement habitats in the surrounding area. Behavioural sensitivity to disturbance also varies between species.

Significant disturbance/displacement effects are unlikely to occur along the route of the electricity line, with the electricity line being buried within or immediately adjacent to existing public roads or within heavily modified cultivated habitats (e.g. agricultural grasslands and conifer plantation). Any disturbance/displacement from construction activities while the electricity line is being installed is unlikely to be significantly greater than that from typical traffic levels or agricultural activities. Also, the electricity line does not pass through any nature conservation sites designated for their ornithological interest.

Disturbance/displacement effects due to the project are likely to be greatest at the electricity substation site and control unit during the construction phase. This is due to the larger scale of works in comparison to those along the electricity line route, and during construction there will be an increased presence of personnel and vehicles which provide visual and aural disturbance stimuli. However, no sensitive aggregations of birds were recorded at the substation or control unit sites during surveys. In addition, the substation site is located within 75m from the busy M9 motorway which contributes a notable aural disturbance stimulus.

There are also no significant disturbance effects likely for any IEF bird species during the non-breeding season (predominantly between October and March, depending on the species under consideration). This is because the project site is not considered to provide important habitats for sensitive wintering birds (e.g. aggregations of wildfowl and waders) due to steep topography and a dominance of highly modified or cultivated habitats.

On this basis, disturbance to IEF common kestrel, common linnet, common snipe, common starling, goldcrest, meadow pipit and willow warbler during the construction phase is assessed to be temporary and not significant.

Indirect Effects

If the construction of the project gave rise to the pollution of wetland habitats and/or dewatering of groundwater-dependent habitats within nearby designated sites for birds, it could result in indirect habitat loss for qualifying bird species. The same is true for wetland sites that could be used by bird species from nearby designated sites, even if those wetland sites are not designated themselves.

No such effects are assessed as likely as no pathways for effects on nature conservation sites designated for birds was identified in **Section 5.3.1**.

5.5.2.4 Terrestrial Mammals (Excluding Bats)

Direct Effects

No direct effects to IEF mammals are assessed as likely as there were no dwelling places for IEF mammals identified within the project site or species-specific ZoI during the field surveys.

On this basis, no significant direct effects on IEF mammals such as badger are likely.

Indirect Effects

Indirect effects on mammals during construction could result in the loss of potential foraging, commuting and sheltering habitat. Disturbance from noise, vibration, machinery movement and increased human presence could also displace foraging individuals or cause breeding mammals to abandon natal sites.

As above, most habitats likely to be lost are either highly artificial or intensely modified, and there was no evidence of mammals using the more important habitats such as hedgerows, treelines or scrub for foraging, commuting or sheltering. No natal sites were recorded.

On this basis, no significant indirect effects are assessed as likely for IEF mammals such as badger.

5.5.2.5 Bats

Direct Effects

Direct effects on bats during construction of the project include vegetation removal or removal/modification of existing structures which could result in a loss of potential roost sites.

All potential bat roosts identified were outside the construction footprint and the highest potential identified within the project footprint was low (structures) or PRF-I (trees). Additionally, no signs of activity or confirmed bat roosts were recorded within or nearby the works footprint. This includes hedgerows and treelines (and mosaics of the same) requiring trimming or removal, a corrugated shed and the watercourse crossings.

There are no existing crossings at the Paulstown Stream, Shankill 14, Moanmore 14 and unnamed tributary watercourses. There is a very shallow culvert present near the unnamed watercourse; however, this had negligible bat roosting potential.

On this basis, no significant direct effects on bats are assessed as likely.

Indirect Effects

Indirect effects could include the loss of foraging/commuting habitats or features. If lighting is used for night-time working, this could also disturb roosting and foraging bats. However, no night-time working is proposed as part of embedded mitigation measures and no disturbance is likely (see **Section 5.6.1.7**).

The majority of habitats that will be permanently lost are either artificial or highly modified and intensely farmed with low value to foraging or commuting bats.

The permanent removal of any linear features such as hedgerows, treelines and watercourses has been minimised. Any hedgerow or treeline habitats (or mosaics of the same) that will be removed will be reinstated following construction. While there will be a small amount of hedgerow and drainage ditch x hedgerow mosaic permanently lost, compensatory re-planting will occur in situ. Therefore, only temporary disruption to connectivity will occur, and there will be no overall net loss of these habitat types. Even in the absence of any mitigation or compensation, the individual lengths of hedgerow (and mosaics) to be permanently lost are small, and unlikely to disrupt connectivity within the project and surrounds significantly.

Similarly, as only small segments of linear features will be removed along the

underground electricity line route (c. 4-5m width at respective locations), any disruption to connectivity here will be minimal.

The only known (or suspected) bat roost with ecological connectivity to the project (i.e. the distance between the roost and the project is less than the CSZ for the relevant bat species) is a roost of Daubenton's bat. This roost is located c. 2km northwest of the control unit and is on the very edge of the CSZ for this bat species. As the greatest effects on foraging bats are predicted for the electricity substation site, which has no ecological connectivity to this known roost (i.e. the distance between the substation and roost is much greater than the CSZ), no significant effects are assessed as likely for this roost.

On this basis, no significant indirect effects on foraging and commuting bats are predicted.

5.5.2.6 Other Protected Fauna

Direct Effects

Direct effects on amphibians such as common frog and smooth newt; reptiles such as common lizard; and terrestrial invertebrates such as Gooden's nomad bee, could include destruction of breeding sites and mortality from construction activities.

There are wet areas within the project footprint (e.g. damp grasslands, watercourses and drainage ditches) and, therefore, there is a possibility of direct effects on breeding amphibians.

It is unlikely that common lizards are present in improved agricultural grassland habitats; however, lizards could use other habitat types predicted to be lost (e.g. damper grasslands, stone walls etc).

Gooden's nomad bee is found within a range of habitats; therefore, it is possible that it could use some habitats that are predicted to be lost.

On this basis, and in the absence of mitigation, significant negative permanent direct effects, at the local higher value scale only, are predicted for common frog, smooth newt, common lizard and Gooden's nomad bee.

Indirect Effects

In the absence of mitigation, any accidental pollution that drains to drainage ditches and watercourses is likely to have significant short-term negative effects on amphibians at the local higher value scale.

None of the habitats within the project footprint are likely to be of importance for foraging common lizard or Gooden's nomad bee. Therefore, it is unlikely that any significant indirect effects will occur for common lizard or Gooden's nomad bee.

5.5.2.7 Aquatic Ecology

Direct Effects

Direct effects could include the loss of natural watercourses due to the watercourse crossing and the placement of culverts, water quality degradation, the diversion of natural watercourses, increased suspended solids/hydrocarbons/cement leachate within watercourses inside the project site and the loss of freshwater habitats due to removal or blockage of watercourses.

Horizontal Directional Drilling (HDD) will be used for the crossing of the Paulstown

Stream, Shankill 14, Moanmore 15 and unnamed tributary and the unnamed watercourse by the underground electricity line; while a bottomless culvert (or similar) will be used for the crossing of the unnamed watercourse by the access track leading to the electricity substation, all of which will avoid any instream works. As a result, significant direct effects on aquatic habitats such as FW1 eroding/upland rivers; and aquatic receptors such as brook, river and sea lamprey, white-clawed crayfish, Twaite shad, salmon and freshwater pearl mussel are assessed as unlikely.

There will be the permanent loss of a small section of drainage ditch x hedgerow mosaic FW4 x WL1 at the electricity substation site; however, this will not disrupt connectivity to the rest of the drainage ditch network in the surrounding area. The drainage ditch component will be back-filled and any water diverted to the substation footprint. Compensatory replanting of hedgerow will occur at the substation site and an associated drainage ditch will be created. Unmitigated, direct effects are only likely to be significant at the local lower-value scale for drainage ditch x hedgerow FW4 x WL1 mosaic owing to the small lengths involved.

There are no otter holts or couches within 150m of the watercourse crossings. Therefore, no significant direct effects of disturbance to breeding/resting otters are assessed as likely.

Indirect Effects

Indirect effects include the release of suspended solids, hydrocarbons or cement leachate which could reach downstream receptors such as white-clawed crayfish, lampreys, Twaite shad, salmon and freshwater pearl mussel via hydrological connections. This could reduce the water quality, which could have negative effects on aquatic receptors.

Salmonids require very high levels of water quality to complete their life cycles. High levels of suspended solids can increase turbidity (inhibits respiration) and siltation (affects riverbed substrate composition, reducing spawning and fry survival). Suspended solids typically contain phosphorous or hydrocarbons that can lead to eutrophication and reduced oxygen levels (a cause of death for all salmonid and lamprey life stages). The release of even small amounts of hydrocarbons (e.g. fuel spills) can reduce oxygen levels, affecting salmonid and lamprey populations.

Habitat availability and quality are linked with survival rates of salmon fry and parr (Kalleberg, 1958), with small amounts of debris entering a watercourse important for vulnerable life stages of salmonids and lamprey potentially leading to negative effects on juvenile survival and habitat use.

Accidental fuel spills, which could occur during construction, can release hydrocarbons, which can bioaccumulate in salmonids (McCain, et al., 1990), leading to a loss of condition. As salmonids are known to avoid areas containing hydrocarbons (Maynard & Weber, 1981), fuel spills can lead to the effective loss of habitat and/or migration routes. Fuel spills are unlikely to occur at all, and even if one did occur, it is unlikely to be a scale which would have an appreciable effect on salmonid habitats. However, this risk cannot be completely discounted and requires the implementation of mitigation measures.

Similarly, enrichment and pollution can result in profusions of macrophytes and filamentous algae, obscuring juvenile and spawning habitats for lampreys (e.g. O'Connor, 2006; NPWS, 2019).

The same is true for Twaite shad (NPWS, 2019) and reduced water quality can affect adult stages also (e.g. Maitland and Hatton-Ellis, 2003; King and Roche, 2008).

Freshwater pearl mussel are sensitive to sedimentation and enrichment (Byrne et al., 2009), which come from a combination and wide variety of sources (e.g. pollution from urban wastewater, development activities, forestry and farming). They also rely on salmonids during part of their lifecycle and so any effects on salmonid populations can cascade to freshwater pearl mussel populations also.

A decrease in fish stocks can also lead to reduced prey availability to otter.

Unmitigated, indirect effects are therefore assessed as likely to be significant, negative and temporary at the regional scale for downstream populations of Twaite shad, sea lamprey, freshwater pearl mussel and salmon at the county scale for downstream populations of brook lamprey and river lamprey; and local higher scale for downstream populations of otter.

The main threat to white-clawed crayfish is crayfish plague *Aphanomyces astaci* and the species is known to be tolerant of a wide variety of water quality conditions (NPWS, 2019); therefore, unmitigated, indirect effects of pollution and sedimentation are only assessed as likely to be significant at the local higher-value scale for downstream populations of white-clawed crayfish.

5.5.3 Operational Phase

Direct effects are unlikely to occur at the underground electricity line during the operational phase. The electricity line will be buried underground and avoids sensitive IEFs. Once installed, there are no likely significant operational effects from the electricity line.

While the primary function of the project is to facilitate the connection of the White Hill Wind Farm to the national electricity grid; the substation component of the project will, once operational, be operated and maintained by EirGrid as part of the national electricity network. On this basis, operational effects are assessed to be permanent for the electricity substation component of the project, but temporary for the control unit or underground electricity line.

Possible effects resulting from the operational phase are as follows:-

- Direct effects:-
  - Collision with interface masts for birds and bats.
- Indirect effects:-
  - Collection/drainage of surface water runoff;
  - Operational activities and servicing (a few visits per week with a light commercial vehicle); and,
  - Displacement effects of substation lighting.

5.5.3.1 Nature Conservation Sites

European sites are assessed fully in the NIS. No adverse effects on the integrity of any other European site were identified and therefore, in EIA terms, there are no likely significant effects on these designated sites identified which require additional mitigation measures not contained within the NIS (**Section 5.3.1.1**).

The only national site (not included as part of an SAC or SPA) that is within the ZoI with connectivity to the project site is Whitehall Quarries pNHA.

Direct Effects

The project is not located within any NHAs or pNHAs and no significant direct effects are assessed as likely.

Indirect Effects

The only pathway for effects on Whitehall Quarries pNHA is via airborne dust generated by the project. As no dust is to be generated during the operational phase, no significant indirect effects are assessed as likely for this pNHA.

5.5.3.2 Habitats and Flora

Direct Effects

There will be no significant, direct, operational effects on any habitats during the operational phase.

Indirect Effects

There will be no significant, indirect, operational effects on any habitats during the operational phase.

5.5.3.3 Birds

Direct Effects

Possible direct effects include:-

- Disturbance/displacement and barrier effects; and,
- Collision with the substation and interface masts.

Collision

No statistical model exists to assess bird collisions with static objects or interface masts. The buried electricity line poses no operational effects. The EirGrid Building, IPP Building and electrical control unit, at c. 8.5m, c. 5.5m and c. 4.9m tall respectively, present negligible collision risk. The interface masts (maximum height of 16m) will be placed along the route of an existing overhead line with no new overhead lines being added. Therefore, the project is not assessed as likely to significantly increase bird collision risk.

Disturbance/Displacement & Barrier Effects

Once construction has been completed, any disturbance stimuli will reduce considerably in magnitude as considerably fewer personnel and vehicles will be present. Birds will also become habituated to the static infrastructure which will be screened via newly planted hedgerows and infilling of existing hedgerows, while the electricity line will be buried underground. Therefore, disturbance and displacement during the operational phase is very unlikely and can be excluded from further assessment.

Also, due to the small scale of the project, no barrier effects to birds will occur, as there will be no appreciable increase in the energy expended to fly around the project, and so no significant effects from barrier effects are likely.

Indirect effects

If hydrocarbon spills during the operation of the project led to pollution of wetland habitats and/or dewatering of groundwater-dependent habitats within nearby

designated sites for birds, it could result in indirect habitat loss for qualifying bird species. The same is true for wetland sites that could be used by bird species from nearby designated sites, even if those wetland sites are not designated themselves.

No such wetland sites are within the baseline study area and, as detailed at **Chapter 7**, the embedded mitigation proposed including an extensive drainage system will prevent any such effects occurring and so no significant effects are predicted.

5.5.3.4 Terrestrial Mammals (excluding bats)

Direct Effects

As described at **Section 5.3.4**, there were no mammal breeding or resting sites recorded during the surveys within or in any proximity to the project footprint. Therefore, no destruction of such sites or accidental killing of mammals is likely.

Therefore, no significant direct effects are assessed as likely for terrestrial mammals such as badger.

Indirect Effects

As there will be low numbers of personnel visiting the substation relatively infrequently during the day, thereby avoiding the period when most mammals are most active, it is highly unlikely there will be any indirect loss of foraging or commuting habitats due to the presence of personnel. Therefore, no significant indirect effects are assessed as likely for mammals such as badger.

5.5.3.5 Bats

Direct Effects

Possible direct effects include:-

- Collision with substation and interface masts.

Collision with substations, power lines and other electrical infrastructure is a very low risk for Irish bat species (EirGrid, 2015). Therefore, even without mitigation, operational phase effects are unlikely to have significant effects on the local bat assemblage.

Indirect Effects

Indirect effects due to operational lighting at the substation could disturb or displace roosting or foraging bats (BCT, 2023). However, such lighting is only likely to be required in the unlikely event of night-time maintenance or emergency works. The only known bat roost lacks ecological connectivity to the substation component of the project, precluding indirect effects on this roost. There are linear features such as treelines, hedgerows or watercourses nearby the substation, which likely provide flight corridors and foraging areas for bats. Therefore, given that the effect is only likely to occur sporadically, unmitigated, temporary, indirect lighting effects on the assemblage of bats are only assessed as likely to be significant at the local higher scale.

5.5.3.6 Other Protected Fauna

Direct Effects

No direct effects on common frog, smooth newt, common lizard or Gooden's nomad bee are assessed as likely during the operational phase.

Indirect Effects

No indirect effects on common lizard or Gooden's nomad bee are assessed as likely during the operational phase.

Indirect effects on common frog and smooth newt may include the release of suspended solids or hydrocarbons (from vehicles) into watercourses as described at **Section 5.5.2.7**. As described at **Chapter 7**, the embedded mitigation proposed including an extensive drainage control system will prevent any such effects occurring for amphibians using drainage ditches at the substation site. Therefore, no indirect effects on amphibians such as common frog or smooth newt are likely to occur.

5.5.3.7 Aquatic Ecology

Direct Effects

No IEF aquatic habitats or species are located within the project site; therefore, it is unlikely there will be any significant direct effects during the operational phase.

Indirect Effects

Indirect effects include release of suspended solids or hydrocarbons (from vehicles) into watercourses as described at **Section 5.5.2.7**, which could travel downstream to IEFs including brook, river and sea lamprey, Twaite shade, salmon, freshwater pearl mussel and otter.

No significant effects are predicted for white-clawed crayfish owing to its tolerance of a wide-range of water quality conditions (see **Section 5.5.2.7**).

As described at **Chapter 7**, the embedded mitigation proposed including an extensive drainage control system will prevent any such water-quality related effects occurring.

Similarly, once the underground electricity line is installed, there will be no mechanism through which pollutants can be released into any downstream watercourses.

Therefore, no indirect effects on brook, river and sea lamprey, Twaite shade, salmon, freshwater pearl mussel, and otter are assessed as likely.

5.5.4 Decommissioning Phase

As set out at **Chapter 3** (**Sections 3.2** and **3.7**), the substation component of the project will form part of the national electricity network and decommissioning of the substation is not proposed. Therefore, decommissioning phase effects for the substation will not occur.

However, the electrical control unit and underground electricity line will be decommissioned upon the decommissioning of the White Hill Wind Farm.

Likely sources of direct effects during the decommissioning phase are as follows:-

- Grubbing of hardcore compound and potentially access track at control unit; and
- Excavation of trenches at joint bases to remove electricity line.

Likely sources of indirect effects during the construction phase are as follows:-

- Stockpiling of materials on-site;
- Dust and changes in air quality;
- Collection/drainage of surface water runoff;

- Pollution and changes in hydrology;
- Spreading non-native/invasive plants; and,
- Decommissioning activity (including noise, light and the presence of construction workers) disturbing birds and mammals.

These effects are similar to those reported for the construction phase but will be of lower magnitude. For brevity, it can be considered that the effects discussed in **Section 5.5.2** will occur for the decommissioning phase.

5.5.5 Cumulative Effect

Other projects considered for cumulative impact assessment are detailed at **Table 5.10** below and **Chapter 1**.

Development Type	Name (Planning Reference)	Distance (km) /Direction	Details	Hydro – or Hydrogeological Connection between project site and other development?
Wind Farm	White Hill Wind Farm (An Bord Pleanála Reference ABP-315365-22)	0	Permitted development of a 7 no. turbine wind farm and associated ancillary infrastructure	Hydrological – Y Hydrogeological – Y, partly in same Castlecomer groundwater body as the project
	Gortahile Wind Farm (04/935, 09/237, 09/618, and 10/7 [County Laois])	10.6 northeast	Existing 8 no. wind turbines and all associated infrastructure	Hydrological – Y Hydrogeological – N
	Bilboa Wind Farm (11/154 (An Bord Pleanála Reference PL01.240245), 21/15 and 22/340 (An Bord Pleanála Reference PL01.318295) [County Carlow])	6.8 northeast	Permitted 5 no. wind turbines and all associated infrastructure	Hydrological – Y Hydrogeological – Y, partly in same Shanragh groundwater body as the project
	Bilboa Wind Farm Grid Connection (20/180 [County Carlow] & 20/281 [County Laois])	9.3 northeast	Permitted approximately 6.6km of underground electricity cables	Hydrological – Y Hydrogeological – Y, partly in same Shanragh groundwater body as the project
	Pinewoods Wind Farm (16/260 (An Bord Pleanála Reference PL11.248518) & 22/507 (An Bord Pleanála Reference ABP-316305-23) [County Laois]; and 17/62 (An Bord Pleanála Reference PL10.248392) [County Kilkenny])	20.5 northwest	Permitted 11 no. wind turbines and all associated infrastructure	Hydrological – Y Hydrogeological – N

Development Type	Name (Planning Reference)	Distance (km) /Direction	Details	Hydro – or Hydrogeological Connection between project site and other development?
	Pinewoods Wind Farm Grid Connection (An Bord Pleanála Reference ABP-308448-20 [County Laois])	20.5 northwest	Permitted 110kV electricity substation and all associated infrastructure	Hydrological – Y Hydrogeological – N
	Seskin Wind Farm and Grid Connection (24/60122 (An Bord Pleanála Reference ABP-320354-24) [County Carlow])	4.5 northeast	Proposed 7 no. wind turbines and all associated infrastructure	Hydrological – Y Hydrogeological – Y, partly in same Shanragh and Castlecomer groundwater bodies as the project
	Seskin Wind Farm Grid Connection (24/60210 [County Kilkenny])	2.0 northwest	Proposed approximately 20km of underground electricity cables and ancillary works	Hydrological – Y Hydrogeological – Y, partly in same Shanragh and Castlecomer groundwater bodies as the project
	Freneystown Wind Farm (An Bord Pleanála Reference ABP-317589-23 [County Kilkenny])	5.6 southwest	Proposed up to eight no. wind turbines and all associated infrastructure	Hydrological – Y Hydrogeological – Y, partly in same Shanragh groundwater body as the project
	Ballynalacken Wind Farm (An Bord Pleanála Reference ABP-312016-21 [County Kilkenny])	16.8 northwest	Proposed 11 no. wind turbines and all associated infrastructure	Hydrological – Y Hydrogeological – N
	Single Wind Turbine (13/322 (An Bord Pleanála Reference PL01.243964), 19/463, and 20/46 [County Carlow])	5.1 east	Existing 1 no. wind turbine, electrical substation, access track and all ancillary works	Hydrological – N Hydrogeological – N
	Single Wind Turbine (21/254 (An Bord Pleanála Reference PL01.314517) [County Carlow])	9.1 northeast	Existing 1 no. wind turbine, electrical substation, access track and all ancillary works	Hydrological – N Hydrogeological – N
Electricity Line	Kellis-Kilkenny 110kV overhead electricity line (N/A)	0	Existing overhead Electricity Transmission Line	Hydrological – N Hydrogeological – Y, in same Shanragh groundwater body as the project

Development Type	Name (Planning Reference)	Distance (km) /Direction	Details	Hydro – or Hydrogeological Connection between project site and other development?
Quarry	Kellymount Quarry (Kilkenny Limestone) (05/1927, 12/248, and 12/285 [County Kilkenny])	1.1 southwest	Existing quarry and all associated quarrying plant and machinery	Hydrological – N Hydrogeological – Y, in same Shanragh and Bagenalstown Lower groundwater bodies as the project
	Milford Quarries (Carlow County Council Planning Register Reference and 23/60042 (ABP-319198-24) and 23/60263 (An Bord Pleanála Reference ABP-320180-24) [County Carlow])	2.0 northeast	Proposed quarry and all associated quarrying plant and machinery	Hydrological – Y Hydrogeological – Y, in same Bagenalstown Lower groundwater body as the project
	Kilkenny Limestone Quarry (Oldleighlin) An Bord Pleanála Reference PL01.SU0024 and 15/239. [County Kilkenny])	2.3 northeast	Existing quarry and all associated quarrying plant and machinery	Hydrological – Y Hydrogeological – Y, in same Bagenalstown Lower groundwater body as the project
	Holdensrath Quarry Limited (19/519 and 20/190 [County Kilkenny])	15.5 southwest	Existing quarry and all associated quarrying plant and machinery	Hydrological – N Hydrogeological – N
	McKeon Stone Threecastles Quarry (96/538, 04/1867, 15/673, 16/474 and 23/60097 [County Kilkenny])	15.5 southwest	Existing quarry and all associated quarrying plant and machinery	Hydrological – N Hydrogeological – N
	Kilcarrig Quarries Limited (96/78, 96/319, 01/300, 07/354, 07/554, 07/556, 07/835, 08/502, 10/202, 10/282,11/206, 12/199, 13/92, 13/187, 14/67, 15/121, 16/180, 17/308, 18/395, 20/423, and 22/143 [County Carlow])	19.7 northeast	Existing quarry and all associated quarrying plant and machinery	Hydrological – N Hydrogeological – N
	Oldleighlin Quarry (15/239, 17/64 and18/450, [County Carlow])	2.4 northeast	Existing quarry and all associated quarrying plant and machinery	Hydrological – Y Hydrogeological – Y, same Bagenalstown Lower groundwater body as the project
	Dan Morrisey & Company (92/137,	10.5 northeast	Existing quarry and all	Hydrological – Y

Development Type	Name (Planning Reference)	Distance (km) /Direction	Details	Hydro – or Hydrogeological Connection between project site and other development?
	04/299, 07/769, 07/976, 10/130, 11/301, and 12/240 [County Carlow])		associated quarrying plant and machinery	Hydrogeological – Y, same Bagenalstown Lower groundwater body as the project
Other	Firtree Developments Industrial Buildings (19/313 [County Carlow])	3.5 east	Existing four no. industrial buildings	Hydrological – Y Hydrogeological – Y, same Bagenalstown Lower groundwater body as the project

Table 5.10: Other Developments within 15km of the Project

Cumulative impacts during construction are mainly limited to water quality changes in nearby watercourses. The watercourses draining the site currently meets moderate biological water quality standards (≥Q3-4), but other projects could affect water quality if built simultaneously without mitigation.

There are numerous Section 4 discharges and industrial emissions sites linked to the River Barrow. Existing plans, such as the *Kilkenny City and County Development Plan 2021-2027* and *Carlow County Development Plan 2022-2028* provide a framework for land use developments which include a series of policies with embedded environmental considerations from the existing SEA and AA processes – these policies are considered to lower any likely risk of cumulative effects.

There are several operational, consented or proposed projects with hydrological connections to the project (see **Table 5.10**).

Without mitigation, short-term negative cumulative effects on freshwater ecology may occur at the regional scale for salmon, Twaite shad, sea lamprey and freshwater pearl mussel; county scale for white-clawed crayfish, brook lamprey and river lamprey; and local higher scale for otter.

Potential groundwater effects from nearby quarry developments could affect these species also if groundwater flows reach overland watercourses.

While several quarry projects are within the same groundwater body as the project, most are operational and subject to strict licencing procedures to avoid the pollution of groundwater.

Assuming there is a groundwater connection between relevant quarries and the project, and in the absence of mitigation, there could be significant short-term negative effects on IEF aquatic species as described above for surface-water pollution.

European sites are assessed fully in the NIS. The conclusion of the NIS is that, with mitigation, there would not be an adverse effect on the integrity of any European sites because of the project, in combination with all other projects and plans (**Section 5.3.1.1**). In EIA terms, this means there are no likely significant cumulative effects on European sites.

There are no national nature conservation site with a hydro- or hydrogeological connection to the project precluding any cumulative effects on these sites.

Operational effects could occur because of the substation and ancillary infrastructure. As the electricity line will be located underground, there will be no operational effects due to underground cabling/ducting.

No cumulative operational effects on surface water are predicted as an extensive drainage control system is proposed as part of the embedded mitigation, no significant cumulative effects on these receptors are predicted.

Cumulative decommissioning effects are likely to be similar as for the construction phase but of lower magnitude.

5.5.6 Summary of Likely Effects

A summary of likely effects is shown in **Table 5.11** and those requiring mitigation identified.

Ecological Feature	Phase	Likely Effect	Likely Cumulative Effect	Significance Pre-Mitigation	Requires Mitigation?
Aquatic Ecology					
Brook lamprey, river lamprey, sea lamprey, freshwater pearl mussel, Twaite shad, salmon, white-clawed crayfish, otter, eroding/upland rivers FW1, drainage ditches FW4 (and mosaics), common frog and smooth newt	Construction and decommissioning	Direct: permanent loss of small section of drainage ditch FW4 as part of hedgerow WL1 mosaic. Indirect: short-term deterioration in surface and groundwater water quality due to pollution or suspended solids	Risk slightly increased due to other projects and plans	Significant short-term negative at regional scale for sea lamprey, freshwater pearl mussel, Twaite shad and salmon; at county scale for brook lamprey, river lamprey; and lower higher value for white-clawed crayfish otter, common frog and smooth newt. Not significant for eroding/upland rivers FW1. Significant permanent negative at local low scale for drainage ditches FW4 as part of hedgerow WL1 mosaic.	Yes – see Carlow County Council policy objective ND P2 and Kilkenny County Council development management requirements under objective 9A and under section 9.2.1.5 (see **Annex 5.4**).
	Operation	No direct or indirect effects	No elevated risk	Not significant	No
Designated Sites					
European Sites	Assessed in NIS and assessed above in **Sections 5.3.1.1**, and **5.5.3.1**. The NIS confirms that, with mitigation measures, the project, either alone or in combination with any other plan or project, would not undermine the conservation objectives or have an adverse effect on the integrity of any European site				
Whitehall Quarries pNHA	Construction and decommissioning	Direct: none. Indirect: short-term smothering of flora of acidic habitats from the pNHA due to dust	No elevated risk	Not significant due to small-scale nature of project and intervening features.	No
	Operation	No direct or indirect effects	No elevated risk	Not significant	No
Habitats					

BC4 flower beds and borders, BL1 stonewalls and other stoneworks, BL2 earth banks, ED2 spoil and bare ground, ED2 x ED3 x WS1 spoil and bare ground x recolonizing bare ground x scrub mosaic, FL8 other artificial lakes and ponds, FW4 x WL2 drainage ditches x treeline mosaic, GA1 x WS1 improved agricultural grassland x scrub mosaic, GA2 amenity grassland (improved), GS2 dry meadows and grassy verges, GS4 x WS1 wet grassland x scrub mosaic, WD1 (mixed) broadleaved woodland, WD4 conifer plantation, WD5 scattered trees and parkland	Construction, operation and decommissioning	No direct or indirect effects	No elevated risk	Not significant	No
GA1 improved agricultural grassland, GS4 wet grassland, WS5 recently-felled woodland	Construction	Direct habitat loss	No elevated risk	Significant permanent negative at local lower value scale for GA2 and WS5 and at local higher value scale for GS4.	Yes – see Carlow County Council policy objective ND P2 and Kilkenny County Council development management requirements under objective 9A (see **Annex 5.4**).

	Operation and decommissioning	No direct or indirect effects	No elevated risk	Not significant	No
BL3 buildings and artificial surfaces	Construction	Direct habitat loss	No elevated risk	Not significant	No
	Operation and decommissioning	No direct or indirect effects	No elevated risk	Not significant	No
GS2 dry meadows and grassy verges, FW1 eroding / upland watercourses, FW4 drainage ditches	Construction and decommissioning	Direct: none Indirect effects: accidental spread of invasive and non-native plant species.	No elevated risk	Significant permanent negative at local higher value scale	Yes – see Carlow County Council policy objective ND P2 and Kilkenny County Council development management requirements under objective 9A and section 9.2.10 (see **Annex 5.4**).
	Operation	No direct or indirect effects	No elevated risk	Not significant	No
WL1 hedgerows and WL2 treelines (including mosaics)	Construction and decommissioning	Direct: loss of habitat Indirect effects: accidental spread of invasive and non-native plant species.	No elevated risk	Significant permanent negative at lower higher value scale.	Yes – see Carlow County Council policy objective ND P2 and Kilkenny County Council development management requirements under objective 9A and sections 9.2.51 and 9.2.10 (see **Annex 5.4**).
	Operation	No direct or indirect effects	No elevated risk	Not significant	No
IEF Birds					
IEF birds recorded during breeding	Construction and decommissioning	Direct nest damage or destruction	No elevated risk	Not significant due to embedded mitigation	No

season (kestrel, linnet, snipe, starling, goldcrest, meadow pipit and willow warbler)	Operation	No direct or indirect effects	No elevated risk	Not significant	No
IEF Mammals					
Bat assemblage	Construction and decommissioning	Direct destruction/disturbance of roost sites, or loss of foraging and commuting habitats	No risk	No confirmed or potential roosts with moderate or high suitability were recorded in works footprint of project. Temporary loss of hedgerow and treeline foraging or commuting habitat is predicted for construction phase only but not decommissioning phase. Small segment of hedgerow to be permanently lost. Not significant.	No
	Operation	Indirect disturbance/displacement due to lighting	No risk	Significant permanent negative at local higher value scale.	Yes – see Carlow County Council policy objective ND P2 and Kilkenny County Council development management requirements under objective 9A and under section 9.2.1.5 (see **Annex 5.4**).
Badger	Construction and decommissioning	Direct destruction of sensitive breeding or resting sites or indirect disturbance / displacement or loss of key foraging or breeding habitats	No risk	Not significant	No
	Operation	Indirect disturbance / displacement	No risk	Not significant	No
Other Fauna					

Amphibians (common frog and smooth newt)	Construction	Direct effects via accidental destruction of spawn.	No risk	Significant short-term negative at local higher scale	Yes – see Carlow County Council policy objective ND P2 and Kilkenny County Council development management requirements under objective 9A and under section 9.2.1.5 (see **Annex 5.4**).
		Indirect loss of foraging habitats	No risk	Significant short-term negative at local higher scale	Yes – see Carlow County Council policy objective ND P2 and Kilkenny County Council development management requirements under objective 9A and under section 9.2.1.5 (see **Annex 5.4**).
	Operation	Disturbance / displacement	No elevated risk	Not significant	No
Gooden's nomad bee	Construction, operation and decommissioning	No direct or indirect effects	No elevated risk	Not significant	No

Table 5.11: Summary of Likely Effects

5.6 Mitigation Measures

The Developer will be responsible for implementing proposed mitigation and compensation during construction and the operator will be responsible for the same during operation and decommissioning.

5.6.1 Construction Phase

5.6.1.1 Nature Conservation Sites, Aquatic Ecology

Mitigation measures to prevent adverse effects on downstream European sites during construction are provided in full in the NIS. These will ensure no deterioration in the quality of water entering the River Barrow and River Nore cSAC; and will ensure there will be no effects on any QI habitats and species. The same is true for IEF non-QI aquatic habitats and species.

These measures are taken from **Chapter 7** and the CEMP (**Annex 3.5**), which also includes a Surface Water Management Plan (SWMP), which incorporates Sustainable Drainage Systems (SuDS) through an arrangement of surface water drainage infrastructure.

To mitigate likely effects during the construction phase, best practice construction methods will be implemented in order to prevent water (surface water and groundwater) pollution. Good practice measures will be applied in relation to pollution risk, sediment management and management of surface runoff rates and volumes.

While no significant effects are considered likely, as a precaution, specific measures to prevent any effects on freshwater pearl mussel are included, following the design of Altmüller and Dettmer (2006). These measures will also be beneficial for any other downstream aquatic habitat and species.

All personnel working on the project will be responsible for the environmental control of their work and will perform their duties in accordance with the requirements and procedures of the CEMP.

During the construction phase, all works associated with the construction of the project will be undertaken in accordance with the guidance contained within CIRIA Document C741 'Environmental Good Practice on Site' (CIRIA, 2015). Any groundwater encountered will be managed and treated in accordance with CIRIA C750, 'Groundwater control: design and practice' (CIRIA, 2016).

A summary of the mitigation measures from **Chapter 7** has been included below in **Table 5.12**; refer to **Chapter 7** for a full list of measures.

Effect	Element of Infrastructure	Summary of Mitigation Measures
Earthworks (removal of vegetation cover, excavations, trenching and stock piling)	Electricity Substation and Electrical Control Unit	Silt fences Check dams Stilling ponds Settlement Lagoons (following design by Altmüller and Dettmer, 2006) Discharge of clean water to natural grassland Daily monitoring

		Restriction of earthworks to periods of low rainfall
	Electricity Line	HDD and bottomless culvert to cross watercourses Blocking of existing dry drains Installation of clean water drains Silt traps or straw bales Double silt fence perimeter
Excavation dewatering	All	Interceptor drains Pumping of excavation inflows Discharge to site constructed drainage system or grassland for electricity line Daily monitoring Mobile 'Siltbuster'
Release of hydrocarbons	All	Minimising storage of fuels or oils stored on site in bunded area Double skinned fuel bowers for onsite refuelling Regular inspections of plant and machinery Spill kits Removal of waste tar offsite Outline emergency plan contained within preliminary CEMP (**Annex 3.5**)
Wastewater disposal	All	Self-contained portaloos No sourcing of water or discharge of wastewater on site
Release of cement based products	All	No batching of wet-cement products onsite Only the chute will be cleaned onsite at lined cement washout ponds Restriction of pouring to avoid periods of prolonged or intense rain Pour site will be kept free of standing water
Morphological changes to watercourses and drainage patterns	All	Silt fencing / traps at existing drainage Removal / disposing of trapped sediment at appropriate licenced facility Re-seeding / reinstatement of bare ground immediately Bottomless culvert at unnamed stream Incorporation of guidance / best practice requirements of Office of Public Works (OPW) or IFI into design / construction Instream constructions works if/where required carried out according to period permitted by IFI
HDD	All	Fencing or flagging tape to demarcate crossing works area 10 m minimum buffer zone Double silt fencing Bunding around Clear Bore™ batching Mats to prevent soil erosion / rutting and water quality effects Temporary storage of excavated

		material / restrict use of machinery and equipment outside 10 m buffer No refuelling within 100 m of watercourse crossing Check plant prior to use Restriction of works to avoid periods of prolonged or intense rain

Table 5.12: Summary of Construction Phase Mitigation Measures from Chapter 7

5.6.1.2 Habitats (Whitehall Quarries pNHA)

The project footprint predominately overlaps with lower-value terrestrial habitats and will be located almost entirely within existing roads and improved agricultural grassland. Some treelines and hedgerows (and mosaics of the same) will be removed.

To avoid widespread disturbance to habitats, access within the project will be restricted to the footprint of the proposed works corridor and no access between different parts of the project will be permitted, except via the proposed works corridor. An Ecological Clerk of Works (ECoW) will be employed throughout the construction phase to ensure that construction activities do not encroach unnecessarily into any important habitats.

During dry weather (i.e. no rainfall), dust generated will be managed using dust suppression bowsers. This will avoid damaging tree lines and hedgerows, as well as acidic habitats at Whitehall Quarries pNHA.

5.6.1.3 Rare Flora

No rare flora were recorded during surveys and no mitigation measures are required.

5.6.1.4 Invasive Plants

The following will be implemented to avoid the accidental spread of any invasive or non-native species:-

- An invasive species management plan will be developed and implemented. This will include the general prevention and containment measures and species-specific treatment measures below; and,
- An Ecological Clerk of Works will be employed for the duration of the construction period to make contractors aware of any invasive and non-native species sensitivities of the project and to undertake pre-construction surveys, enforcing any exclusion zones and mitigation measures as required.

General Prevention Measures

- Use of toolbox talks as part of site introduction to workers, including what to look out for and what procedures to follow if invasive species are observed;
- Signs will be used to warn workers of invasive species contamination;
- Only planting and sowing of native species if any reinstatement works are required or where invasive plant species are physically removed;
- Unwanted material contaminated with invasive species will be transported off-site by an appropriate licenced waste contractor and disposed of at a suitably licenced facility (NRA, 2010); and,
- Good hygiene practices will be adhered to including the removal of build-up of soil on equipment; keeping equipment clean; washing vehicles exiting the site using a pressure washer to prevent the transport of seeds; storing wastewater from washing facilities securely and treating to prevent spread of invasive

species; checking footwear and clothing of workers for seeds, fruits or other viable material before leaving the site; any plant material arising from cleaning equipment, footwear and clothing will be carefully disposed of following (NRA, 2010) guidelines in such a manner not to cause the spread of invasive species.

General Containment Measures

- A pre-construction walkover survey of the project will be undertaken during the growing season (April to August). This will search for invasive and non-native species, which could change over time. The extent of invasive plant species will be physically marked out if there have been any changes since baseline surveys; and,
- If any are identified, then appropriate exclusion zone(s) will be implemented. A 1m buffer (except for the named species below) will be used to cordon off invasive species outside the works footprint.

Himalayan balsam

The following treatment options are recommended by TII (2020) guidance.

Chemical control

Chemical control of Himalayan balsam is possible and the use of glyphosate-based products can provide a very successful outcome. As the plant is an annual and the roots are extremely short, it is not necessary to hold off spraying until after flowering, as with deep rooted, rhizomatous and perennial species. Treatment in late May or early June will provide a good kill of treated plants but seeds from the previous season will germinate to replace the treated individuals and further spraying will be required in August or September. Since the seeds can remain dormant for more than one year, spraying, as in the first year will be required in the subsequent season. In Years 3 and 4, if no seeds have been deposited in the area, few plants should survive but monitoring and localised retreatment will be required.

If found near a watercourse crossing, bioactive-formulation glyphosate-based herbicide treatment is suitable.

Physical control

Mechanical control of Himalayan balsam is only likely to be effective where good access is available and the ground is smooth or level enough to permit either mowing or cutting. Where accessible, plants can be cut, mown or strimmed back to ground level before flowering in June. Do not cut earlier as this promotes greater seed production in plants that regrow. Unless the plant is cut to below the lowest node, it will re-sprout. Regular mowing will control the plant, provided the frequency of mowing is regular enough to prevent sprouting and flower formation. This should be repeated annually until complete control is achieved.

As the plants are very shallow-rooted, they can also be easily pulled from the ground by hand. Himalayan balsam has no spines, thorns or stinging cells and, hence, is not a danger to those doing the pulling, although it is always recommended to wear gloves as brambles and nettles commonly grow amongst the stands of Himalayan balsam plants. This control method, commonly referred to as 'balsam bashing', should be conducted in late April or early May when the plants are circa 1 m high. This puts less strain on the back of those pulling the plants. The pulled plants should be broken to discourage flowering, which can occur even with plants that have been removed from the ground. The broken plants can be placed in piles to rot naturally. Because seeds from the previous season will germinate and produce new plants following

hand pulling in April or May, the exercise will need to be repeated later in the season, probably in August. As with herbicide spraying, hand pulling will be required the following year to account for the fact that seeds are capable of surviving for at least one year. Monitoring and localised hand pulling should be conducted for the following two years or as monitoring dictates.

Vegetative material can be disposed of by composting provided the compost will not be disturbed for a minimum of two years. Material may also be disposed of to a licensed landfill or incineration facility, or the material could be disposed of by shallow or deep burial.

Montbretia

The following treatment options are recommended by NRA (2010) guidance.

Chemical control

Montbretia can be treated with herbicide during the active growing season. Due to the potential for re-infestation from seeds, corms and/or rhizome fragments, regular monitoring and follow-up treatment, as dictated by the monitoring, will be required over several years. If found near a watercourse crossing, similar bioactive-formulation glyphosate-based herbicide treatment is recommended as for Japanese knotweed (see above).

Physical control

Physical control of montbretia is difficult as individual corms easily break from their chains and can result in ready re-infestation or further spread. Where infestations are limited in extent, the entire stand can be excavated and buried or disposed of to a licensed landfill or incineration facility under licence. The most effective time to remove montbretia is before the flowering/seeding season. The corms are very hardy and are not suitable for composting. Due to the potential for re-infestation from corms, regular follow-up will be required over several years to deal with any re-growth.

Salmonberry

In the event of interaction of works with salmonberry, excavation of the entire root system is recommended, in addition to the general prevent and containment measures outlined earlier.

This must be done before the plants' seeds ripen in autumn and plant matter from this process can be disposed of at a licenced landfill site or may be buried on-site up to a depth of >2 m.

Snowberry

As snowberry is present within hedgerows in third-party lands, the primary means of preventing spread will be avoidance.

In the event of interaction of works with snowberry, excavation of the entire root system is recommended, in addition to the general prevent and containment measures outlined earlier.

This must be done before the plants' seeds ripen in autumn and plant matter from this process can be disposed of at a licenced landfill site or may be buried on-site up to a depth of >2m.

5.6.1.5 Birds

To avoid widespread disturbance to birds, access will be restricted to the footprint of the proposed works corridor.

Disturbance is predicted to have the greatest effect on breeding IEF passerines that use scrubby habitats.

The following will be implemented to reduce the possibility of damage and destruction (and disturbance to sensitive species) to occupied bird nests:-

- if site clearance and construction activities are required to take place during the main breeding bird season, pre-commencement survey work will be undertaken to ensure that nest destruction and disturbance is avoided;
- once vegetation has been removed from the works corridor, these areas will be retained in a condition that limits suitability for nesting birds for the remainder of the construction phase e.g. cover for ground nesting species will be made unsuitable for cutting vegetation or tracking over with an excavator; and,
- a suitably experienced Ecological Clerk of Works will be employed for the duration of the construction period to make contractors aware of the ornithological sensitivities of the project and to undertake surveys for nesting birds throughout the construction period, and enforcing exclusion areas, as required.

5.6.1.6 Terrestrial Mammals (excluding bats)

Measures proposed in **Section 5.6.1.1** will prevent deterioration of water quality and adverse effects on mammals relying on downstream habitats, such as otter. Habitat features important for mammals will be retained (e.g. hedgerows and treelines).

A pre-construction walkover survey of the project will be undertaken. This will search for mammal resting/breeding places which could change over time. If any are identified, then appropriate exclusion zone(s) will be implemented and construction activities timed to avoid sensitive periods, such as the breeding season or hibernation, as relevant.

The following will be implemented to reduce the possibility of direct and indirect effects on mammals:-

- limiting constructions works to daylight hours;
- providing exit points for any excavations (e.g. escape planks or spoil runs) so mammals do not become trapped; and,
- if any threatened or legally protected mammals are recorded during the pre-construction walkover survey, the Ecological Clerk of Works make contractors aware of the mammalian sensitivities of the project and to undertake surveys for breeding or resting mammals throughout the construction period, enforcing exclusion areas as required. These are 50m for red squirrel, 100m for pine marten, 150m for otter and 50m for badger. If in the unlikely event that exclusion zones cannot be implemented, advice will be sought from NPWS, and appropriate mitigation and compensation measures will be put in place and an application will be made to NPWS for a derogation licence if required.

5.6.1.7 Bats

While some hedgerows and treelines will be lost due to construction, the majority of these will be replaced in situ, so there will be no net loss of commuting and foraging routes for bats.

The only structure located within the project footprint is the corrugated roofed component of structure PRF9, which has negligible bat roosting potential. Therefore, it will not be necessary for an ecologist to undertake a comprehensive survey of any structures in advance of construction works. Similarly, there are no PRF-I trees within or nearby the project footprint, and so no further surveys for bats are required.

A precautionary working method statement (PWMS) will be prepared prior to felling any trees to ensure work methods and timings avoid any effects on bats. This will detail how tree felling will be carried out to avoid any effects to bats.

Soft-felling will be carried out in suitable weather conditions and at appropriate times of year (other than winter when they are hibernating). Briefly, this involves the following:-

- removal of the tree in sections, starting with the top branches and working down the trunk avoiding cutting through cavities;
- lowering of any sections with potential roost features with care, positioning them on the ground with potential entrances to roosts facing upwards to allow bats to exit the roost; and
- leaving these sections in place for at least 24-hours in suitable weather.

During early-morning and evening working hours, the electricity substation and temporary construction compound and electrical control unit compound will be illuminated to enable construction activities. To avoid any effects on bats, cowled lighting will be used, directing light inwards, and away from hedgerows, to minimise disturbance of any commuting or foraging bats.

Appropriate luminaire specifications will also be used for lighting at the substation as outlined in BCT (2023). These include:-

- All luminaires should lack UV elements when manufactured. Metal halide, compact fluorescent sources should not be used;
- LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- A warm white light source (2700Kelvin or lower) should be adopted to reduce blue light component;
- Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012);
- Column heights should be carefully considered to minimise light spill and glare visibility. This should be balanced with the potential for increased numbers of columns and upward light reflectance as with bollards;
- Only luminaires with a negligible or zero Upward Light Ratio, and with good optical control, should be considered; and,
- Luminaires should always be mounted horizontally, with no light output above 90° and/or no upward tilt.

5.6.1.8 Other Protected Fauna

Pre-construction checks will be undertaken for spawning frogs in drainage ditches adjacent to the underground electricity line if construction works are undertaken in February. If found, adults and spawn will be translocated under NPWS licence to suitable alternative locations if present. Pitfall traps and drift fences will be used to capture adult frogs.

Amphibian-proof fencing close to any ponds/pools will be used to prevent frogs or smooth newts from accessing any parts of the project most hazardous to amphibians during the construction phase.

5.6.2 Operational Phase

5.6.2.1 Nature Conservation Sites, Aquatic Ecology

Mitigation measures to protect water quality are provided at **Chapter 7** and at **Annex 3.5** of this EIAR. Maintenance of the drainage system will ensure the system is operating effectively and will be undertaken following the CIRIA C697 SuDS and Maintenance Manual. A review of the ecological mitigation measures will be required during the operational phase and project specific mitigation will be provided as appropriate where further measures are required to ensure no significant environmental effects on aquatic receptors and nature conservation sites.

A summary of the mitigation measures from **Chapter 7** has been included below in **Table 5.13**; refer to **Chapter 7** for a full list of measures.

Effect	Element of Infrastructure	Summary of Mitigation Measures
Stormwater runoff	Substation and control unit	Discharge to local drains or to ground via soakaways
	Compound areas	Use of oil interceptors
Hydrocarbons and chemicals	Substation and control unit	Appropriate labelling of storage containers Use of appropriate material for fuel / chemical storage for holding tanks Impervious bunds for bulk tanks Appropriate storage of barrels and bunded containers Spill kits Weekly inspection Removal of leaking or empty drums and disposal at registered waste disposal contractor

Table 5.13: Summary of Operation Phase Mitigation Measures from Chapter 7 (Water)

5.6.2.2 Birds

No mitigation measures for birds are required as no direct effects are assessed as likely.

5.6.2.3 Bats

To avoid any effects on bats from lighting at the substation, cowled lighting will be used, directing light inwards to minimise disturbance of any commuting or foraging bats.

Appropriate luminaire specifications will also be used for lighting at the substation as outlined in BCT (2023). These include:-

- All luminaires should lack UV elements when manufactured. Metal halide, compact fluorescent sources should not be used;
- LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- A warm white light source (2700Kelvin or lower) should be adopted to reduce blue light component;
- Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012);
- Column heights should be carefully considered to minimise light spill and glare visibility. This should be balanced with the potential for increased numbers of columns and upward light reflectance as with bollards;

- Only luminaires with a negligible or zero Upward Light Ratio, and with good optical control, should be considered;
- Luminaires should always be mounted horizontally, with no light output above 90° and/or no upward tilt; and,
- Where appropriate, external security lighting should be set on motion sensors and set to as short a possible a timer as the risk assessment will allow.

5.6.3 Decommissioning Phase

Mitigation measures will be the same as for those for the construction phase.

Specifically, surface runoff control measures will be put in place during decommissioning works. The drainage system at the electrical control unit will remain operational during the decommissioning phase and will serve to treat any sediment laden surface water run-off due to the renewed disturbance of soils. Following decommissioning, re-vegetation of excavated areas will be implemented as soon as practicable and monitored to ensure vegetation becomes fully established.

5.7 Compensation Measures

The mitigation measures outlined above avoid and minimise the identified direct and indirect effects, such that compensatory measures are not required, other than reinstatement of any treelines or hedgerows (or mosaics of the same including drainage ditches) temporarily or permanently lost due to construction works.

Following Kilkenny County Council's development management requirements ("*and to ensure that a new hedgerow is planted using native species, and species of local provenance to replace the existing hedgerow*") and Carlow County Council's policy objective WT.P2 ("*mitigation planting will be required comprising a hedge of similar length and species composition to the original…*"), all treeline and hedgerow will be replaced using native species and those of local provenance and are illustrated at **Annex 5.1** (**Figure 6**). This is outlined below.

Objective 1: Establishment of compensatory hedgerows/treelines:-

- Plant c. 220m of new, compensatory hedgerow habitat using species around the substation for screening as specified in **Annex 9.2** (e.g. trees including hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa*, pedunculate oak *Quercus robur*, and grey willow *Salix cinerea;* and, shrubs including dog rose *Rosa canina*, guelder rose *Viburnum opulus*, and honeysuckle *Lonicera pericycleum*);
- Reinstate c. 103m of hedgerow, 5m of hedgerow x treeline mosaic, and 18m of treeline habitat temporarily lost during excavation of the electricity line using species specified above;
- Plants must be of Irish Origin or Irish Provenance and purchased from Department of Agriculture, Fishing and the Marine (DAFM) registered professional operators;
- New planting will be undertaken in the appropriate season, with bareroot stock planted October to December (avoiding periods when the ground is waterlogged or frozen) unless on clay, when planting should be delayed until March due to risk of heave during heavy frost;
- Planting will not be undertaken until the first appropriate season post-construction to avoid damage to whips;
- Cultivate the ground prior to planting and add organic matter if required;
- To ensure new hedgerows / treelines are beneficial for biodiversity, there must be six plants per metre in a double-staggered row at a spacing of 600mm.

Overall, no one species will make up more than 70% of the total number of plants;
- Any mix of native hedgerow species found in the local area can be chosen, with one tree species planted at every 1.5m to 3m, and shrubs to be planted at 900mm to 1,500mm spacings;
- Water during first year to assist with establishment. Frequency of watering to adapt to weather conditions;
- New hedgerows will be protected from livestock with an appropriate permanent fence, which can be moved out further as the hedgerow matures and expands;
- Cut hedgerows annually during establishment phase to encourage sideways growth and canopy closure. Hedgerows will be maintained at 4m height and treelines will be allowed to develop from escaped hedgerows;
- A minimum width of 2m from the base of the hedgerow to field margins is recommended and the margins will be managed using the BRIDE project EIP techniques;
- Competing vegetation at the newly planted hedgerow will be controlled, preferably via mulching with organic matter, and avoiding the of use of chemical herbicides;
- Failed or dead plants (identified during condition assessments) should be replaced the following planting season; and,
- Should any newly planted hedgerows/treelines require temporary removal to allow for maintenance works to the project, they will be reinstated following the criteria mentioned above.

The success of this objective will be measured through:-

- Monitoring the condition of hedgerows/trees throughout the establishment phase, and, at less frequent intervals, throughout the maintenance phases;
- Newly created hedgerows will be subject to condition assessment following the Hedgerow Appraisal System each year after planting for the first 5-years (the establishment phase), and then every 5-years. This will help identify ongoing management actions, such as weed control, gapping up and where fence maintenance is required;
- By Year-5 after planting, hedgerows should meet the criteria for 'Favourable' under the Hedgerow Appraisal System – if this has not been achieved a subsequent review process will be undertaken and recommended action to provide further management to assist the enhancement; and,
- In addition to the condition assessment, the diversity of the tree/shrub/climber component (otherwise described in the Hedgerow Appraisal System as 'canopy' forming species) should be the same, or greater than, that at planting.

5.8 Enhancement Measures

The following enhancement measures are proposed, which support Kilkenny County Council's development management requirements (*"make provision for local biodiversity"* and *"and to ensure that a new hedgerow is planted using native species, and species of local provenance to replace the existing hedgerow"*), and Carlow County Council's policy objectives WT.P2 (*"mitigation planting will be required comprising a hedge of similar length and species composition to the original…"*) and NH.P9 (*"…integrate the protection and enhancement of biodiversity…wherever possible"*).

5.8.1.1 Habitats

Objective 2: 'Bolstering' existing hedgerows:-

- Bolster existing boundary hedgerows around the electricity substation (c. 922m) and at the electrical control unit using a native planting whip mix (from species described above for new hedgerows) to fill any existing gaps; and
- All other measures for planting new hedgerows will be followed.

The success of this objective will be measured through:-

- Monitoring the condition of hedgerows/trees throughout the establishment phase, and, at less frequent intervals, throughout the maintenance phases;
- Bolstered hedgerows will be subject to condition assessment following the Hedgerow Appraisal System each year after planting for the first 5-years (the establishment phase), and then every 5-years. This will help identify ongoing management actions, such as weed control, gapping up and where fence maintenance is required;
- By Year-5 after bolstering, hedgerows should meet the criteria for 'Favourable' under the Hedgerow Appraisal System – if this has not been achieved a subsequent review process will be undertaken and recommended action to provide further management to assist the enhancement; and,
- In addition to the condition assessment, the diversity of the tree/shrub/climber component (otherwise described in the Hedgerow Appraisal System as 'canopy' forming species) should be the same, or greater than, that at planting.

5.8.1.2 Bats

Objective 3: Provision of bat roosts:-

- 1 no. bat box will be erected in a tree;
- The box will be installed at least 4m above ground level (AGL), facing a direction to provide shelter from strong, prevailing winds;
- The box will be positioned such that there is a clear flight path to and from the box entrance (i.e. the box entrance is not obscured by vegetation);
- A box suitable for either maternity or hibernation roosting will be used;
- The location and access arrangements to the box will be agreed with the relevant landowner;
- The bat box will be subject to inspections for bats and maintenance checks once a year during Years 1-5 (post-construction), and then every five years;
- Detritus (not including bat droppings) to be cleared from the bat box during inspections and vegetation trimmed to ensure entrances do not become obstructed; and,
- Where the bat box has become damaged or are missing, it will be replaced immediately. If there is evidence of human vandalism, an alternative tree in a less prominent position will be identified (and permissions obtained) and a replacement box will be reinstalled in the new tree.

The success of this objective will be measured through:-

- Bat box inspections undertaken in every year post-construction Years 1-5, and every 5-years thereafter; where poor condition is identified, corrective action will be taken;
- Evidence of occupation by bats within the first five years following construction; and,

- All bat roosts records to be submitted to Bat Conservation Ireland online at https://www.batconservationireland.org/in-your-area/sightings.

5.8.1.3 Birds

Objective 4: Provision of bird nesting habitat:-

- Installation of 1 no. bird box near the project site; and,
- Position nest box such that it is not exposed to sun and is sheltered from the rain and is at least 7m from the ground.

The success of this objective will be measured through:-

- Checks every year during years 1-5 post-construction to ensure that the bird box is in good condition; where poor condition is identified, corrective action will be taken.

This will help to determine whether repairs/replacement of the bird box are required.

5.8.1.4 Reptiles and amphibians

Objective 5: Provision of amphibian hibernaculum:-

- 1 no. hibernaculum will be constructed for amphibians;
- The hibernaculum will be located in a sunny position, orientated such that a long side faces south and near to watercourses/drainage ditches, within rough grassland or scrub and avoiding areas of intensively managed/grazed land; and,
- The location of the hibernaculum will be agreed in conjunction with landowner prior to the completion of construction of the project.

The success of this objective will be measured through:-

- Amphibian species richness and abundance will be measured via physical checks to ensure hibernacula are still present and functional in years 1-5 post-construction; where poor condition is identified, corrective action will be taken.

5.8.1.5 Invertebrates

Objective 6: Provision of invertebrate foraging habitat and hibernacula:-

- Existing area of grassland to be managed as meadows;
- Where soil has been disturbed from construction stage activity, natural recolonisation will be allowed to occur;
- Locally sourced yellow rattle *Rhianthus minor* seed to be planted in these areas;
- No fertiliser or herbicides to be used for management of these invertebrate foraging habitats;
- Erect 1 no. insect hotel in the first year of operation. Insect hotels or bee boxes can be created by drilling holes into fence posts or pieces of wood and positioning appropriately. This site can be created along dry hedgerows, access tracks and other field boundaries;
- Ensure insect hotel is maintained or replaced over the lifespan of the project as required;
- Locate insect hotels in sunny, sheltered areas, ideally no more than 300m from areas of food plants; and,
- The locations of the insect hotels will be agreed in conjunction with landowners prior to the completion of construction of the project.

The success of this objective will be measured through:-

- Maintenance checks and management to ensure wildflower/grassland buffer habitats, and, insect hotel still present and functional, to be carried out annually in Years 1-5 post-construction.

5.8.2 Implementation

5.8.2.1 Roles and Responsibilities

The implementation of enhancement measures will be overseen by an ecologist with the required experience and expertise, appointed by the project. All management tasks will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf and all ecological monitoring will be undertaken by suitably qualified and experienced ecologists.

5.8.2.2 Reporting and Reviewing

This enhancement measures have been developed using best-practice guidance and following the recommendations of this guidance monitoring is proposed to measure success of the management measures and to identify whether remedial measures are required if objectives are not being met.

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated objectives were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.

5.9 Monitoring

5.9.1 General Pre-Construction Confirmation Surveys

To prevent accidental disturbance to resting/breeding/hibernating places of mammals (badgers, red squirrel, pine marten, otter and hedgehog), an ecological walkover survey will be undertaken prior to any construction activities within the project footprint. If any sensitive locations for mammals are newly recorded, ongoing monitoring and appropriate exclusion zones will be implemented to determine when and where works can proceed. If exclusion zones cannot be implemented, NPWS will be contacted and based on their advice, additional mitigation and compensation will be implemented, with relevant licences applied for, if required. It is important to note that this is not anticipated to be required based on the survey results.

Similarly, trees and structures within the works corridor will be re-assessed for bat roosting potential, with any inspections or emergence surveys carried out as required under licence.

Checks for nesting birds will be required for construction undertaken during the bird breeding season. If nests are newly recorded, ongoing monitoring and appropriate exclusion zones will be implemented to determine when and where works can proceed. If exclusion zones cannot be implemented, NPWS will be contacted and based on their advice, additional mitigation and compensation will be implemented, with relevant licences applied for, if required.

5.9.2 Water Quality (During and Post-Construction)

Water quality monitoring will be undertaken as outlined at **Chapter 7** to confirm the efficacy of mitigation measures.

5.10 Residual Effects

A summary of the effects, mitigation and residual effects, considering cumulative effects, is set out in **Table 5.15.**

A 'balance-sheet' of habitat losses and gains is also presented in **Table 5.14**.

Fossitt Code	Fossitt Name	Potential EU Annex I or PAW Affiliation?	Area (ha)/Length (m)					Where and How Compensation/Enhancement Will Occur
			Total (baseline)	Permanent Loss	Temporary Loss	Compensation/ Enhancement Gain	Net Change	
BC4	Flower beds and borders	No	0.03ha	-	-	-	0ha	Not required
BL1	Stone walls and other stonework	No	76.22m	-	-	-	0m	Not required
BL2	Earth banks	No	0.15ha	-	-	-	0ha	Not required
BL3	Buildings and artificial surfaces	No	1.20ha/3,370.06m	0.004ha/0m	-	-	-0.004ha/0m	Roads will be reinstated immediately after installation of electricity line. No compensation required for loss of artificial habitat
ED2	Spoil and bare ground	No	0.05ha	-	-	-	0ha	Not required
ED2 x ED3 x WS1	Spoil and bare ground x Recolonising bare ground x Scrub mosaic	No	0.44ha	-	-	-	0ha	Not required
ED3	Recolonising bare ground	No	0.73ha/42.67m	-	0.42ha/0m	-	0ha/0m	Will be reinstated after installation of electricity line
F8	Other artificial lakes and ponds	No	0.01ha	-	-	-	0ha	Not required
FW1	Depositing/lowland rivers	No	1,624.50m	-	-	-	0m	Not required
FW4	Drainage ditches	No	0.16ha/660.00m	-	-	-	0ha/0m	Not required
FW4 x WL1	Drainage ditches x Hedgerows mosaic	No	707.80m	150m	-	+150m	0m	New compensatory drainage ditch x hedgerow will be created as part of landscaping at the

								substation
FW4 x WL2	Drainage ditches x Treelines mosaic	No	150.19m	-	-	-	0m	Not required
GA1	Improved agricultural grassland	No	66.40ha	1.90ha	12.44ha	+12.44ha	-1.90ha	Temporary loss will be reinstated immediately after installation of electricity line. There will be some permanent loss at the substation and electrical control unit sites (including access tracks and footprint of electrical interface masts); however, the remaining habitat at the substation compound will be enhanced for pollinators, which will help offset any loss of lower-value pure GA1 habitat
GA1 x WS1	Improved agricultural grassland x Scrub mosaic	No	0.17ha	-	-	-	0ha	Not required
GA2	Amenity grassland (improved)	No	1.26ha	-	-	-	0ha	Not required
GS2	Dry meadows and grassy verges	No	0.05ha/74.62m	-	-	-	0ha/0m	Not required
GS4	Wet grassland	No	4.71ha	-	1.25ha	+1.25ha	0m	Temporary loss will be reinstated immediately after installation of electricity line.
GS4 x WS1	Wet grassland x Scrub mosaic	No	0.07ha	-	-	-	0ha	Not required
WD1	(Mixed) broadleaved woodland	No	2.29ha	-	-	-	0ha	Not required
WD4	Conifer plantation	No	5.61ha	-	-	-	0ha	Not required

WD5	Scattered trees and parklands	No	0.03ha	-	-	-	0ha	Not required
WL1	Hedgerows	No	9,438.53m	44.43m	103.5m	+323.50m	+25.57m	c. 220m new hedgerow will be planted to screen substation and ancillary infrastructure and of this, c. 44.43m will replace the WL1 to be permanently lost, and 150 m of FW4 x WL1 mosaic to be permanently lost, leaving c. 25.57m of new hedgerow for enhancement. In addition, c. 922m existing hedgerow will be bolstered and 103.5 m of hedgerows temporarily lost will be reinstated immediately after the installation of the electricity line.
WL1 x WL2	Hedgerows x Treelines mosaic	No	387.48m	-	4.5m	4.5m	0m	New hedgerows will be replanted immediately after the installation of the electricity line.
WL2	Treelines	No	2,960.48m	-	18m	+18m	0m	New hedgerows will be planted to screen substation and ancillary infrastructure and will be allowed to 'escape' to turn into treelines. Any treelines lost will be reinstated immediately after the installation of the electricity line.
WS1	Scrub	No	1.90ha	-	0.33ha	+0.33ha	0ha	Temporary loss will be reinstated immediately after installation of electricity line.
WS5	Recently-felled	No	0.44ha	-	0.02ha	+0.02ha	0ha	Temporary loss will be

	woodland							reinstated immediately after installation of electricity line.

Table 5.14: Habitat Loss

Ecological Feature	Phase	Likely Effect	Likely Cumulative Effect	Significance Pre-Mitigation	Proposed Mitigation/Compensation/Enhancement	Significance of Residual Effect
Aquatic Ecology						
Brook lamprey, river lamprey, sea lamprey, freshwater pearl mussel, Twaite shad, salmon, white-clawed crayfish, otter, eroding/upland rivers FW1, drainage ditches FW4 (and mosaics), common frog and smooth newt	Construction and decommissioning	Direct: None Indirect: short-term deterioration in surface and groundwater water quality due to pollution or suspended solids	Risk slightly increased due to other projects and plans	Significant short-term negative at regional scale for sea lamprey, freshwater pearl mussel, Twaite shad and salmon; at county scale for brook lamprey, river lamprey; and lower higher value for white-clawed crayfish otter, common frog and smooth newt. Not significant for eroding/upland rivers FW1. Significant permanent negative at local low scale for drainage ditches FW4 x hedgerow WL1 mosaic.	See **Section 5.6.1.1** based on **Chapter 7** and CEMP in **Annex 3.5** found in Volume II of this EIAR. Small section of drainage ditch x hedgerow mosaic to be permanently lost will be fully compensated for onsite (see **Section 5.7**).	Not significant
	Operation	No direct or indirect	No	Not significant	See **Section 5.6.1.1** based on **Chapter 7**	Not

		effects	elevated risk		and CEMP in **Annex 3.5** found in Volume II of this EIAR	significant
Designated Sites						
European Sites	Assessed in NIS and assessed above in **Sections 5.3.1.1**, and **5.5.3.1**. The NIS confirms that, with mitigation measures, the project, either alone or in combination with any other plan or project, would not undermine the conservation objectives or have an adverse effect on the integrity of any European site					
Whitehall Quarries pNHA	Construction and decommissioning	Direct: none. Indirect: short-term smothering of flora of acidic habitats from the pNHA due to dust	No elevated risk	Not significant	Precautionary use of dust-suppression bowsers; see **Section 5.6.1.2** and CEMP in **Annex 3.5** found in Volume II of this EIAR.	Not significant
	Operation	No direct or indirect effects	No elevated risk	Not significant	Not significant	Not significant
Habitats						
BC4 flower beds and borders, BL1 stonewalls and other stoneworks, BL2 earth banks, ED2 spoil and bare ground, ED2 x ED3 x WS1 spoil and bare ground x recolonizing bare ground x scrub mosaic, FL8 other artificial lakes and ponds, FW4 x WL2 drainage ditches x	Construction, operation and decommissioning	No direct or indirect effects	No elevated risk	Not significant	None	Not significant

treeline mosaic, GA1 x WS1 improved agricultural grassland x scrub mosaic, GA2 amenity grassland (improved), GS2 dry meadows and grassy verges, GS4 x WS1 wet grassland x scrub mosaic, WD1 (mixed) broadleaved woodland, WD4 conifer plantation, WD5 scattered trees and parkland						
GA1 improved agricultural grassland, GS4 wet grassland, WS5 recently-felled woodland	Construction	Direct habitat loss	No elevated risk	Significant permanent negative at local lower value scale for GA1 and WS5 and at local higher value scale for GS4.	Temporary loss of GA1, GS4 and WS5 will be compensated for and enhancement measures will increase biodiversity value of improved agricultural grassland GA1 due to be permanently lost (see **Section 5.8**).	Not significant
	Operation and decommissioning	No direct or indirect effects	No elevated risk	Not significant	None	Not significant
BL3 buildings and artificial surfaces	Construction	Direct habitat loss	No elevated risk	Not significant	None	Not significant

	Operation and decommissioning	No direct or indirect effects	No elevated risk	Not significant	None	Not significant
GS2 dry meadows and grassy verges, FW1 eroding / upland watercourses, FW4 drainage ditches	Construction and decommissioning	Direct: none Indirect effects: accidental spread of invasive and non-native plant species.	No elevated risk	Significant permanent negative at local higher value scale	Invasive species management plan will be used to avoid accidental spread of invasive and non-native plants.	Not significant.
	Operation	No direct or indirect effects	No elevated risk	Not significant	None	Not significant
WL1 hedgerows and WL2 treelines (including mosaics)	Construction and decommissioning	Direct: loss of habitat Indirect effects: accidental spread of invasive and non-native plant species.	No elevated risk	Significant permanent negative at lower higher value scale	Invasive species management plan will be used to avoid accidental spread of invasive and non-native plants. Hedgerow and treeline (including mosaics) due to be temporarily lost will be reinstated following completion of trenching. A net gain of +25.57m of new hedgerow (accounting for any compensation) will be planted at the substation site and 922m of existing hedgerow will be bolstered (see **Section 5.8**)	Significant, positive effect at the local higher scale
	Operation	No direct or indirect effects	No elevated risk	Not significant	None	Not significant
IEF Birds						
IEF birds recorded during breeding season (kestrel, linnet, snipe, starling,	Construction and decommissioning	Direct nest damage or destruction	No elevated risk	Not significant due to embedded mitigation	As detailed in **Section 5.6.1.5** a series of embedded mitigation measures are included to avoid destruction of active nests. Bird boxes are proposed (see **Section 5.8.1.3**) and other enhancement measures including new treelines and	Significant long-term positive effect at the local higher scale

goldcrest, meadow pipit and willow warbler)					hedgerow planting and management of lands for pollinators will have a positive effect on this group.	
	Operation	No direct or indirect effects	No elevated risk	Not significant	None	Not significant
IEF Mammals						
Bat assemblage	Construction and decommissioning	Direct destruction/disturbance of roost sites, or loss of foraging and commuting habitats	No risk	No confirmed or potential roosts were recorded in works footprint of project. Temporary loss of hedgerow and treeline foraging or commuting habitat is predicted for construction phase only but not decommissioning phase. Not significant	See **Section 5.6.1.7**. Bat boxes are proposed (see **Section 5.8.1.2**) and other enhancement measures including new treelines and hedgerow planting and management of lands for pollinators will have a positive effect on this group.	Significant long-term positive effect at the local higher scale
	Operation	Indirect disturbance/displacement due to lighting	No risk	Significant permanent negative at local higher value scale.	See **Section 5.6.2.3.**	Not significant
Badger	Construction and decommissioning	Direct destruction of sensitive breeding or resting sites or indirect disturbance / displacement or loss of key foraging or breeding habitats	No risk	Not significant	None	Not significant
	Operation	Indirect disturbance /	No risk	Not significant	None	Not

		displacement				significant
IEF Other Fauna						
Amphibians (common frog and smooth newt)	Construction	Direct effects via accidental destruction of spawn.	No risk	Significant short-term negative at local higher scale	See **Section 5.6.1.8**.	Not significant
		Indirect loss of foraging habitats	No risk	Significant short-term negative at local higher scale	See **Section 5.6.2.1**. A suite of measures to enhance habitat for amphibians is proposed (see **Section 5.8.1.4**) and other enhancement measures including n management of lands for pollinators will have a positive effect on this group.	Significant long-term positive effect at the local higher scale
	Operation	Disturbance / displacement	No risk	Not significant	Not significant	Not significant
Gooden's nomad bee	Construction, operation and decommissioning	No direct or indirect effects	No elevated risk	Not significant	A suite of measures to enhance habitats for pollinators is proposed (see **Section 5.8.1.5**).	Significant long-term positive effect at the local higher scale

Table 5.15: Summary of Effects

5.11 Conclusion

This chapter assesses the project which is described throughout.

A proposed mitigation scheme for the construction, operational and decommissioning phases is described in this chapter and these mitigation measures will be implemented in full for the project.

With the implementation of the mitigation measures, there are not likely to be any significant residual adverse effects on important ecological features and the proposed enhancement measures, including the planting of new hedgerows/treelines and bolstering of existing hedgerows, will likely have a significant positive effect on biodiversity at the local level.

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