FEHILY TIMONEY

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE

# PROPOSED COUMNAGAPPUL WIND FARM

## REPORT TO INFORM THE APPROPRIATE ASSESSMENT PROCESS (SCREENING AND NATURA IMPACT STATEMENT)

**Prepared for: EMPower**

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**Date: October 2023**

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# 1 INTRODUCTION

Fehily Timoney and Company (FT) has prepared this Report for Appropriate Assessment on behalf of EMP Energy Limited (EMPower) for the proposed Coumnagappul Wind Farm. This report has been prepared in support of an application for planning permission for a proposed wind farm development comprising 10 no. wind turbine generators (WTGs), 1 no. permanent substation compound along with ancillary civil and electrical infrastructure in the townlands of the townlands of Bleantasourmountain, Carrigbrack, Coumnagappul, Glennaneanemountain, Kilkeany, Kilkeany Mountain, Knocavanniamountain and Reanadampaun Commons. in County Waterford ('Site' hereafter), refer to Figure 2-1 for Proposed Development Overview and Location and Figure 2-2 for the Wind Farm Site Layout.

It is proposed to supply the power from Coumnagappul Wind Farm to the Irish electricity network via an underground 110kV cable to the existing Dungarvan 110kV Substation. The underground grid connection route (GCR) passes through the townlands of Ballymacmague North, Ballymacmague South, Colligan More, Colliganwood, Eaglehill, Garryclone, Garryduff, Kilcooney, Killadangan, Knockacaharna, Knockboy, Lackandarra Upper, Reanadampaun Commons and Tinalira. The grid connection and associated works are considered within this Appropriate Assessment Screening Report and Natura Impact Statement as the wind farm and grid connection form a single project. Refer to Figure 2-4 for GCR.

The proposed Turbine Delivery Route (TDR) is located in south County Kilkenny and within County Waterford. Temporary accommodating works will be required at selected locations along the TDR to facilitate the delivery of large components to the site. Refer to Figure 2-3 for TDR.

The Site, TDR and GCR (Proposed Development)are all considered within this Appropriate Assessment Screening Report and Natura Impact Statement.

This report has been prepared to inform the competent authority in completing their obligations in relation to Appropriate Assessment under Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (as amended) (the Habitats Directive)) as implemented in Ireland under *inter alia* the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended), and Part XAB of the Planning and Development Act, 2000 (as amended).

## 1.1 Legislative Context

The Habitats Directive provides legal protection for habitats and species of European importance. The Directive requires that where a plan or project is likely to have a significant effect on a European Site, while not directly connected with or necessary to the nature conservation management of the site, it will be subject to 'Appropriate Assessment' to identify any implications for the European site in view of the site's Conservation Objectives. Specifically, Article 6(3) of the Habitats Directive states:

> *6(3) Any plan or project not directly connected with or necessary to the management of the site (Natura 2000 sites) but likely to have significant effect thereon, either individually or in combination with other plans or projects, shall be subject to Appropriate Assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*

The provisions of Article 6 do not apply where the proposed plan or project is '*connected with or necessary to the management of the site'.* In this case, the Site is not directly connected with or necessary to the management of any European site(s).

Article 6 of the Habitats Directive is implemented the Planning and Development Act 2000 (as amended) under Part XAB of the *Planning and Development Act, 2000* (as amended). Article 177U requires that before consent is given, the competent authority must carry out a screening for appropriate assessment to assess, in view of best scientific knowledge, if the development, individually or in combination with another plan or project is likely to have a significant effect on the European site. If it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site, an Appropriate Assessment of its implications for the Site(s) in view of the Site's conservation objectives is required to be carried out by the Competent Authority. The Appropriate Assessment will inform the decision of the Competent Authority as to whether the plan or project can be approved or not. As such a Natura Impact Statement (NIS) has been prepared in accordance with Regulation 177T of the Planning and Development Act 2000 (as amended) which is a report of a scientific examination of evidence and data, carried out by competent persons (Refer to Section 1.2 herein) to identify and classify any implications for one or more than one European site in view of the conservation objectives of the site or sites.

## 1.2 Statement of Competence

This report has been prepared by David Daly. David Daly is a Project Ecologist with Fehily Timoney and Company. He holds a Bachelor of Science (BSc) in Ecology from University College Cork, and a Master of Science (MSc) in Species Identification and Survey Skills from University of Reading. David's work focused on the survey and assessment of proposed wind and solar energy development sites, and he has carried out comprehensive ecological work on numerous sites. He has carried out numerous mammal surveys including bat, badger, otter, and general mammal surveys, and acted as ecological clerk of works on a cable route construction project. Ben is the Author of the Biodiversity chapter and completed many of the ecological surveys for the Coumnagappul Project, including habitat surveys, botanical surveys, invasive species surveys, mammal surveys and static bat detectors surveys (deployment of detectors).

Rita Mansfield reviewed this report. Rita is an experienced Project Manager and Principal Ecologist. She specialises in statutory consent and environmental assessment for large scale public infrastructure projects in the energy, water (including flood relief schemes) and transport sectors. Rita provides technical advisory services through all stages of project delivery from feasibility assessment, impact assessment, CPO, design, expert witness, contract administration and construction.

Aquatic surveys were undertaken by Ross Macklin and Bill Brazier of Triturus Environmental Ltd.

Ross Macklin PhD (Candidate) BSc (Hons) Applied Ecology HDip GIS Dip IPM MCIEEM IFM is a principal ecologist with Triturus Environmental Ltd. Ross is currently completing a Ph.D. in Environmental Science from University College Cork and holds a B.Sc. (Hons) in Applied Ecology from University College Cork. Ross is a member of Chartered Institute of Ecology and Environmental Management and a registered member Institute of Fisheries Management. Ross has over 15 years' professional experience in Ireland. He specialises in freshwater fisheries ecology, biology and water quality. He has considerable experience in a wide range of ecological and environmental projects including EIAR, EcIA and AA/NIS reporting, as well as biodiversity, water quality monitoring, invasive species and fisheries management. He also has expert identification skills in macrophytes, freshwater invertebrates, protected aquatic habitats and protected aquatic species including freshwater pearl mussel. His diverse project list includes work on renewable energy developments, flood relief schemes, road schemes, blueways/greenways, biodiversity projects, fisheries management projects and catchment wide water quality management. Ross completed the aquatic surveys and reporting for the Coumnagappul Project.

Bill Brazier (Ph.D. (candidate), B.Sc. (Hons.) Applied Freshwater & Marine Biology, MIFM) is an aquatic ecologist with over 9 years' professional experience in Ireland. He specialises in freshwater fisheries ecology, biology and water quality. He has considerable experience in a wide range of ecological and environmental projects including EIAR, EcIA and AA/NIS reporting, as well as biodiversity, invasive species and fisheries management. His diverse project list includes work on wind farm developments, flood relief schemes, road schemes, blueways/greenways and biodiversity projects. He is currently completing his Ph.D. on the genetics, reproductive biology and invasive potential impact of common carp (Cyprinus carpio) in Irish waters. Bill holds a B.Sc. (Hons) in Applied Freshwater & Marine Biology from Galway-Mayo IT. Bill completed aquatic surveys and reporting for the Coumnagappul Project.

Avifauna surveys were undertaken by Malachy Walsh and Partners (MWP), please see Reference Documents, Appendix 10.2 in Volume III of the EIAR for further details.

## 1.3 Methodology

### 1.3.1 Guidance

The assessment was conducted in accordance with the following guidance:

- This document was updated by *Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC.* Commission Notice (2021) Brussels, 28.9.2021 C(2021) 6913 final;
- *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin (2009, updated 2010);
- *Managing Natura 2000 sites. The provisions of Article 6 of the Habitats Directive 92/43/EEC*. European Commission (2018). Brussels, 21.11.2018 C (2018) 7621 final;
- *Interpretation Manual of European Union Habitats*. Version EUR 28. European Commission 2013;
- OPR Practice Note PN01 *Appropriate Assessment Screening for Development Management* Office of the Planning Regulator (March 2021).

### 1.3.2 Process

The process of determining the likelihood of significant effects from a proposed project on European sites is an iterative process centred around a Source-Pathway-Receptor assessment.

The assessment commences with a description of the project. All elements of the project are presented including the project location and existing baseline environment. The type of impacts which are likely due to the project are identified having regard to the spatial and temporal scale of the project, resource requirements and likely emissions. The zone of influence (ZoI) of the project is therefore defined, and the potential source-pathway-receptor (S-P-R) connectivity to European Sites and their qualifying interests / special conservation interests are identified.

The potential for in-combination effects with other plans and projects is also assessed having regard to the identified impacts of the project.

The likelihood of significant effects on the European Sites within the ZoI is determined having regard to the sensitivity of the Site to the impacts associated with the project on its own and in combination with other plans and projects.

Having regard to the European Commission Communication on the Precautionary Principle (EC, 2021), the:

> "*absence of scientific evidence on the significant negative effect of an action cannot be used as justification for approval of this action. When applied to Article 6(3) procedure, the precautionary principle implies that the absence of a negative effect on Natura 2000 sites has to be demonstrated before a plan or project can be authorised. In other words, if there is a lack of certainty as to whether there will be any negative effects, then the plan or project cannot be approved*."

Where significant effects are determined to be likely, or where there is uncertainty regarding the likelihood of significant effects, the project will be required under law to be subjected to Appropriate Assessment.

Stage 1 Screening - The purpose of the screening stage is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project, alone and in-combination with other plans or projects, could have significant effects on a European site in view of the site's conservation objectives.

There is no necessity to establish such an effect; it is merely necessary for the competent authority to determine that there may be such an effect. The need to apply the precautionary principle in making any key decisions in relation to the tests of Appropriate Assessment (AA) has been confirmed by the case law of the Court of Justice of the European Union (CJEU). Plans or projects that have no appreciable effect on a European site may be excluded. The threshold at this first stage is a very low one and operates as a trigger in order to determine whether a Stage Two AA must be undertaken by the competent authority on the implications of the proposed development for the conservation objectives of a European site. Therefore, where significant effects are likely, uncertain or unknown at screening stage, a second stage AA will be required.

**Section 3** of this report presents an assessment of whether the proposed wind farm would be likely to have significant effects on European sites (either alone or in combination with other plans or projects) (Screening for Appropriate Assessment) and has concluded potential for significant effects. As such, having regard to Article 177T(4) of the Planning and Development Act, 2000 (as amended) a Natura Impact Statement (NIS) has been prepared. The NIS is included in **Section 4** of this report.

The European Commission Notice C(2018) 7621: '*Managing Natura 2000 sites The provisions of Article 6 of the*

*'Habitats' Directive 92/43/EEC*' prescribes the content of the Appropriate Assessment and notes the following:

- it must be ensured that the appropriate assessment addresses all elements contributing to the site's integrity as specified in the site's conservation objectives and Standard Data Form, and is based on the best available scientific knowledge in the field;
- the information required should be up-to-date;
- The appropriate assessment should also include a comprehensive identification of all the potential effects of the plan or project likely to be significant on the site, taking into account cumulative and other effects likely to arise as a result of the combined action of the plan or project under assessment with other plans or projects.
- It should apply the best available techniques and methods to assess the extent of the effects of the plan or project on the integrity of the site(s).

The NIS as presented has been developed to address these requirements so as to present sufficient and up-to-date information to allow the Competent Authority to give full consideration of all elements contributing to the site integrity and allowing identification of potential impacts, mitigation measures and residual impacts.

Stage 2 - A Stage Two AA is a focused and detailed examination, analysis and evaluation carried out by the competent authority of the implications of the plan or project, alone and in-combination with other plans and projects, on the integrity of a European site in view of that site's conservation objectives. Case law has established that such an Appropriate Assessment, to be lawfully conducted, in summary:

i. must identify, in the light of the best scientific knowledge in the field, all aspects of the proposed development which can, by itself or in-combination with other plans or projects, affect the conservation objectives of the European site;

ii. must contain complete, precise and definitive findings and conclusions and may not have lacunae or gaps; and

iii. may only include a determination that the proposed development will not adversely affect the integrity of any relevant European site where the competent authority decides (on the basis of complete, precise and definitive findings and conclusions) that no reasonable scientific doubt remains as to the absence of the identified potential effects. If adverse impacts can be satisfactorily avoided or successfully mitigated at this stage, so that no reasonable doubt remains as to the absence of the identified potential effects, then the process is complete. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to stage three and, if necessary, stage four.

### 1.3.3 Information Consulted in the Preparation of this Report

A desk study was carried (June 2023) out to collate available information on the Site's natural environment. This comprised a review of the following publications, data and datasets:

- Waterford City and County Development Plan 2022-2028
- https://consult.waterfordcouncil.ie/en/consultation/draft-waterford-city-and-county-development-plan-2022-2028;
- Waterford County Council Planning Enquiry System
- https://www.waterfordcouncil.ie/departments/planning/planning-enquiries/online-planning-enquiries.htm;
- Kilkenny County Council Planning Enquiry System
- https://kilkennycoco.ie/eng/services/digital_mapping/;
- Tipperary County Council Planning Enquiry System https://www.tipperarycoco.ie/record-based-planning-enquiry-system-eplan;
- National Biodiversity Action Plan 2017-2021
- https://www.npws.ie/sites/default/files/publications/pdf/National%20Biodiversity%20Action%20Plan%20English.pdf;
- Ireland's 4th National Biodiversity Action Plan – Draft for Public Consultation
- An Bord Pleanála Planning Appeals https://www.pleanala.ie/en-ie/home/
- Forestry applications forestry-maps.apps.rhos.agriculture.gov.ie/

- Environmental Protection Agency (EPA) (on-line map-viewer) http://watermaps.wfdireland.ie/HydroTool/Authentication/Login.aspx?ReturnUrl=%2fHydroTool%2fDefault.aspx
- Department of Housing, Planning, and Local Government – online land use mapping www.myplan.ie/en/index.html;
- Department of Housing, Planning, and Local Government- EIA Portal https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal;
- Environmental Protection Agency (EPA) – Water Quality www.epa.ie, http://gis.epa.ie/Envision;
- Geological Survey of Ireland – Geology, soils and Hydrogeology www.gsi.ie;
- Water Framework Directive website – www.catchments.ie;
- National Parks and Wildlife Service – online European site network information, including site conservation objectives www.npws.ie;
- A data request was sent to the NPWS for rare and protected species records within 10km of the Proposed Development. These records were received May 2022;
- National Parks and Wildlife Service – Information on the status of EU protected habitats in Ireland (Article 17 Reports)
- National Biodiversity Data Centre – www.biodiversityireland.ie;
- Ordnance Survey of Ireland – Mapping and Aerial photography www.osi.ie; and
- Inland Fisheries Ireland - https://www.fisheriesireland.ie/.

### 1.3.4 Field surveys

**Habitats**

Detailed botanical surveys and habitat classification for all wind farm infrastructure, including turbine, road infrastructure, sub-station, borrow pit, grid connection, met mast and turbine delivery accommodation works were undertaken on 27th and 28th July 2020, 07th and 08th September 2021 and 07th June 2022 (refer to Appendix 9.4, Volume III of the EIAR for Relevé Survey).

The methodology used during this survey was based on the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (2011) and CIEEM 'Good Practice Guidance for Habitats and Species' Version 3 May 2021.

Vegetation was sampled by taking botanical quadrats/relevés which were undertaken to analyse potential links with Annex I habitat types. The Interpretation Manual of European Union Habitats [EUR28] and Article 17 reports were used to evaluate whether links with Annex I habitats exist. These surveys were carried out on 07th September 2021. Methodology was based on the National Survey of Native Woodlands 2003-2008 (Perrin et. al, 2008).

In addition to habitat identification, each habitat was assessed for its ecological significance, based on the NRA Guidelines for Ecological Impact Assessment of National Road Projects (NRA, 2009).

During habitat surveys, a search for non-native invasive species was undertaken. The survey focused on the identification of invasive species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (As Amended).

Habitat boundaries and associated attribute data were mapped using desk-based GIS software, namely ArcGIS 10.4.1, which was also used to calculate habitat areas and lengths.

Additionally, the habitats within the Proposed Development boundary were evaluated to determine their suitability to support protected species, in particular suitable areas of habitat for marsh fritillary, common lizard and common frog and having regard to the following guidelines:

- Edgar P, Foster J and Baker J (2010) Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth.
- Griffiths RA, Raper SJ and Brady LD (1996). Evaluation of a Standard Method for Surveying Common Frogs (Rana temporaria) and Newts (Triturus cristatus, T. helveticus and T. vulgaris). JNCC, Peterborough.

**Marsh Fritillary Surveys**

During walkover surveys undertaken in 2020 areas of potential suitable habitat for marsh fritillary were identified within the Proposed Development Site. Targeted larval web surveys for the species were undertaken within these areas on the 08th September 2021. The surveys were undertaken within the optimal period for undertaking marsh fritillary larval web surveys, i.e. August – September, on dry days, with no rain and no to little wind. The survey methodology followed that described in the NRA (2009) best practice guidance document and Marsh Fritillary Butterfly Surveys NIEA Specific Requirements (NIEA, 2017).

**Avifauna surveys**

A suite of avifauna surveys were undertaken by Malachy Walsh and Partners as part of this application.

The field surveys comprised two main elements; vantage point (VP) watches and targeted distribution and abundance surveys which comprised:

- VP watches undertaken over two years at 4 VPs (winter 2019/20, winter 2020/21, summer 2019, summer 2020)
- Transect/point count surveys (winter 2019/20, winter 2020/21, summer 2019, summer 2020)
- Hinterland surveys (Summer 2020)
- Evening/nocturnal transect survey and watch for Woodcock, nightjar and owls (summer 2020)
- Habitat assessment and transect survey for merlin, red grouse and golden plover (summer 2020).

The full reports are included in Appendix 10.1 and Appendix 10.2, Volume III of the EIAR.

**Aquatic Surveys**

The following section summaries the results of aquatic surveys carried out for the proposed Coumnagappul wind farm project. The full reports are included in Appendix 9.3, Volume III of the EIAR.

Surveys to inform the aquatic ecology assessment were completed in 2020. The surveys included walkover surveys, catchment wide electro-fishing, White-clawed Crayfish Surveys (conventional methods and eDNA survey), Freshwater Pearl Mussel Survey, biological water quality surveys.

The wind farm Site is located almost entirely within the Colligan River sub- basin, with the exception of a short section of internal access road which will be in the upper boundary of the Nire sub-basin. The focus of the aquatic ecology assessment was therefore on the Colligal catchment with a section of the Nire included also.

A total of n=9 watercourses were selected for detailed aquatic assessment: within the Colligan Main Channel, Coumduane Stream, Lalisheen Stream (and tributary), and Knockanpower Stream.

**White-clawed crayfish survey**

White-clawed crayfish (*Austropotamobius pallipes*) surveys were undertaken in September 2020 under a National Parks and Wildlife (NPWS) open licence (no. C29/2020). Hand-searching of instream refugia and sweep netting was undertaken according to Reynolds et al. (2010). Trapping of crayfish was not feasible given the small nature of most aquatic survey Sites sampled.

**Freshwater pearl mussel survey**

A freshwater pearl mussel (*Margaritifera margaritifera*) survey was undertaken in September 2020 s. Two sections of the Colligan where the most suitable habitat was found, were surveyed for mussels, the upper section is both upstream and downstream of Lackandarra Bridge and the lower section is downstream of Colligan Bridge (under NPWS licence C15/2020). Methodology followed NPWS guidance (Anon, 2004) on a minimum of 500m of river. In addition, a bank of gravel at Kildangan Bridge at the lower end of the Colligan was searched for mussel shell fragments. Assessments were made of the habitat suitability for freshwater pearl mussels, based on the criteria of Hastie et al. (2000) and Skinner et al. (2003).

**Otter**

The presence of otter (*Lutra lutra*) at each aquatic survey Site was determined through the recording of otter signs within 150m upstream and downstream of each watercourse monitoring location. Otter survey followed Chanin P (2003) *Monitoring the Otter Lutra lutra. Conserving Natura 2000 Rivers Monitoring Series No 10.* English Nature, Peterborough.

Otter signs included holts, couches, spraints, latrines, slides and prints which are useful determinants of otter utilisation of watercourses. The location of signs was recorded via handheld GPS.

# 2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

## 1.1 Project Overview

The development proposed by Coumnagappul Wind Farm Limited (the Applicant) is a 10 no. turbine wind farm and associated infrastructure including internal access tracks, hard standings, permanent meteorological mast, onsite substation, internal electrical and communications cabling, temporary construction compound, drainage infrastructure and all associated works related to the construction of the wind farm as well as measures designed to protect and enhance existing habitats and a connection to the National Electricity Grid (NEG).

On 23rd May 2023 An Bord Pleanála deemed the Proposed Development is eligible as Strategic Infrastructure Development (SID) by way of a notice served under section 37B(4)(a) of the Planning and Development Act 2000 as amended and the application is being made directly to the Board (case ref. ABP-309259-21). The Board are the competent authority for the purposes of the Appropriate Assessment.

A 10-year planning permission and 40-year operational life from the date of commissioning of the entire wind farm (including meteorological mast) is being sought. This reflects the lifespan of modern-day turbines.

A permanent planning permission is being sought for the Grid Connection and substation as these will become an asset of the national grid under the management of EirGrid and will remain in place upon decommissioning of the wind farm.

Coumnagappul Wind Farm has been designed in accordance with the current Section 28 Ministerial Guidelines (section 28 of the Planning and Development Act 2000, as amended), 'Wind Energy Guidelines 2006'. These current national guidelines are subject to targeted review, with the 'Draft Revised Wind Energy Development Guidelines' (draft WEGs) having been published by the Department of Housing, Planning and Local Government in December 2019.

The draft WEGs propose an increase in minimum turbine setback from nearby dwellings, requiring that a turbine should be located no closer than 500m from involved properties and a minimum setback of 4 times the turbine tip height from all third party properties (740 m based on the proposed turbine tip height of 185 m). In this regard, the layout and design of the Coumnagappul wind farm complies with the current Draft Revised Wind Energy Development Guidelines, 2019.

Presented hereunder are the elements of the Proposed Development for which development consent is being sought and all other associated project components subject to EIA but for which planning consent is not being sought within the current application.

### *Elements of the Proposed Development for which Development Consent is Being Sought*

The Proposed Development for which consent is being sought will consist of the following:

- Construction of 10 no. wind turbines with a blade tip height of 185 m, a hub height of 104 m and a rotor diameter of 162 m.
- Construction of permanent turbine foundations and crane pad hardstanding areas and associated drainage;
- Construction of 25.43 km of new internal access tracks and associated drainage infrastructure;
- Upgrading of 2,580 m of existing tracks and associated drainage infrastructure;
- Creation of 1 no. new construction and operation access to the wind farm Site;
- Creation of 1 no. new construction and operation access to the permanent meteorological mast;

- All associated drainage and sediment control including interceptor drains, cross drains, sediment ponds and swales;
- Installation of new watercourse crossings including a 15m single span bridge crossing, an open bottomed culvert and a piped culvert;
- Removal and replacement of existing culverted watercourse and drain crossings along the cable route;
- Construction of 1 no. permanent onsite 110kV electrical substation and associated compound including:
  - Welfare facilities;
  - Electrical infrastructure;
  - Parking;
  - Wastewater holding tank;
  - Rainwater harvesting tank;
  - Security fencing;
- All associated infrastructure, services and site works including excavation, earthworks and spoil management;
- Development of 1 no. on-site borrow pit (150m L X 100m W /X 14m D) and associated ancillary drainage which will also act at a peat /spoil deposition area;
- 2 no. temporary construction compounds and associated ancillary infrastructure including parking;
- Forestry felling of 5.4 ha (53,995m $m^2$) to facilitate construction and operation of the proposed development;
- Installation of medium voltage electrical and communication cabling underground between the proposed turbines and the proposed on-site substation and associated ancillary works;
- Installation of 22.47 km of high voltage (110kV) and communication cabling underground between the proposed on-site substation and the existing Dungarvan Substation and associated ancillary works. The proposed grid connection cable works will include 6 no. existing watercourse and drain crossings, three of which will be crossed by Horizontal Directional Drilling. The grid also includes the installation of 30 no. pre-cast joint bays.
- Erection of 1 no. permanent meteorological mast to a height of 110m above ground level with a 4m lightning pole on top.
- Temporary enabling works to accommodate turbine delivery
  - Load bearing surfaces and temporary watercourse and drain crossings
  - Temporary removal of road signage, utility poles, bollards and fencing.

## 1.2 Project Location

The Proposed Development application area (i.e. the red line boundary depicting the land to which the application relates, which includes the Site and associated habitat enhancement lands, TDR accommodation works and GCR) encompasses a land area of 211 ha (2.12 $km^2$) and is shown on Figure 2.1. The development footprint within the application area of the Proposed Development is 195 ha (1.95 km2) (excluding underground 110 kV grid cable and TDR temporary accommodation works. Refer to Figure 2.2 for details of the overall wind farm layout.

### 2.1.1 Existing Land use

The proposed wind farm is wholly located in the jurisdiction of Waterford City and County Council, with the turbine array located approximately 15.8 km north of Dungarvan town centre and 14.5 km south east of Clonmel town centre. The nearest settlement is Ballymacarbry, located 5.5 km to the north west of the Site.

The Site is located in a sparsely populated rural context. The current Wind Energy Development Guidelines (2006) prescribe a 500m set back distance of turbines from properties (based on noise effects). The 'Draft Revised Wind Energy Development Guidelines, 2019' outlines a minimum 500m or 4 times tip height set back. The Proposed Development will achieve a minimum separation distance in excess of 740 m (4 times tip height) between the closest dwellings and the proposed turbines. There are 40 properties within 2 km of the turbine array as shown on Figure 2.5, 13 of which are commercial. The closest property to a turbine is located ca. 820 m distance and is roughly equidistant south between turbines T10 and T12. The on-site substation is broadly located within the centre of the Site and is ca. 1.5 km from the nearest residential neighbour, located to the south.

The Site is located within the upland topography of a horse-shoe shaped area formed by the Comeragh Mountains, Milk Hill and Bleantasour Mountain. The Comeragh Mountains are designated a Special Area of Conservation, protected for corrie lakes and their associated watercourses, heath and bog habitats, rocky slopes and the species Slender Green Feather-moss. The Proposed Development is located wholly outside of the SAC, with the closest turbine (T11) located 740 m from the SAC boundary (as shown in Figure 9.4 Volume IV).

The Corine Land Cover database for Ireland (based on interpretation of satellite imagery and national vector mapping data) identifies the following land cover types within the Site: peat bogs, moors and heathland, natural grasslands, coniferous forest, transitional woodland-shrub and pastures. Land use at the site is dominated by agriculture (sheep grazing in rough heathland with some areas or more intensively managed grasslands) with a smaller area of land in conifer plantation (under both private land ownership and ownership of Coillte).

The dominant habitat type within the Site is wet heath. This occurs on shallow peat on the hillslopes. Wet heath grades into dry heath with increased altitude and is found in mosaic with exposed siliceous rock towards the hilltops. Extensive areas of heath habitat have been subjected to regular uncontrolled burning within the upland areas as evidenced by scorching of the ground, poor regeneration of habitat and poorer species diversity within large areas of land within the Site. Large scale burning occurred most recently in September 2022[1]. The lower valley areas comprise improved agricultural grassland in mosaic with smaller areas of dense bracken and scrub. Conifer plantation occurs along a section of the internal access road and comprises mostly Sitka Spruce and Lodgepole Pine. See Table 2-1 for habitat loss associated with the footprint of the wind farm.

[1] https://www.irishexaminer.com/news/munster/arid-40953893.html

**Table 2-1: Habitat loss (habitat areas) within the main wind farm Site**

| Habitat | Selected as key ecological receptor | Area within the Proposed Development Boundary (ha) | Area of habitat to be lost (ha) |
|---|---|---|---|
| Improved Agricultural Grassland (GA1) | No | 10.09 | 0.11 |
| Wet grassland (GS4) | No | 20.57 | 4.49 |
| Dense bracken (HD1) | No | 14.17 | 1.73 |
| Dense bracken/ scrub mosaic (HD1/WS1) | Yes | 0.93 | 0.10 |
| Dry siliceous heath (HH1) | Yes | 51.83 | 7.25 |
| Wet heath (HH3) | Yes | 57.99 | 5.94 |
| Mixed Broadleaved Woodland (WD1) (Plantation) | No | 0 | 0 |
| Conifer woodland (WD4) | No | 5.89 | 5.4 |
| Exposed siliceous rocks (ER1) | No | 2.83 | 0.56 |
| **Total** | | **190.30** | **25.57** |

The Site is intermittently underlain by superficial deposits comprising Blanket Peat, Glacial Till and subordinate linear deposits of Alluvium. These are in turn underlain by a sequence of Upper Devonian conglomerates, mudstones and sandstone. At serval locations across the Site bedrock is exposed at surface as outcrops. Scree deposits, resulting from freeze-thaw weathering of the bedrock, are also frequent, and are typically mapped in areas of higher elevation. The peat deposits within the Site are relatively thin (maximum 0.70 m thick, average thickness 0.15 m).

The Site is located within the Colligan and Nier river waterbody catchments, and the Proposed Development will require infrastructure crossings of tributaries of the Colligan river (both as part of the internal turbine access roads and the grid connection). There is no historical flooding associated with these watercourses at the Site and the Site is not located within a flood zone. There are several large drains, predominantly associated with townland boundaries, within the Site. Of particular note are the larger drains associated with the Coumnagappul townland and the neighbouring Knocavanniamountain, Carrigbrack and Tooreenmountain townlands.

There are no known archaeological records within the Site with the exception of the redundant records WA014-044 near T7 and WA014-042 near T2. There is a Cairn (WA014-043) located adjacent to the red line boundary near T2 and there are several Fulacht Fia records located south of T11 immediately adjacent to the red line boundary.

There are several archaeological features located adjacent to the GCR and TDR, including ringforts and enclosures, a children's burial ground and NIAH buildings such as the Master McGrath Monument adjacent to R672 junction with the N72 road.

The GCR will be predominantly contained within the public road corridor throughout its length with the exception of the start and finish points where the cables will be terminated in the existing network substation at Dungarvan and the proposed onsite substation which is located within the Site, and one horizontal directional drilling (HDD) in private lands required at approximate ITM Coordinate: 621231.261, 608261.270 to cross a waterbody due to the need to take the cable route off road at an existing a bridge, located on a 90-degree bend in the road, which has insufficient cover to accommodate the cable. This HDD crossing will be entirely within private lands which comprise agricultural grasslands, and will be under the Skeheens Stream (EPA name: COLLIGAN_010).

Similarly, the TDR will be confined to the public road corridor with the exception of locations where temporary accommodation works (mainly comprising laying of load bearing surface, verge widening and furniture/pole removal) will be required in private lands to facilitate the delivery of oversized loads.

### 2.1.2 Land Ownership

A small portion of the Site is owned by Coillte and is in forestry use. However, the majority of the Site is located on lands under third-party private ownership. These landowners have consented to the application for the Proposed Development. Letters of consent accompany the planning application.

### 2.1.3 On-site Wind resource

The layout of the proposed wind farm has been designed to minimise potential environmental impacts, while at the same time maximising the energy yields of the wind resource passing over the site. Available wind speed is a key factor in determining the economic viability of potential wind energy locations. The Sustainable Energy Authority of Ireland (SEAI) Wind Speed Atlas[2] displays onshore wind speeds at between 20 and 150 metres above ground level, based on 2013 data. The atlas identifies the Site as having an average wind speed range of 8.6 m/s to 9.6 m/s at 150 m above ground level.

A temporary meteorological mast, 80m in height, was erected at the proposed Coumnagappul Wind Farm Site in June 2019 (ITM Coordinates E-625004.2844, N-608093.7932). Wind speed monitoring from this mast has recorded average wind speeds of 8.3 m/s.

### 2.1.4 Other Wind farms

***Operational/Permitted***

There are three operational wind developments located within 20 km of the proposed Coumnagappul Wind Farm. Figure 2.6 illustrates the location of existing wind farms within 20 km of the Site.

[2]https://www.seai.ie/technologies/seai-maps/wind-atlas-map/

**Table 2-2: Wind Energy Developments within 20km of the Proposed Development**

| Wind Farm Name | Number of turbines | Distance and Direction from proposed site | Status |
|---|---|---|---|
| Tierney Single Turbine | 1 | 5.1km west of Site | Operational<br><br>Privately owned operational (since 2015) single 150 kW turbine (hub height 30 m, tip height 44 m) |
| Kilnagrance Single Turbine | 1 | 14km east of Site | Operational<br><br>Privately owned (KWT Energy Ltd) operational (since 2016) single turbine with a 60 m tip height |
| Woodhouse Wind Farm | 8 | 17.2km west of Site | Operational<br><br>Woodhouse Wind Farm (ESB) is an operational wind farm (since 2015) and was constructed in 2 phases comprising a total of 8 no. wind turbines with a 126 m tip height (45m blade length). |
| Knocknamona Wind Farm | 8 | 17.6 km west of Site | Permitted<br><br>Was granted permission in September 2022 (PL93.309412) and is located immediately south of the existing Woodhouse Wind Farm. The Knocknamona Wind Farm will comprise 8 no. wind turbines with a 146.3 m tip height. |
| Dyrick Hill Wind Farm | 12 | 7.9 km southwest of Site | Proposed (at planning)<br><br>Proposed private development (EMPower) submitted for planning in June 2020 (Case reference: PA93.317265) comprising a 12-turbine array with a 185m tip height. |

## 2.2 Site Infrastructure

### 2.2.1 Wind Farm

The proposed wind farm will consist of 10 no. wind turbine generators (WTG's), a 110 m meteorological mast, 1 no. borrow pit/spoil management area and 1 no. 110kV substation compound along with ancillary civil, drainage and electrical infrastructure.

#### *2.2.1.1 Wind Turbine Description*

The final choice of turbine model is anticipated to be a Vestas V162 model wind turbine. This turbine model has been included for the purposes of EIAR and planning approval. The Vestas (Model : V162 6.0 – 7.2MW) is a conventional three-blade horizontal axis turbine. Schematic drawings of the candidate turbine accompany the planning application. The plans and particulars are precise and provide specific dimensions for the V162 turbine structures which have been used in this assessment. The turbine specification will have a hub height of 104 m and a rotor diameter of 162 m with a tip height of 185 m.

***Turbine Layout***

The proposed wind farm layout reflects the outcome of iterative engineering and environmental constraints assessments carried out during the wind farm design process aimed at eliminating or minimising adverse effects on the environment and considered *inter alia* risks to sensitive habitats, presence of known or potential archaeological features, risk to sensitive species, assessment of ground conditions and optimisation of cut-fill balance as part of design and existing drainage patterns and water catchment characteristics. The layout has been designed to minimise the potential environmental effects of the wind farm while at the same time maximising the energy yield of the wind resource passing over the Site.

The design rationale and evolution of the wind farm layout is described in Chapter 3 - Site Selection and Alternatives.

Turbine location co-ordinates in Irish Transverse Mercator (ITM) are detailed in Table 2-3:

**Table 2-3 Turbine Coordinates**

| Turbine No. [Note 1] | ITM Easting | ITM Northing |
|---|---|---|
| **T1** | 623836.95 | 610086.77 |
| **T2** | 624450.33 | 610262.63 |
| **T4** | 623765.98 | 609473.64 |
| **T5** | 624338.34 | 609616.17 |
| **T6** | 624985.13 | 609593.52 |
| **T7** | 624817.24 | 608984.47 |
| **T8** | 624437.82 | 608381.42 |
| **T10** | 624745.33 | 608019.25 |
| **T11** | 625248.04 | 607863.24 |
| **T12** | 623727.27 | 608212.24 |

Note 1: numbering is not sequential. This is due to turbines being removed from the array during constraints assessment and design iteration. See Chapter 3 for further details.

The turbines will have a multiple painted coating to protect against corrosion. The V162 has a light grey coloured finish to blend into the sky background. All surfaces will have a matt non-reflective finish. This minimises visual impact, as recommended by the following guidelines on wind energy development:

- "Wind Energy Development – Planning Guidelines" (2006), Department of the Environment, Heritage and Local Government;
- "The Influence of Colour on the Aesthetics of Wind Turbine Generators," ETSU W/14/00533/00/00
- PAN 45, The Scottish Office Environment Department;
- PPG22, Department of the Environment - Welsh Office;
- Technical Advice Note 8, Welsh Assembly, 2005.

It is proposed to install lighting on the turbines in accordance with the Irish Aviation Authority (IAA) requirements for aviation visibility purposes. The lighting configuration and type will be in accordance with the International Civil Aviation Organisation (ICAO) obstacle light requirements.

### Turbine Tower and Foundation

The turbine will be anchored to a foundation. Following detailed site investigations, it has been determined that the wind turbine foundations at Coumnagappul will be standard shallow reinforced concrete base pad foundations. The turbine foundations will be circular in shape and will be 25 m in diameter and 4 m in depth.

The turbine foundations will be constructed using standard reinforced concrete construction techniques. Detailed construction methodologies for turbine foundations are provided in the CEMP in Appendix 2.1 of Volume III.

Turbine foundations will be designed to Eurocode Standards. Foundation loads will be provided by the wind turbine supplier, and factors of safety will be applied to these in accordance with European design standards:

- EN 1992-1-1: Eurocode 2: Design of concrete structures.
- BS EN 61400-1:2005: Wind Turbines Design Requirements.

Once completed, a portion of the foundation (30 $m^2$ concrete plinth with 4m access area around that for further access and maintenance) will be above ground. The tower will be bolted to the turbine foundation.

The turbine will comprise a full tubular steel tower or a hybrid concrete/ steel tower. The hybrid towers consist of a concrete bottom part with a transition piece towards a tubular steel top. The concrete part is made of precast high strength concrete rings, and the tubular steel top is made of flange joined steel sections. Full steel tower comprises fully of flange joined steel sections.

The tower will be delivered to the Site in four sections as follows:

| Component | Aprox. Length (m) | Aprox. Weight (t) |
|---|---|---|
| Base | 19 | 80. |
| Mid 1 | 25 | 77 |
| Mid 1 | 30 | 67 |
| Top | 30 | 57 |

Once the turbine components arrive on site they will be placed on the hardstand and lay down areas prior to assembly. The towers will be delivered in sections and each blade will be delivered in a separate delivery. Once there is a suitable weather window the turbine will be assembled.

It is anticipated that each turbine will take approximately 3 to 4 days to erect (depending on the weather), requiring two cranes. Finally, the turbines will be commissioned and tested.

The first (base) section is bolted to a steel frame, which is cast into the turbine concrete foundation. The upper sections of the tower are bolted to the lower ones in sequence. The base of the tower is approximately 5 m in diameter, tapering to approximately 3 m where it is attached to the nacelle. The first floor of the tower is approximately 3 m above ground level it is accessed by a galvanised steel staircase and a steel hatch door which will be kept locked except during maintenance. Access to the top platform in the tower is by a ladder or service lift. Access to the nacelle from the top platform is by ladder. Access to the transformer room in the nacelle is controlled with an interlock.

In summary the works will be carried out as follows:

- The extent of the excavation will be marked out.
- Around the perimeter of the foundation formation a shallow drain will be formed and settlement pond.
- The base of the foundations will be excavated to competent bearing strata.
- Excavated soil will be managed in accordance with the Soil Management Plan, within the CEMP Appendix 2.1.
- A layer of concrete blinding will be laid approximately 75 mm thick directly on top of the newly exposed formation.
- Formwork and reinforcement will be fixed.
- Ductwork will be installed as required for cables, and formwork erected around the steel cage.
- Concrete will be placed using a concrete pump and compacted using vibrating pokers.
- Upon completion of the concreting works the foundation base will be covered against precipitation.
- Steel shutters will be used to pour the upper plinth section.
- Once the concrete is set the earthing system is put in place and the foundation is backfilled with suitable material.
- The foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation.

### *Turbine Blades and Hub/Nacelle*

The turbine blades comprise fibreglass reinforced epoxy, carbon fibres and solid metal tip. The blades are 79.35 m in length with a width (maximum chord length) of 4.3 m. The swept area of the blades is 20,612 $m^2$.

The turbines will have a cut in wind speed of 3 m/s and cut out speed of 25 m/s. Turbine rotor rotation is in a clockwise direction. The turbine begins generating electricity at a wind speed of 3 m/s, with rated power generation at wind speeds of approximately 12 to 14 m/s.

The dynamic operation range (the rate at which the blades rotate) of the Vestas V162 is 4.3 -12.1 revolutions per minute (rpm) which will be influenced by wind speed.

The cast iron hub supports the three blades and transfers the reaction loads to the nacelle which houses the generating components of the wind turbine including the generator and gearbox, electrical components and control unit. These convert the rotation of the blades to generator rotation.

A yaw mechanism turns the nacelle and blades into and out of the wind. A wind vane on the nacelle controls the yaw mechanism.

The blade bearings allow the blades to operate at varying pitch angles. Based on the prevailing wind conditions (determined by the wind vane), the blades are continuously positioned to optimise the pitch angle with the pitch range being -5° to 95°.

The turbines are equipped with an aerodynamic brake. Stopping the turbine is done by full feathering the three blades (individually turning each blade).

A glass fibre reinforced polyester hood covers the nacelle. The turbines are equipped with a Lightning Protection System (LPS) earthing and isolation to help protect the wind turbine against the physical damage caused by lightning strikes. Additionally the turbines can be equipped with a Fire Suppression System. The turbine can also be equipped with an Ice Detection and Anti-Icing System.

### *Turbine Transformer and Wind Farm Power Output*

The Vestas V162 has flexible power output ratings of 6.0 MW, 6.2 MW, 6.8 MW and 7.2 MW. The range of installed capacity has been fully assessed in the Air and Climate chapter with respect to emissions calculations and in the Noise Chapter with respect to maximum sound power level.

The turbine will have a transformer located within the tower. The turbine transformer will step up the voltage to either 20kV or 33kV to reduce the electrical loss on the cabling connector circuits that connect to the site substation via a network of underground medium voltage cable circuits to be located adjacent to the proposed site track network.

The Proposed Development will have an Export Capacity (MEC) ranging from 60.0 MW to 72.0 MW depending on the power rating employed. This range of generation capacity has been used to calculate the power output of the proposed Coumnagappul Wind Farm based on the following calculation:

*A x B x C = Megawatt Hours of electricity produced per year*

*where:*

*A = The number of hours in a year: 8,760 hours*

*B = The capacity factor, which takes into account the intermittent nature of the wind, the availability of wind turbines and array losses etc. A capacity factor of 35 % is applied here*[3].

*C = Rated capacity of the wind farm: 60.0 –72.0 MW*

[3] EirGrid in their All-Island Generation Capacity Statement (2017-2026) estimates a capacity factor of approximately 31% for onshore wind. The capacity factor applied for the proposed wind farm is greater than the EirGrid estimation as a result of improvements in turbine technology and the good wind flows at the site. The proposed turbine type allows for the use of fewer, taller turbines with an increased efficiency and in return greater economic benefit to the consumer.

The proposed wind farm has the potential to produce between approximately 7,358 MWh (megawatt hours) and 8,830 MWh of electricity per year over the 40 year lifetime of the Proposed Development.

The electricity produced by the proposed wind farm would be sufficient to supply between approximately 43,800 – 52,560 Irish households with electricity per year (depending on MEC), based on the average Irish household using 4.2 MWh of electricity (this figure is taken from the March 2017 Commission for Energy Regulation (CER) Review of Typical Consumption Figures Decision Paper and Commission for Regulation of Utilities Energy and Water Monitoring Report for 2021).

#### *2.2.1.2 Site Access and Internal Road Infrastructure*

***Site Access***

Coumnagappul Wind Farm will have one primary site entrance accessed from the local Seapark road (off the L5119) which will be used for construction, operation and decommissioning. The access is via an existing Coillte Forestry access, which will be upgraded to facilitate the delivery of turbine components. All loads including turbine towers, turbine blades and trucks with materials will enter the Site via this access. The proposed grid connection export cable will exit the Site through this access point. This access point will also be used for construction and operation vehicles and will be used by both HGV's and LGV's.

The general local road speed limit applies of 80 kph. The minimum sightline distance for an 80 kph road is 160 m in line with Transport Infrastructure Ireland (TII) standards (TII Publication DN-GEO-03060). It is proposed to widen the existing access and clear forestry and vegetation within the 160m visibility splays in both directions to facilitate the over-sized turbine delivery vehicles entering the Site at this point. The detail is shown on P2360-0101-0003 planning application drawing included with the planning application. Visual obstructions 1.05m above ground level will be removed to achieve 'Y' visibility distances in both directions of 160m in accordance with TII design specifications.

The on-site substation will be located within the Wind Farm Site and will be accessed via new internal access tracks.

The permanent meteorological mast will be accessed from the local road network to the south of the Site and will be used solely for works associated with the construction, operation and decommissioning of the meteorological mast.

The locations of the Site entrance and access to the meteorological mast is shown on Figure 2.2, Volume IV and on Planning Drawing P2360-0100-0002.

The access has been selected with consideration for safety of public road users and construction staff and to ensure that it can be constructed to comply with the requirements of both Waterford City and County Council and TII design requirements for direct accesses.

Locations of passing bays along the TDR and haul routes on the local road L5119 to the unclassified local Seapark road at the Site entrance have been identified and are discussed further in Chapter 14.

***Wind Farm Internal Access Tracks***

The internal access track serving the wind farm will comprise 25.43 km of new road infrastructure, with an additional a small section of existing forestry road and agricultural track which will be upgraded for 2,580 m in length (refer to Figure 2.2, Volume IV).

The proposed internal site track layout will permit access for vehicles during the construction phase, for maintenance during the operational phase and for vehicles to decommission the turbines at the end of the life of the Proposed Development.

The proposed new internal access tracks will be founded on suitable substrate, noting that depths to bedrock within the Site are shallow (refer to Chapter 11 Land, Soils and Geology).

All access tracks will be 5 m wide along straight sections and wider junctions and turning areas as required as shown on accompanying planning application drawings in accordance with wind turbine manufacturer requirements for the wind turbines of this size. The existing forestry track is approximately 4.5 m in width and will be widened by approximately 1m, with an additional widening at the bend where the new internal access road deviates from the existing track. The existing agricultural track is approximately 3 m in width and will be widened by approximately 2.5 m. Access to the met mast will not be altered.

Access track formation will consist of a minimum 500mm hardcore on geo-textile membrane. The proposed construction methodology for newly constructed tracks is as follows:

- The formation will be prepared to receive the geotextile membrane.
- A well graded aggregate stone will be placed and compacted in layers to minimum 500mm depth.
- A layer of compacted Cl 804 material will be placed on top to provide a suitable running surface.
- Surplus excavated material will be placed along the side of sections of the tracks in suitable locations as identified in the Soil Management Plan (within the CEMP in Appendix 2.1) and where appropriate dressed to blend in with surrounding landscaping and partially obscure visibility of the track during operation.

The stone required for the construction of the internal access roads will be sourced from within the Site borrow pit and from licenced quarries in the vicinity of the Proposed Development. The location of licensed quarries and haulage routes are identified in Chapter 14: Traffic and Transportation and in Figure 14.3, Volume IV.

Floating roads will not be required for this site based on the results of ground investigation and geotechnical walkover assessments.

Further details on access track construction are provided in the CEMP in Appendix 2.1, Volume III.

Internal access track drawings are presented in 100-Series planning application drawings.

A drainage system will be installed adjacent to the internal access tracks. Existing drainage infrastructure will be maintained and upgraded where necessary. Existing drainage channels will be upgraded to the same standard as the proposed drainage infrastructure in accordance with the drainage design and Surface Water Management Plan (within the CEMP in Appendix 2.1).

Existing forest track and farm track drainage will be maintained and upgraded as required to meet the requirements of the proposed wind farm drainage design. SuDS design approach will ensure that existing drainage patterns will be maintained. Surface water runoff from the existing forestry track and farm track discharges to the two adjacent streams (which are tributaries of the Colligan River: Colligan_010).

Drainage ditches will be formed, within the excavated width and along the sides of the internal access tracks.

Drainage infrastructure will be constructed in parallel with the access track construction.

### *Hardstand and Laydown Area*

Each wind turbine will have an associated turbine hardstand area and temporary laydown area adjacent to the foundation to accommodate the delivery and temporary storage of the turbine components prior to their erection and to support the cranes during erection.

Once the turbine components arrive on site they will be placed on the hardstand and lay down areas prior to assembly. The towers will be delivered in sections and each blade will be delivered in a separate delivery. Once there is a suitable weather window the turbine will be assembled.

A turbine hardstanding area consists of a main crane pad hardstanding of 57 m x 192 m with a number of additional smaller hardstandings that act as set down and assembly areas, located as shown on the accompanying planning drawings. This area will accommodate a main crane and an assist crane during the assembly of the turbine, as well as during occasional maintenance periods during operation. It will also facilitate parking for operation and maintenance staff.

A turbine hardstanding area will be constructed at the base of each turbine to provide a solid area for the installation crane that will be used to erect the turbine and for the assembly of the turbine.

Hard standing formation will consist of a minimum 500mm hardcore on geo-textile membrane. The construction methodology for hard standings will be as follows:

- The formation will be prepared to receive the geotextile membrane.
- Stone (either sourced within the site or locally from licensed quarries) will be placed and compacted in layers to minimum 500mm depth.
- Drainage ditches will be formed, within the excavated width and along the sides of the hard standing.
- Surplus topsoil will be placed along the side of the hard standing (avoiding any existing land drains) and dressed to blend in with surrounding landscaping.

### *Watercourse Crossings Within the Site*

Within the Site there are three watercourse crossings, as set out in Table 2-4 below. It is proposed to install one single-span bridge and one open-bottomed box culvert crossing and one piped culvert. The proposed crossing designs have been designed in line with Inland Fisheries Ireland (IFI) requirements for salmonid watercourses as included in their 2016 'Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters' and TII 2008 'Guidelines for the Crossing of Watercourses During the Construction of Road Schemes'. Details of proposed crossing structures are presented in 0500-Series planning application drawings.

The plant which will be used in the construction of the watercourse crossings will include:

- Excavators;
- Dump Trucks;
- Mobile Crane;
- Concrete Truck and Pump;
- Hand Compactor;
- Smooth Rollers;
- Pumps.

**Table 2-4: River Crossings within the Wind Farm Site**

| Watercourse Name | Coordinates: ITM | Width at Base | Width at top of bank | Bank Height | Depth of Water | Type of Crossing |
|---|---|---|---|---|---|---|
| Watercourse Crossing 4 - Skeheens Stream (COLLIGAN_010) | 622466.431, 609322.014 | 2500mm | 4000mm | 600mm | c. 100mm | Open-bottomed box Culvert to replace existing river ford on forest access track.<br><br>The river comprises a cobble, gravel, silt and boulder substrate upstream and downstream of the ford. Flows are characterised by riffles and glides. |
| Watercourse Crossing 5 – Knockavanniamountain Stream tributary of the Colligan River (COLLIGAN_010) | 624882.65, 609163.46 | 1200mm | 1800mm | 450mm | Ponding Water | Piped Culvert<br><br>Small stream comprising boulder cobble and gravel. |
| Watercourse Crossing 6 - Colligan River (COLLIGAN_010) | 624241.28, 608601.32 | 2600mm - 3000mm | 3300mm - 3500mm | 450mm - 600mm | c. 100mm | Clear Span Bridge c. 15m in length<br><br>High energy watercourse with bed substrate comprising boulder cobble and gravel. |

*Bottomless Culvert and Piped Culvert Construction Methodology*

Culverts will be made of precast units which will be sized specific to the hydraulic capacity required relative to the characteristics of the watercourse to be crossed. The crossing angle for the culverts will be set out in relation to road alignment and the existing watercourse channel. The project engineer will determine the required gradient of the culvert. Standard details for piped and bottomless culverts are provided in Planning Drawings P2360-0300-0019 and P2360-0501-0002.

The access road on the approach to the channel will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the culvert crossings.

The culverts will be installed on-line (i.e. within the existing channel) and the works will be carried out under dry conditions in accordance with IFI (2016) ' *Guidelines on protection of fisheries during construction works in and adjacent to waters*'. The watercourse flow will be diverted by overpumping or by fluming the flow as appropriate in order to facilitate construction of the culvert in dry conditions. The installation of the culvert will take place in low flow conditions. Mitigation for the protection of sensitive biological receptors when fluming / overpumping are presented in Chapter 9 – Biodiversity.

For piped culvert, the bed of the watercourse will be taken down to the desired levels to create a suitable platform for laying the culvert. The pipe culvert will be lifted into place with excavator with a lifting mechanism / crane and will have an invert level 500 mm below the existing watercourse bed level. The embedded section will be allowed to fill naturally.

For bottomless box culvert, the base will be excavated to rock or competent ground with a mechanical excavator with the foundation formed in-situ using a semi-dry concrete lean mix foundation and concrete panels. The base will be excavated along the stream bank with no instream works required. The bottom plate of the culvert will be bolted to the foundation on both sides of the watercourse. The top section of the culvert will be bolted together and lifted into position and bolted to the two bottom sections. Once the culvert is in position stone backfill will be placed and compacted against the culvert up to the required level above the foundations. A concrete beam will then be shuttered, fixed and poured along the two shoulders of the culvert. When the concrete beams are cured the filling and compaction of the road will be completed.

The culverts will be such that it will not prevent fish passage.

*Clear Span Bridge Details and Construction Methodology*

The bridge will be installed on-line (i.e. within the existing channel) and the works will be carried out under dry conditions in accordance with IFI (2016) ' *Guidelines on protection of fisheries during construction works in and adjacent to waters*'. The watercourse flow will be diverted by overpumping or by fluming the flow as appropriate in order to facilitate construction in dry conditions. The installation will take place in low flow conditions. Mitigation for the protection of sensitive biological receptors when fluming / overpumping are presented in Chapter 9 – Biodiversity.

A ground investigation (GI) for the Coumnagappul site was undertaken by Ground Investigations Ireland (GII) between 7th December 2022 and 24th January 2023. It was concluded that the ground conditions at the river crossing are good, comprising dense to very dense GRAVEL and very stiff SILT and CLAY. There are no signs of slope instability at the site.

Foundations for the different elements of the river crossing will likely comprise the following:

- Bridge Structure – bank seat foundation within the underlying GRAVEL deposits; and
- Approach Embankments – founded on the underlying GRAVEL deposits.

Foundations: Abutments will be pre-cast concrete sections. The abutments for the bridge will be founded on reinforced concrete pad footings. An excavator will be used to reach the subgrade on which the concrete pads will be founded. From the available GI the gravel subgrade which is anticipated to be located approximately 1.3m below existing ground level. The excavations will be set back a minimum of 2.5m from the banks of the Colligan River. Groundwater was encountered at a depth of 1.8m bgl within the trial pit displaying a moderate flow. Dewatering of the excavations as per the Surface Water Management Plan will likely be required through sump pump or alternative means until completion of the footings. A layer of Class 6N2 fill will be laid as a regulating layer on top of the subgrade. A 75mm thick blinding concrete will be placed over the full extent of the rectangular foundation to produce a clean flat surface for the wet structural foundation concrete. The reinforcement cage for the pad footing will be fixed and tied with bars protruding vertically for subsequent concrete pours. Formwork will be placed around the perimeter of the footing ensuring sufficient concrete cover to the reinforcement. Approximately 18m$^3$ of concrete will be required for each abutment bank seat pad and will be delivered to site by ready mix trucks. The concrete will be placed in the formwork using a hopper or concrete pump and vibratory poker used to remove air bubbles.

Abutments: Once the pad footing has achieved sufficient strength, the reinforcement for the abutment upstands will be cut, tied and fixed into position. A vertical formwork will be placed around the perimeter of the abutment wall. Each abutment upstand will require approximately 13m3 of concrete which will be placed using a hopper or concrete pump. A vibratory poker will be used to remove any air pockets. Once the formwork has been removed and the concrete has cured, a waterproofing membrane will be applied to the concrete. At the top of the upstands, seatings for the precast deck beams will be prepared at the correct levels.

Deck: The bridge deck will be set above the 1% AEP flood height (100-year event) and will be made up of c. 7 No. precast concrete beams with a span of c.14m. The beams will be precast off site and delivered to site on a flatbed truck. A crane will be used to lift the beams into position onto the seatings formed on top of the abutment upstands. When in place, 2 No. ducts will be placed in the voids between each of the beam webs and mesh reinforcement placed above them. Cement Bound Granular Mixtures B (Cl 822) will surround the ducts and be compacted in accordance with Cl813.10 and Table 8/4 of TII Specification of Roadworks. Side forms for the edge parapet beams will be secured and reinforcement for the deck slab and parapet edge beams will be cut, tied and fixed into position with bars protruding vertically from the edge beams for subsequent concrete pours for the concrete parapets. The bridge deck slab and edge beams will be concreted to the finished level. Once the deck slab has reached sufficient strength the abutment walls will be backfilled with a granular fill to road formation level.

Parapets and Deck Topping: The bridge deck parapets will be constructed from reinforced concrete. Reinforcement for the parapets will be fixed to lap with the starter bars from the edge beams. Vertical formwork will be erected and secured in place. An in situ pour will be carried out to cast the parapets to the design height and vibratory poker used. Once the parapets have reached sufficient strength the formwork will be stripped. The deck surfacing is to be formed using an ST1 concrete mix. This will be placed on top of the deck slab with a minimum thickness of 100mm and with a crossfall from the centre of the deck to the parapet to allow water to drain.

Approach Earthworks: It is anticipated that the approach embankments to the bridge structure can be founded directly on top of the dense to very dense gravel. The ground investigation findings indicate that the gravel is encountered between 0.7 (BH-04) and 1.3m bgl (TP-12). Additional depth of excavation may be required where soft spots are encountered. Benching into the existing slopes may also be required due to sloping ground conditions.

Ducts for the later pulling of power and communication cables for the wind farm will be pre-cast into the bridge deck sections.

Construction of the water crossing will be scheduled to align with fisheries seasonal restrictions.

The access road on the approach to the watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the watercourse crossing.

All drainage measures, including check-dams and /or silt traps, along the proposed road will be installed in advance of the works along with the first layer of road construction.

All earthworks adjacent to the crossing locations will be carried out so as to prevent soil entering the watercourse and will be in accordance with the Spoil Management Plan.

Safe access over the stream for this installation will be via a steel walkway & handrail which will span the stream.

Further details on hydrology and drainage are contained in Chapter 12 - Hydrology and Water Quality, the Surface Water Management Plan (SWMP) which is contained in Appendix 2.1 and on accompanying planning application drawings.

*Minor Stream / Drain Crossing Construction Methodology*

All other minor streams or drains within the Site (which are not identified as Rivers by the EPA in their reporting under the Water Framework Directive) which are crossed by the wind farm infrastructure will be collected by interceptor drains and carried under the road by cross drains. Further details on the locations of such cross drains are provided in the Surface Water Management Plan in Appendix 2.1, Volume III and in the Drainage Drawings presented in 0100 and 0500-Series planning application drawings. The cross drains will be an appropriately sized pipe buried in the sub-base of the road at the necessary invert level to ensure ponding or pooling doesn't occur above or below the cross drain and water can continue to flow as necessary.

For a minor stream/drain crossing the following will be employed:

- The access track construction will finish at least 10m from the nearside bank of the minor stream/drain.
- All environmental mitigation measures, described in detail in Chapter 12 - Hydrology and Water Quality and Chapter 9 - Biodiversity, will be implemented locally in advance of the works, in accordance with the measures outlined in the Surface Water Management Plan (SWMP) in the CEMP in Appendix 2.1.
- The pipe is laid in one lift or in sections using a lifting mechanism attached to an excavator.
- Rock armour headwalls will be constructed where necessary to protect pipe ends and the base of slope embankments on either side of the track.

#### *2.2.1.3 On-Site Electrical Substation and Cabling*

An onsite electricity substation will be constructed within the Site as shown in Figure 2.2. This will provide a connection point between the wind farm and the proposed grid connection point at the existing Dungarvan substation.

The dimensions of the substation compounds will be 123 m X 62.8 m and will include a substation control building and electrical components necessary to export the electricity generated from the wind farm to the national grid. The substation compound will be surrounded by a ca. 2.5-metre-high steel palisade fence and internal fences will also be provided to segregate different areas within the main substation compound.

Lighting will be required on site, and this will be provided by lighting poles located around the substation and exterior wall mounted lights on the control buildings.

The control building located within the substation compound will measure 25 m by 18 m and 8.38 m in height. The Independent Power Production (IPP) building will include grid operator control rooms, an office space and welfare facilities for staff during the operational phase of the wind farm and will measure 10.7m by 20.1m and 6.9m in height.

Due to the nature of the Proposed Development, there will be a small water requirement for occasional toilet flushing/hand washing with a rainwater harvesting tank adjacent to the control building. A wastewater holding tank will be provided outside the substation compound fence line so that it can be maintained where required without requiring access to the substation compound. The wastewater holding tank will be a sealed storage tank with all wastewater tankered off site as required by an authorised waste collector to a wastewater treatment plant. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007, will be employed to transport wastewater away from the site. The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. Potable water will be delivered to site and stored in a holding tank in the substation control building.

The substation compound will also contain external electrical and ancillary infrastructure in the form of the following:

- Cable sealing ends;
- Surge arrestors;
- Cable disconnectors;
- Post insulators;
- Circuit breakers;
- Current and voltage transformers;
- Steel gantry's and cable chairs;
- Power transformers;
- Power quality compensation equipment;
- Concrete plinths and bunds;
- External lighting;
- Lightening protection masts;
- Telecommunications masts;
- Security cameras;
- Palisade fencing and gates.

Lightning protection and telecommunications masts will represent the tallest structures in the compound and will not exceed 18.0m in height.

The proposed substation compound is presented in accompanying planning application drawings.

#### *2.2.1.4 On-Site Electrical Cabling*

Electricity generated from wind turbines will be collected at medium voltage (33kV) by an internal circuit of buried cables. This circuit will be terminated at the proposed onsite substation. The internal collector circuit cable routes are shown on the planning application drawings and will follow the alignment of the internal access tracks.

The electricity will be transmitted as a three-phase power supply so there will be three individual conductors (or individual cables) in each cable circuit. The three conductors will each be laid in separate ducts which will usually be laid in a trefoil formation but may also be laid in a flat formation where conditions require it such as where the ducts need to cross an existing structure or culvert in such cases, cable ducts will be cast into the structures to allow the power cables to cross the watercourses under the access tracks.

The design and construction methods associated with the internal wind farm electrical cabling will be similar in nature to that of the 110 kV grid connection cable works as described in Section 2.2.2.

The width of the internal cable trench with a trefoil formation will be 600 mm, a flat formation will require a wider trench width (approximately 1200 mm). The depth of cover to the ducts carrying the cables will be 900 mm to the top of the upper ducts. The depth of trench for the cables will be 1200 mm. The diameter of the ducting will be selected to suit the range of cross-sectional areas of electrical cables and is likely to fall between 100 mm and 200 mm diameter.

Internal cable trench section types associated with on-site electrical cabling are presented in the accompanying planning application drawings.

Further details on cable trench construction methodologies can be found in the CEMP in Appendix 2.1.

### *2.2.1.5 Meteorological Mast*

1 no. permanent meteorological (met) mast will be erected on Site at the location shown in Figure 2.2. The permanent met mast will be of the following general configuration:

- 110 m high lattice steel mast with a shallow concrete foundation, which includes a 4m lightning rod which will extend above the mast structure.

The power source for the permanent met mast will be taken from the ESB overhead line along the local road and will be an underground cable following the access road tot eh met mast and will connect to an electrical kiosk which will be installed within the met mast site.

The met mast installation works will be carried out by a small crew and are described as follows:

- An access track will be extended towards the mast location from the local road as shown on Figure 2.2. The access track will be 3.5m in width. Temporary and permanent drainage infrastructure will be extended, and underground cable power supply will be provided along the new access.
- A small aggregate crane pad of approximately 10m x 10m in size will be constructed in front of the proposed mast location.
- General construction methods for the above access track and hard standing will match those described for wind farm access tracks and hard standings however the dimensions and stone depth requirements of the infrastructure will be considerably less than that required for that serving the wind turbine construction.
- The foundation will be excavated followed by shuttering, steel fixing and finally concrete pouring by ready mix truck. Excavation and concrete operations will be carried out in accordance with the CEMP (Appendix 2.1). The foundation will be 10m x 10m x 1.8m in size.
- Following crane setup, the mast sections will be delivered and unloaded by truck.
- In accordance with an agreed lifting plan, mast sections will be lifted by crane into place. Wind speeds will be monitored at all times during lifting operations by the lead climber and crane operator.
- Mast sections will be bolted together by climbers.
- Following erection of main mast sections, lightning protection and other ancillary components will be fixed to the mast.

Details of the proposed met mast design can be found in the planning application drawings.

### *2.2.1.6 Borrow Pits and Peat /Spoil Deposition Areas*

Civil engineering assessment of the proposed Coumnagappul Wind Farm indicates the requirement for approximately 233,715m$^3$ of stone fill across the Site to provide fill for the internal access roads, hardstands, upfill to foundations and the temporary compound. Further details are provided in the Peat and Spoil Management Plan.

**Table 2-5: Anticipated stone volumes necessary for construction**

| Infrastructure Element | Typical Dimensions | Stone Volume ($m^3$) | Average Stone Depth (m) |
|---|---|---|---|
| 10 no. Turbines | 25m diameter excavation footprint for turbine foundation | 2,375 | 3 |
| 10 no. Turbine Hardstands | Hardstand area (7,600$m^2$) | 168,911 | 0.5 |
| Substation | Assumed 9,288$m^2$ footprint | 22,145 | Varies |
| Access Roads, turning bays and earthworks for Colligan River Crossing | Assumed 5m running surface with 6m wide development footprint for the access roads. | 33,009 | Varies |
| Temporary Construction Compound | Footprint of 18,000$m^2$ | 6,750 | 0.3 |
| Met Mast Foundation and Hardstand | Hardstanding area of 16$m^2$ | 525 | 1.5m foundation / 0.3m hardstand area |
| | **Total** | 233,715 | Fill to be sourced from the on-site borrow pit. |

Note: A contingency factor of 25% stone volumes to allow for a variation in ground conditions across the Site.

One borrow pit will be excavated as part of the Proposed Development, which will be located in proximity to Turbine T2 and will be 15,000 $m^2$ in area. The borrow pit will have the capacity to provide 239,580$m^3$ of Class 1 fill material to an excavated depth of 14 m.

The borrow pit will be excavated only as required. Where rock and fill material is available from the excavation of turbine foundations and internal roads this material will be used first. The use of an on-site borrow pit will reduce the need to transport material to the Site.

Weaker rock will be extracted using a hydraulic excavator and a ripper. Where stronger rock is encountered and cannot be extracted using an excavator, then rock breaking equipment will be employed. This will typically involve the use of a hydraulic excavator with a rock breaker.

Excavated rock will be crushed on site using a mobile crusher and crushed down into the correct grade for use in the construction.

The borrow pit shall be typically constructed as follows:

1. The rock within the proposed borrow pit footprint will be removed by excavation and ripping methods.
2. It is proposed to construct the borrow pit so that the base of the borrow pit is below the level of the adjacent section of access road. This may vary and as excavation progresses into the back edge of the borrow pit, the base of the borrow pit may be raised to suit local conditions. Localised deepening of the borrow pit floor may be required depending on extraction operations.

3. Depending on the depth and type of rock present in the borrow pit it may be possible to excavate the rock from the borrow pit whilst leaving in place upstands/segments of intact rock which will help to retain the placed peat and spoil. The upstands/segments of intact rock will essentially act as engineered rock buttresses.
4. Slopes within the excavated rock formed around the perimeter of the borrow pit will be formed at stable inclinations to suit local in-situ rock conditions. Exposed sections of the rock slopes will be left with irregular faces and declivities to promote re-vegetation and provide a naturalistic appearance.
5. The stability of the rock faces within the borrow pit will be inspected by competent personnel upon excavation to ensure stability during construction works and in the long term. This inspection will allow unfavourable rock conditions to be identified and suitable mitigation measures to be applied such as removal of loose rock.
6. Where it is not possible to leave upstands/segments of intact rock in place it may be necessary to construct rock buttresses founded on in-situ rock within the borrow pits. The rock buttresses will be constructed of rock fill from the borrow pit excavation. The founding stratum for each rock buttress will be inspected and approved by a competent person.
7. It may be necessary to construct the rock buttress within the borrow pit in stages as infilling of spoil behind the buttresses progresses. The buttress will be constructed of selected rock fill and placed and compacted in suitable layers to form a buttress of sufficient stability to retain the placed spoil, as necessary.
8. Infilling of the peat and spoil will commence at the back edge of the borrow pit and progress towards the borrow pit entrance. The contractor excavating the rock will be required to develop the borrow pits in a way which will allow the excavated peat and spoil to be placed safely.
9. The height of the rock buttresses constructed will be greater than the height of the placed peat and spoil to prevent any surface spoil run-off.
10. The use of temporary access ramps and long reach excavators during the placement of the excavated peat and spoil is likely to be required.
11. Where possible, the surface of the placed peat and spoil will be shaped to allow efficient run-off of surface water from borrow pit area.
12. An interceptor drain will also be installed upslope of the borrow pit. This drain will divert any surface water away from the borrow pit and hence prevent water from ponding and lodging on the re-instated borrow pit area.
13. Control of groundwater within the borrow pit may be required. A temporary pump and suitable outfall locations are likely to be required during construction.
14. A silting pond will be required at the lower side/outfall location of the borrow pit.
15. Supervision by a geotechnical engineer or appropriately competent person will be carried out for the works.
16. All of the above commitments will be implemented in full and may be added to by the designer prior to construction.

The borrow pit is shown on planning drawing P2360-0300-0001.

### *Spoil and Overburden Management*

The predicted overburden volumes generated during construction have been calculated and are outlined in Table 2-7. Spoil and overburden will be stored within the Site, at the borrow pit location as shown on Figure 2.2, Volume IV, the dimensions of which and details on rock volume are show in Table 2-6. Further details are provided in the Peat and Spoil Management Plan within the CEMP in Appendix 2.1, Volume III.

**Table 2-6: Borrow Pit Dimensions**

| Element | Typical Dimensions | Rock Volume ($m^3$) | Comment |
|---|---|---|---|
| Borrow Pit | 150m (L) x 100m (W) x 14m (D). | 239,580 | Rock depth at approximately 1.9m bgl (taken from BH-03) |

Prior to the use of the borrow pit/storage area an interceptor drain will be excavated upslope in order to intercept existing overland flow and divert it around the storage area prior to discharge via an overland diffuser on the downslope side. A dirty water cut-off drain will be provided on the downhill side of the storage area to catch potential sediment-laden run-off and transfer it to a settlement pond.

**Table 2-7: Summary of Estimated Excavation Quantities on Site**

| Infrastructure Element (1) | Typical Dimensions | Peat Volume ($m^3$) (2) | Spoil (non-peat) Volume ($m^3$) (2) | Comment |
|---|---|---|---|---|
| 10 no. Turbines and Hardstands | 25m diameter excavation footprint for turbine foundation with 7,600$m^2$ hardstand area. | 14,364 | 101,772 | Hardstanding area and foundation footprint. |
| Access Roads (to include Colligan River Crossing Earthworks) | Assumed 5m running surface with 6m wide development footprint. | 10,368 | 16,530 | Upgrade of New and Construction of existing roads required. |
| Temporary Construction Compound | 18,000$m^2$ footprint | 3,240 | 3,240 | 2 no. TCC areas proposed |
| Substation | 9,288$m^2$ footprint | 2,325 | 18,329 | |
| Met Mast and Hardstand | Foundation area of 100$m^2$ with an excavation depth of 1.5m. Hardstand area of 900$m^2$ with an excavation depth of 0.30m. | 0 | 180 | Foundation and Hardstanding area. |

| Infrastructure Element (1) | Typical Dimensions | Peat Volume ($m^3$) (2) | Spoil (non-peat) Volume ($m^3$) (2) | Comment |
|---|---|---|---|---|
| Borrow Pit (surface material) | 150m (L) x 100m (W) x 14m (D). | 2,970 | 34,650 | Peat and Soil volumes only. Excludes rock volumes which will be used on site as fill. |
| | | | | |
| | **Total =** | **36,831** | **174,701** | **Total = 211,532$m^3$ (peat and spoil volume)** |

Note (1) The location of the infrastructure elements on site are shown on drawing no. P2360-0100-0001.

Note (2) A factor of 20% (bulking factor of 15% and contingency factor of 5%) has been applied to the excavated peat and spoil volumes to allow for expected increase in volume upon excavation and to allow for a variation in ground conditions across the site.

#### *2.2.1.7 Biodiversity Management / Enhancement*

A Biodiversity Enhancement and Management Plan (BEMP) has been prepared which prescribes land management practices to be employed as part of the proposed Coumnagappul Wind Farm Development (see Appendix 9.1, Volume III).

The measures set out in the BEMP include those designed to protect and enhance existing habitats. Higher value habitats will be actively managed to maintain and improve their value and lower value habitats will see specific interventions designed to improve their attractiveness for a range of species.

The BEMP measures will be employed for the lifetime of the windfarm.

#### *2.2.1.8 Felled Forestry*

Permanent felling of approximately 5.4 ha of coniferous forestry is required near the main entrance to the wind farm. It should be noted that the clear-felling of trees in the State requires a felling licence. The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing which is governed by the Forestry Act 2014 as amended and the Forestry Regulations 2017 (S.I. No. 191 of 2017). A felling licence will include the provision of relevant replant lands (afforestation area) to be planted in lieu of the proposed tree felling on the Site. The associated afforestation of alternative lands equivalent in area to those lands being permanently clear-felled is also subject to licensing ('afforestation licensing').

It should be noted that the forestry within the Site was originally planted as a commercial crop and will be felled and replanted in the coming years should the Proposed Development not proceed.

The area of trees to be felled will be the minimum required to accommodate the Proposed Development. However, for the purpose of the EIAR the area for felling has been identified as the maximum area that could conceivably be required to construct the Proposed Development.

The felling will be the subject of a Felling Licence Application to the Forest Service prior to construction as per the Forest Service's policy on granting felling licenses for wind farm developments. The Forest Service Policy requires that a copy of the planning permission for the wind farm be submitted with a felling license application therefore the felling license cannot be applied for until planning permission is received for the Proposed Development.

The Applicant commits to not commencing tree removal on site to accommodate the Proposed Development until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.

### 2.2.2 Grid Connection

It is proposed to connect the development via underground cable to the existing Dungarvan 110kV substation. The proposed grid connection for the Coumnagappul Wind Farm is approximately 22.47 km in length and runs in a northerly direction from the existing Dungarvan 110kV Substation. The proposed connection route utilizes approximately 17,339 m of public road, and approximately 5,031m of wind farm access tracks and sections of private land. The proposed grid connection arrangement is illustrated in Figure 2.4, Volume IV. A detailed description of the proposed grid connection and associated construction methodologies can be found in the CEMP in Volume III, Appendix 2.1. Details of proposed grid connection infrastructure are provided in planning application drawings.

Connection works from the onsite substation to Dungarvan substation will involve the installation of ducting, joint bays and ancillary infrastructure and the subsequent running of cables along the existing road network. This will require delivery of plant and construction materials, followed by excavation, laying of cables and subsequent reinstatement of trenches and road surfaces.

The GCR will consist of 3 No. 125mm diameter HDPE power cable ducts, 2 No. 125mm diameter HDPE communications ducts and 1 No. earth continuity conductor duct to be installed in an excavated trench. The trench will be typically 825mm wide by 1,315mm deep with variations on this design to adapt to bridge crossings, service crossings and watercourse crossings.

The ducts will be installed, and the trench reinstated in accordance with landowner, EirGrid and Waterford City and County Council specifications. The electrical cabling/fibre cable will be pulled through the installed ducts in approximately 730 to 770m section lengths. Construction methodologies implemented and materials used will ensure that the GCR is installed in accordance with the requirements and specifications of EirGrid.

Dungarvan 110kV substation has a number of existing GCR routes exiting the substation within this section. The exact location, depth, and arrangement of the existing GCRs will need to be confirmed by detailed survey and site investigation works. A minimum separation distance between the cables will need to be adhered to in order to comply with EirGrid/ESB requirements.

It is expected that full road closures will be put in place to facilitate cabling works in combination with lane closures, partial road closures and stop/go systems. This will enable the works to be completed as quickly and as safely as possible, with minimal disruption time for residents of the area. These works will be undertaken on a rolling basis with short sections closed for short periods before moving onto the next section. This is described in more detail in Chapter 14 - Traffic and Transportation.

As part of the scoping and consultation process for the Proposed Development, searches of existing utility services were carried out to identify areas where major assets exist such as high voltage electricity cables or gas mains. Private utility and telecommunications companies were also consulted during this period.

In advance of the construction phase cable detection tools, a ground penetrating radar and slit trenches will be used, as appropriate, to verify the exact locations of existing services. The final locations of the proposed cable routes in the public roads and in the verge along the public road will be within the area indicated and assessed in this EIAR and will minimise conflicts with other services.

#### *2.2.2.1 Trenching Methodology*

The following section outlines the methodology to be followed during trenching works, with further details in in the Grid Connection Construction Methodology in the CEMP in Volume III, Appendix 2.1.

- All existing underground services along the GCR route will be confirmed prior to the commencement of construction works;
- At watercourse crossings, the contractor will be required to adhere to environmental control measures as described in the Construction Environmental Management Plan (CEMP);
- Where the cable route intersects with culverts, the culvert will remain in place (where possible) and the ducting will be installed either above or below the culvert to provide minimum separation distances in accordance with EirGrid and Irish Water specifications;
- In the event that culverts require removal for ducting installation, a suitable method of damming the water source and pumping the water around the work area will be set out in a method statement and agreed with the relevant stakeholders. Once the ducts are installed the culvert will be reinstated to match existing levels and dimensions. If works of this nature are required, the contractor will liaise with Inland Fisheries Ireland in advance of works;
- A detailed Traffic Management Plan will be prepared and agreed with Waterford City and County Council;
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height. Stockpiles will be located a minimum of 50m from surface water features and all stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECoW);
- Excavated material will be employed to backfill the trench where appropriate and any surplus material will be transported off site and disposed of at a fully authorised soil recovery site;
- Any earthen (sod) banks to be excavated will be carefully opened with the surface sods being stored separately and maintained for use during reinstatement;
- The excavated trench will be dewatered if required, from a sump installed within the low section of the opened trench. Where dewatering is required, dirty water will be fully and appropriately attenuated, through silt bags, before being appropriately discharged to vegetation or surface water drainage feature;
- Where required, grass will be reinstated by either seeding or by replacing with grass turves;
- No more than a 50m section of trench will be opened at any one time. The second 50m will only be excavated once the majority of reinstatement has been completed on the first;
- The excavation, installation and reinstatement process will take approximately one day to complete a 100m section;
- Where the cable is being installed in a roadway, temporary reinstatement may be provided to allow larger sections of road to be permanently reinstated together;
- Following the installation of ducting, pulling the cable will take approximately one day between each joint bay, with the jointing of cables taking approximately 1 week per joint bay location.

**Image 2-1: Example of 110kV Underground Duct Installation**

### *2.2.2.2 Ducting Installation Methodology*

The trenching and ducting works will follow the step-by-step methodology below.

- Grade, smooth and trim trench floor when the required 1,265mm depth and 825mm width have been obtained.
- Place bedding layer of Cement Bound Granular Mixture B (CBGM B) material in accordance with its specification and compact it so that the compacted thickness is as per drawings.
- Lay the bottom row of ducts in trefoil formation as detailed on design drawings. Use spacers as appropriate to establish horizontal duct spacing. Fit a secure cap / bung to the end of each duct run to prevent the ingress of dirt or water.
- Carefully surround and cover ducts with CBGM B in accordance with the design drawings and specifications and thoroughly compact without damaging ducts.
- Place cable protection strips on compacted CBGM B directly over the ducts.
- Lay the top row of ducts onto the freshly compacted CBGM B including the cable protection strips above the bottom row of ducts. Place a secure cap at the end of each duct to prevent the ingress of dirt or water.
- Carefully surround and cover ducts with CBGM B material in accordance with drawings and thoroughly compact without damaging ducts.
- Place red cable protection strip on top of compacted CBGM B over each set of ducts as shown on the drawings.

- Place and thoroughly compact CBGM B material or Clause 804 backfill, or soil backfill as specified and place warning tape at the depth shown on the drawings.
- For concrete and asphalt/bitmac road sections, carry out immediate temporary/permanent reinstatement in accordance with the specification and to the approval of the local authority or landowner, unless otherwise agreed with local authorities.
- For unsurfaced/grass sections, backfill with suitable excavated material to ground level leaving at least 100mm topsoil or match existing level at the top to allow for seeding or replace turves as per the specification of the local authority or landowner.
- Clean and test the ducts in accordance with the specification by pulling through a brush and mandrel. Install 12mm polypropylene draw rope in each duct and seal all ducts using robust duct end seals fitted with rope attachment eyes in preparation for cable installation at a later date. All the works should be witnessed by an EirGrid Clerk of Works (CoW) as required.

#### 2.2.2.2.1 GCR Installation within the public road

The majority of the 110kV route is located within public road and where applicable the trench will be installed in the non-trafficked strip between the typical vehicular wheel locations on the road. The cable will be micro-sited based on the presence of existing utilities and the nature of the road and the adjoining terrain.

### *2.2.2.3 Surface Cable Markers & Marker Posts*

Surface cable markers will be placed along the route where the cable depth is unavoidably shallow due to constraints such as existing services. These cable markers will indicate the precise location of the GCR and will be metallic plates in accordance with ESBN and EirGrid standards.

Marker posts will be used on non-roadway routes to delineate the cable route and joint bay positions. Corrosion proof aluminium triangular danger sign, with a 700mm base, and with centred lightning symbol, on engineering grade fluorescent yellow background will be installed in adequately sized concrete foundations. Marker post will also be placed in the event that the cable burial depth is not standard. Siting of any marker posts will be agreed with EirGrid as part of the detailed design process.

### *2.2.2.4 Joint Bays and Associated Chambers*

Joints bays are to be installed approximately every 700m - 850m along the GCR to facilitate the jointing of 3 No. lengths of GCR. Joint bays are approximately 2.5m x 6m x 1.75m pre-cast concrete structures installed below finished ground level. Joint bays will be located in the non-wheel bearing strip of roadways, however given the narrow profile of local roads this may not always be possible.

In association with joint bays, communication chambers are required at every joint bay location to facilitate communication links between Coumnagappul Wind Farm and the existing 110kV substation at Dungarvan. Earth sheath link chambers are only required at single point bonded sections along the cable route. Earth Sheath Links are used for earthing and bonding cable sheaths of underground power cables, so that the circulating currents and induced voltages are eliminated or reduced. Earth sheath link chambers and communication chambers are located in close proximity to joint bays. Earth sheath link chambers and communication chambers will be pre-cast concrete structures with an access cover at finished surface level.

The precise siting of all joint bays, earth sheath link chambers and communication chambers is subject to approval by EirGrid. Marker posts will be used on non-roadway routes to delineate the duct route and joint bay positions.

#### *2.2.2.5 Joint Bay Construction and Cable Installation*

Before starting construction, the area around the edge of the joint bay which will be used by heavy vehicles will be surfaced with a terram cover (if required) and stone aggregate to minimise ground damage. Any roadside drains within the temporary works area will be culverted and check dams made from stone or sandbags covered with terram will be inserted upstream and downstream of these culverts to intercept any solids generated during the insertion or which wash out during the works. Silt fencing with straw bales will be interposed between the works area and any watercourses.

All excavated material will be stored near the excavations and reused for reinstatement works. Any soil required for reinstatement that will be temporarily stockpiled on site will be placed at least 15m back from the nearest watercourse on level ground and will be ringed at the base by silt fencing and be regularly monitored by a designated competent person for signs of solids escape. If necessary, an additional line of silt fencing with straw bales will be added in line with the relevant environmental control measures.

If the joint bay needs to be dewatered, this will be pumped to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the dewatering process to comply with the environmental control measures.

The following steps outline the methodology for joint bay construction and reinstatement:

- The contractor will excavate a pit for joint bay construction, including for a sump in one corner.
- Grade and smooth floor; then lay a 50mm depth of thick sand for pre-cast concrete construction on 200mm thick Clause 804 granular material.
- Place pre-cast concrete sections on sand bedding.
- Where joint bays are located under the road surface the joint bay will be backfilled with compacted layers of Clause 804 and the road surface temporarily reinstated as specified by the local authority.
- For cable installation and jointing, the cable is supplied in pre-ordered lengths on large cable drums. Installing “one section” of cable normally involves pulling three individual conductors into three separate ducts. The cable pulling winch must be set at a predetermined cut off pulling tension as specified by the designer. The cable will be connected to the winch rope, using approved suitably sized and rated cable pulling stocking & swivel and a pulling head, fitted by the cable manufacturer. A sponge may also be secured to the winch rope to disperse lubricant through the duct. Lubrication is also applied to the cable in the joint bay before it enters the duct.
- Once the “two sections” of cable (total of 6 conductors) are pulled into the joint bay, a jointing container is positioned over the joint bay and the cable jointing procedure is carried out in this controlled environment.
- Following the completion of jointing and duct sealing works, place, and thoroughly compact cement-bound sand in the joint bay, in approximately 200mm layers to the level of the cable joint base to provide vertical support. Install additional layers of cement-bound sand and compact each layer until the cement-bound sand is level with the top of the joint. Install an additional 100mm cement-bound sand layer. Install cable protection strip. Backfill with cement-bound sand to a depth of 250mm below surface and carry out permanent reinstatement including placement of warning tape at 400mm depth below finished surface.

#### *2.2.2.6 Watercourse Crossings Along the Grid Connection*

The grid connection cable route includes 1 No. bridge crossing (TII bridge: WD-N72-007.00) which will be completed using horizontal directional drilling (HDD). Where the cable route intersects with existing watercourses, a detailed construction method statement will need to be prepared by the Contractor prior to the commencement of construction and is to be approved by the Local Authority and relevant environmental agencies. Minor watercourse crossing locations have been noted along the cable route in the form of culverts, pipe drains and minor field drains. Crossing of these existing culverts will be as per undercrossing or overcrossing methods, depending on the depth of the culvert or using open trenching.

Inland Fisheries Ireland have published guidelines relating to construction works along water bodies entitled 'Requirements for the Protection of Fisheries Habitats during Construction and Development Works at River Sites", and these guidelines will be adhered to during the construction of the development.

The river crossings associated with the cable route are presented in Table 2-7:

**Table 2-8: River Crossings on the GCR**

| Watercourse Name | Coordinates: ITM | Road Name | Crossing Type |
|---|---|---|---|
| Watercourse 1 - Coligan River (COLLIGAN_040) | 623170.967, 595184.165 [Cable route Chainage 550m] | N72 - Bridge Crossing (TII bridge: WD-N72-007.00) | There is insufficient cover available to allow the ducts to be installed in the bridge deck. Therefore, the watercourse will be crossed by Horizontal Directional Drilling (HDD) to pass under the bridge and riverbed. Entry and exit pits will be within the N72 road corridor. |
| Watercourse 2 - Ballynaguilkee Lower stream (FINISK_020) | 620455.928, 603348.975 [Chainage 10,550m]. | L1041 | Existing culverted stream. The preferred crossing method is using a culvert undercrossing or overcrossing method which will be selected based on the cover available above the culvert. Culvert crossings have been designed in line with ESB specifications. Where it is not possible to cross under an existing culvert while maintaining the culvert in place, the culvert may be replaced. All reinstatement works will be carried out to the required Waterford City & County Councils specification and in line with the 'Guidelines for Managing Openings in Public Roads – 2017'. |
| Watercourse 3 - Unnamed tributary of the Skeheens Stream (COLLIGAN_010) | 621231.261, 608261.270 [Cable route Chainage 15,500m] | Unnamed road at a staggered crossroads (Bryan's Crossroads) | GCR: The cable will exit the public road and enter privately owned lands which are in agricultural use. Here the cable will cross the stream utilising a Horizontal Directional Drilling (HDD stream undercrossing). Entry and exit pits will be within the adjacent agricultural lands. |

| Watercourse Name | Coordinates: ITM | Road Name | Crossing Type |
|---|---|---|---|
| | | | TDR: the route will exit the public road and enter privately owned lands. The stream will be crossed using a temporary piped culvert crossing. |
| Watercourse 4 - Skeheens Stream (COLLIGAN_010)) | 622466.431, 609322.014 [Cable route Chainage 17,950m] | On the access road within the Wind Farm Site. | The crossing is an existing river ford (shallow point where a river or stream may be crossed by wading, or inside a vehicle getting its wheels wet) on the existing forestry track. The riverbed has been modified and raised to allow this crossing. This crossing will be upgraded as part of the Proposed Development by replacement with an open-bottomed culvert. The cable ducting will be installed above the culvert. |

#### 2.2.2.6.1 Horizontal Directional Drilling (HDD) Operations

Horizontal Direction Drilling (HDD) will be employed at 3 no. locations along the GCR:

- HDD of the N72 - Bridge Crossing (TII bridge: WD-N72-007.00) at Watercourse 1 - Coligan River (ITM 623170.9678, 595184.1652)
- HDD of cattle undercrossing on the L5068 (ITM 620475.1496, 599734.4383)
- HDD in private lands of Watercourse 3 - Unnamed tributary of the Skeheens Stream (ITM 621231.2615, 608261.2700)

HDD is a method of drilling under obstacles such as bridges, railways, water courses, etc. in order to install cable ducts under the obstacle. This method is employed where installing the ducts using standard installation methods is not possible. There are two bridges on this GCR route which will require HDD due to insufficient cover and depth in the bridge to cross within the bridge deck.

A specialist contractor will be appointed to prepare a Methodology Statements of works, prepared by the and submitted to the local and relevant authorities associated with the Proposed Development.

The drilling methodology is as follows:

- A works area of circa. 150m$^2$ will be fenced on both sides of the river crossing, all within the road corridor.
- Fuels, lubricants and hydraulic fluids for equipment use on Site will be carefully handled to avoid spillage, properly secured and provided with spill containment kits in case of incident.
- The timing of grid connection cable laying will be carried out during metrologically dry seasons/periods and HDD on the stream crossing will not be carried out during the salmonid spawning season.
- The depth of the bore will be at least 3m below the level of the public road and stream bed so as not to conflict with the road drainage and watercourse;
- Inert, biodegradable drilling fluid will be used;
- There will be no refuelling within 50m of the watercourse.

- The drilling rig and fluid handling units will be located on one side of the bridge and will be stored on double bunded 0.5mm PVC bunds which will contain any fluid spills and storm water run-off.
- Entry and exit pits (1m x 1m x 2m) will be excavated using an excavator. The excavated material will be temporarily stored within the works area and used for reinstatement or disposed of to a licensed facility.
- A 1m x 1m x 2m steel box will be placed in each pit. This box will contain any drilling fluid returns from the borehole.
- The HDD pilot bore will be undertaken using a wireline guidance system. Assembly will be set up by the drilling team and steering engineer.
- A comprehensive monitoring system will be established to closely oversee any procedures involving bentonite, encompassing the careful observation of pumping pressure, the precise formulation of drilling mud (including drilling fluid volume), and the accurate measurement of mud returns.
- Fluid return lines used in HDD process will be tested for leaks prior to use to check their reliability.
- The pilot bore will be drilled to the pre-determined profile and alignment under the watercourse crossings.
- The steering engineer and drill team will monitor the drilling works to ensure that modelled stresses and pressures are not exceeded.
- The drilled cuttings will be flushed back by drilling fluid to the entry and exist pits and re-cycled for re-use.
- Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit side which will then be pulled back to the entry side as part of the pre-reaming/hole opening process to enlarge the hole to the correct size.
- When the pre-reaming/hole opening/hole cleaning has been completed, a reamer of slightly smaller diameter than the final cut will be installed on the drill string to which the ducts will be attached for installation. The steel boxes will be removed, with the drilling fluid disposed of to a licensed facility.
- The ducts will be cleaned and proven, and their installed location surveyed.
- The entry and exit pits will be reinstated to the specification of ESB Networks, EirGrid, Waterford City & County Councils & landowner.
- A joint bay/transition coupler/ transition chamber will be installed at either side of the bridge following the horizontal directional drilling as per EirGrid requirements, this will join the HDD ducts to the standard ducts.

In the case of HDD operations within the public road corridor, the works will be carried out in accordance with measures described in the Traffic Management Plan contained within the CEMP. Appropriate road opening licences will be in place.

See the 110kV Grid Connection Outline Construction Methodology in Appendix 2.1, CEMP for further details on GCR construction.

### 2.2.3 Turbine Delivery

Large components associated with the wind farm construction e.g. turbine blades and tower sections, will be transported to site via the identified turbine delivery route (TDR). A substation transformer unit will be transported to site which will be categorised as an abnormal load. As a result, an abnormal load permit will be sought for this movement. Multiple transformers have already been delivered to ESBN substations in the area without any impact on the structures along the road network.

The proposed turbine delivery route is presented in Figure 2.3 and is 73.2 km in length. A Delivery Route Selection and Assessment was carried out to identify the optimum delivery route to site and is presented as Appendix 2.2 in Volume III of this EIAR.

The proposed access route to Site is as follows:

- Loads will depart the Port of Waterford (Belview) and travel along the N29, taking the third exit on the Slieverue Roundabout to continue on the N29;
- Loads will proceed to the Luffany Roundabout where they will take the first exit onto the N25;
- Loads will travel west on the N25;
- Loads will continue west onto the N72;
- Loads will depart the N72 and head north on the R672;
- Loads will depart the R672 right near Touraneena onto the L5119;
- Loads will continue north-east on the L5119 to the proposed site entrance.

The objective will be to maintain the strategic capacity and safety of the N29, N25 and N72 carriageways at all times, cognisant of the National Development Plan, 2021 – 2030, with key sectoral priorities for maintaining the N25 and N72 national road network to a robust and safe standard for users.

Temporary accommodation works will be required at selected locations along the TDR to facilitate the delivery of large components to the site. No permanent road widening or junction accommodation works are required along the turbine delivery route. Some temporary hardcore surfacing will be required at roundabouts or areas of oversail. All temporary accommodation works associated with the TDR will be fully reinstated following the construction stage.

Overhead utilities and obstructions will need to be removed at several locations to provide adequate overhead clearance. The removal of overhead utilities will be by either temporary disconnections or permanent re-routing. Such works will be carried out by the utility providers in advance of turbine delivery to site. Further details and assessment of these works are provided in Chapter 14- Traffic and Transportation.

Temporary accommodation works will only be required during the operational phase in the unlikely event of a major turbine component replacement. The temporary accommodation works will not be required for the decommissioning phase as turbine components can be broken up on site and removed using standard HGVs.

Elements of the temporary accommodation works for the delivery of turbines are summarised below. Works within private lands at PoI 17 and PoI 26 are included within the planning application red line boundary. All other works are within the road.

**Table 2-9: Accommodation Works on Delivery Route**

| POI Ref. | Description of Works |
|---|---|
| **POI 02: N29 / R711 Slieverue Roundabout** | Load bearing surface through the centre of the roundabout island. Temporary removal of road signage. |
| **POI 03: N29 / N25 Luffany Roundabout** | N29 / N25 Luffany Roundabout - Preparation of local load bearing surfaces for vehicle over-run. Temporary removal of all obstruction including road signage and street lighting. |
| **POI 05: N25 / R680 Carrick Road Roundabout:** | Load bearing surface through the roundabout and temporary removal of road signage. |
| **POI 06: N25 / N72 Junction** | Preparation of local load bearing surface through built out green area. Removal of road signage. |
| **POI 07: R672 / N72 Junction** | Preparation of local load bearing surface through cycle lane and ghost island hatched area. Temporary removal of all street furniture along cycle lane to facilitate vehicle overrun and to avoid local monument. |
| **POI 08: N72 / R672 Junction** | Preparation of local load bearing surface through cycle lane and pedestrian footway. Temporary removal of all street furniture. |
| **POI 10: R672 Colligan** | Load bearing surface to be laid and the road bollard to be temporarily removed. |
| **POI 12: R672 Colligan** | Load bearing surface to be laid. Hedge, wall section and fence may need to be removed and reinstated (to be determined at a later date and appropriate consents sought in advance of works). |
| **POI 13: R672 West of Colligan** | A load bearing surface should be laid, and one traffic bollard should be removed. |
| **POI 14: R672 North of Garrycline** | Load bearing surface to be laid. Trees and vegetation may need to be removed (to be determined at a later date and appropriate consents sought in advance of works). Road signage to be temporarily removed |
| **POI 15: West of Colligan** | Load bearing surface to be laid. Temporary removal of all street furniture. Trailer suspension raise to oversail the verge. The fence and vegetation may need to be removed and reinstated (to be determined at a later date and appropriate consents sought in advance of works). |
| **POI 26: R672 Clooncogaile Cross Roads** | Loads to **utilise third party land** to the north of the road where a load bearing surface will be laid. Ditches will be temporarily culverted and the verge reprofiled. Fences and road signage will be temporarily removed and reinstated. Included in Proposed Development Red Line Boundary. |
| **POI 27: Unclassified Road east of Clooncogaile Cross Roads** | Trees and vegetation may need to be cut (to be determined at a later date and appropriate consents sought in advance of works) and utility pole to be temporarily removed. |
| **POI 28: Ford's Cross Roads** | Utility pole to be temporarily removed and road to be widened. |

| POI Ref. | Description of Works |
|---|---|
| **POI 17: Bryan's Cross Roads** | Will require **third party land** take. Temporary stream crossing and load bearing surface. Temporary removal of fencing and cutting of hedgerow. Included in Proposed Development Red Line Boundary. |
| **POI 18: Sweep Crossroads** | Trailer suspension raise to oversail stone wall. Utility pole and hedge may need to be removed (to be determined at a later date and appropriate consents sought in advance of works). |
| **POI 19: West of Blaentasour** | Road widening required to a minimum driveable surface of 4.5m and clearance of 5.5m corridor. Vegetation trimming may be required (to be determined at a later date and appropriate consents sought in advance of works). |

All overhead utilities and obstructions will be removed at any locations that the swept path analysis indicated possible conflict and where the lifting trailer is raised, namely at R672 Hickeys Cross road and at the Sweep Crossroads. The removal of overhead utilities will be either temporary disconnections or permanent re-routing. Such works will be carried out by the utility providers in advance of turbine delivery to site.

A traffic management plan will be agreed with Waterford City and County Council in advance of any such works. Any trenching and road reinstatement works associated with utility diversions will be subject to a road opening license and is expected to be carried out in such a way as to ensure one lane of traffic will be open to traffic at all times. Such works will be carried out over a number of days (estimated 1 day per service).

The schedule of turbine component deliveries will be determined by the turbine supplier however it is reasonable and worst case to assume that five convoys will be required to deliver all of the turbine components to site over the course of the turbine installation works which is expected to take place over the course of 5 months. This is based on a total of 7 no. loads per turbine to deliver blades, tower sections and nacelles, with each convoy consisting of components for two turbines at a time. Over the course of the 5 -month installation period, it has been assumed convoys will be scheduled to deliver components to site every 4 weeks. The impact on residents and businesses is assessed in Chapter 6, Population, Human Health and Material Assets.

## 2.3 Construction

### 2.3.1 Construction Activities

In the event that the Planning Authority decides to grant planning permission for the Proposed Development, tree felling, upgrading of existing site tracks and the provision of new site tracks will precede all other activities. Drainage infrastructure will be constructed in parallel with the track construction. This will be followed by the construction of the turbine hardstanding areas and foundations.

In parallel with these works the on-site electrical works i.e., the sub-station and internal cable network as well as off-site connection works to the national grid will be completed. Construction techniques are outlined in the CEMP in Appendix 2.1.

The hours of construction activity for the Proposed Development will be limited to avoid unsociable hours as per Section 8.5 (d) of the code of practice for BS 5228: Part 1: 1997. Construction operations will generally be restricted to between 08:00 hours and 19:00 hours Monday to Saturday. It should be noted that it may be necessary to commence turbine base concrete pours earlier due to time constraints incurred by the concrete curing process. Work on Sundays or public holidays will only be conducted in exceptional circumstances or in an emergency. Additional emergency works may also be required outside of normal working hours as quoted above. Further details on working hours and restrictions of same are provided in the CEMP in Appendix 2.1.

### 2.3.2 Construction Programme

The construction of the Proposed Development in its entirety is expected to take 24 months. The proposed construction programme upon which assessments in the EIAR have been based is presented hereunder.

| Activity | Month | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Mobilisation and site setup | | | | | | | | | | | | | | | | | | | | | | | | |
| Site clearance and felling | | | | | | | | | | | | | | | | | | | | | | | | |
| Internal access tracks | | | | | | | | | | | | | | | | | | | | | | | | |
| Turbine hard standings | | | | | | | | | | | | | | | | | | | | | | | | |
| Turbine foundations | | | | | | | | | | | | | | | | | | | | | | | | |
| TDR accommodation works | | | | | | | | | | | | | | | | | | | | | | | | |
| Turbine Installation | | | | | | | | | | | | | | | | | | | | | | | | |
| Onsite substation | | | | | | | | | | | | | | | | | | | | | | | | |
| Grid connection cable works | | | | | | | | | | | | | | | | | | | | | | | | |
| Private electrical network | | | | | | | | | | | | | | | | | | | | | | | | |
| Landscaping, reinstatement, demobilisation | | | | | | | | | | | | | | | | | | | | | | | | |

### 2.3.3 CEMP

A Construction and Environmental Management Plan (CEMP) is contained in Appendix 2.1 of Volume III.

The CEMP sets out the key environmental management measures associated with the construction, operation and decommissioning of the Proposed Development, to ensure that during these phases of the Proposed Development, the environment is protected, and any potential impacts are minimised. The CEMP will be developed further at the construction stage, on the appointment of the main contractor to the Proposed Development to address the requirements of any relevant planning conditions, including any additional mitigation measures that are conditioned.

The CEMP document is divided into six sections:

- Section 1: Introduction provides details on the existing site and the Proposed Development.
- Section 2: Existing Site Environmental Conditions provides details of the main existing geotechnical, hydrological, ecological and archaeological conditions onsite. These conditions will be considered by the Contractor in the construction, operation and decommissioning of this Proposed Development and the prescribed measures complied with.
- Section 3: Overview of Construction Works, this section provides an overview of the construction works proposed and drainage and sediment controls to be installed.
- Section 4: Environmental Management Plan (EMP), this section outlines the main requirements of the EMP and outlines controls for the protection of the environment for example soil management, waste management, traffic management, site drainage management, site reinstatement & decommissioning, habitat and archaeology management etc.
- Section 5: Safety & Health Management Plan, this section defines the work practices, procedures and management responsibilities relating to the management of health and safety during the design, construction and operation of the Proposed Development.
- Section 6: Emergency Response Plan contains predetermined procedures to ensure the safety, health and welfare of everybody involved in the Proposed Development and to protect the environment during the construction phase of the Proposed Development.

### 2.3.4 Traffic Management

A careful approach will be taken to planning the entirety of the works associated with the Proposed Development to ensure minimal impacts on road users and the public.

A Traffic Management Plan will be adopted, in consultation with Waterford City and County Council, to provide a safe environment for road users and construction workers. A Traffic Management Plan is contained in the CEMP. In the event permission is granted for the Proposed Development the Traffic Management Plan will be finalised following the appointment of the contractor for the main construction works to address the requirements of any relevant planning conditions, including any additional mitigation measures that are conditioned and will be submitted to the planning authority for agreement.

**Construction Haul Routes**

The stone required for the construction of the internal access roads will be sourced from within the on-site borrow pit and as such will significantly reduce the need for road haulage from local quarries.

The Site is surrounded by a comprehensive road network with routing options available via the main Site entrance to the west of the Site. Access to the proposed substation compound will be facilitated via the main Site entrance along internal access tracks and the location of the met mast will be accessed from the south. The proposed haul routes for the delivery of materials associated with the construction of the Proposed Development are outlined in Figure 14.3, Volume IV.

Construction deliveries from the south will use the L-5119 and the undesignated local road as the designated delivery routes for the Site which will likely be accessed via the N72 and the R672. Deliveries from the north will also use the L-5119 and undesignated local road near the Site entrance as the designated delivery route which will be accessed via the M8, the N24, the L-3214, the R665, and the R671. The haul routes are primarily along national secondary and regional roads, with additional local roads leading to the Site. In order to reduce two-way construction vehicle movements on local roads, it is proposed that all general construction delivery vehicles enter the Site via the L-5119 and the Undesignated Local road and exit the Site via the Undesignated Local Road and continue south at Renadampaun towards Lagg onto the L-1041 and rejoin the R672 at Beary's Cross.

**Dust Suppression**

In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and the construction compound to prevent the generation of dust. Silty or oily water will not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser movements will be carefully monitored, as the application of too much water may lead to increased runoff. A site speed limit will also be adhered to which will assist in suppressing dust on the Proposed Development site.

**Vehicle Washing**

Wheels or vehicle underbodies are often washed before leaving sites to prevent the build-up of mud on public (and site) roads. A vehicle or wheelwash facility will be provided at the Proposed Development and will be used where required. The site roads will be well finished with non-friable, compacted hardcore, and so the public road-going vehicles will not be travelling over soft or muddy ground where they might pick up mud or dirt. A road sweeper will be available if any section of the public roads were to be dirtied by trucks associated with the Proposed Development.

### 2.3.5 Soil and Peat Management

Management of all excavated soils and peat will be carried out in accordance with the Soils Management Plan contained Volume III.

### 2.3.6 Surface Water Management and Site Drainage

Site drainage at the Coumnagappul Wind Farm will implement Sustainable Drainage Systems (SuDS). This design approach ensures that existing drainage patterns will be maintained throughout the site.

An appropriate drainage design as proposed for this development is the primary mitigation measure for the protection of waterbodies, incorporating silt protection infrastructure and control measures to reduce the rate of surface water runoff from the wind farm site.

The drainage system will be constructed alongside all turbine hardstands, internal access tracks, substation and the temporary construction compound. The drainage system for the existing tracks and roads will largely be retained. Where the roads require widening, this will involve the re-location of existing roadside swales to allow for widening.

As standard and best practice approach, surface water runoff attenuation and drainage management are key elements in terms of mitigation against impacts on surface water bodies.

Two distinct methods will be employed in the management of construction surface water runoff. The first method involves keeping clean water clean by avoiding disturbance to natural drainage features, minimising any works in or around drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waste from works areas within the site that might carry silt or sediment, and to route them towards settlement ponds prior to controlled diffuse release over vegetated natural surfaces. There will be no direct discharge to surface water.

'Clean' water is separated from 'dirty' water utilizing interceptor drains as illustrated in Image 2-2 below. The interceptor drains will be installed on the upslope side of the construction area. This will reduce the amount of water from the construction area that will need to be treated before it can be safely discharged into the environment. Collected clean water will be carried under wind farm infrastructures by cross drains at regular intervals to ensure the original hillside flow is not impeded. The maximum distance between the cross drains will be 250m. The cross drains will be connected to a diffuse outfall to allow collected water to disperse overland.

The proposed access tracks will be constructed from a permeable aggregate material which allows the runoff to infiltrate underground. The excess water will drain into the swales which will be connected, during the construction stage, to the settlement ponds. The settlement ponds will have a diffuse outfall which will disperse the flow across the site. On completion of the works the settlement ponds will be filled in and the swales will be connected to a diffuse outfall.

The proposed access roads and associated drainage infrastructure will follow contours as much as possible to reduce the gradient of the road and road drains (swales). This will reduce velocities within the swales, and consequently erosion.

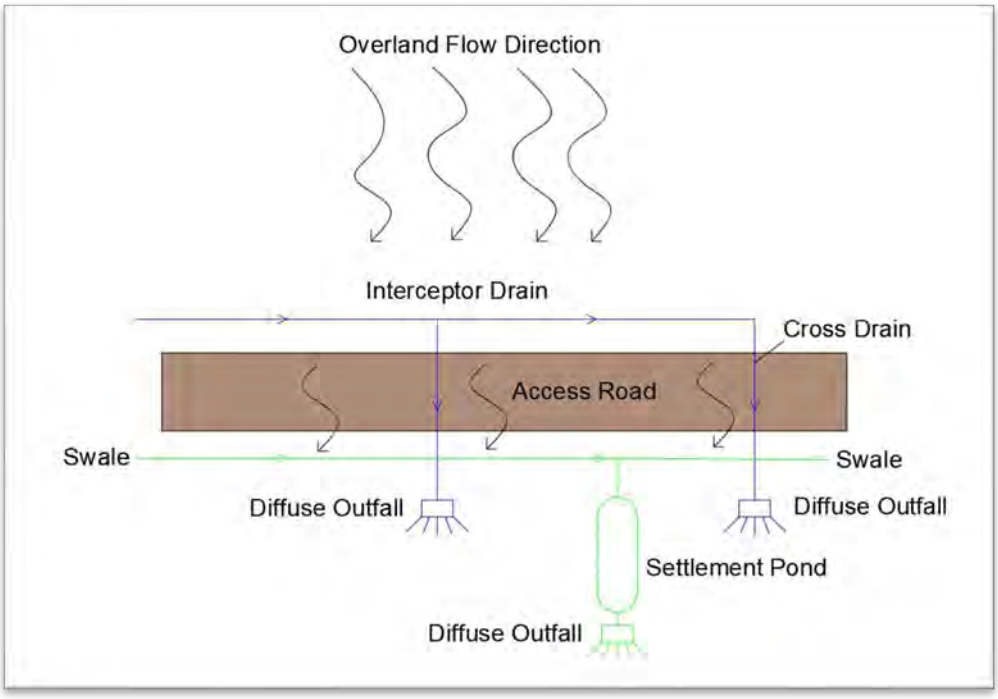


**Image 2-2: Drainage Diagram**

The settlement ponds will be designed in the accordance with CIRIA C648. The volume of a settlement pond is related to the area draining into it. Any upslope runoff from site will be diverted from ponds. This is achieved by interceptor drains as discussed above.

Suspended solids will settle out only when the water is still. It is necessary to retain the water in the settlement pond for several hours to allow the suspended solids to settle out. Retention time depends on the particle size, disturbance of the water, depth of water, temperature and particle density. Retention time of 2h is applied for designing the ponds as outlined in CIRIA C648. This will allow silts to settle out.

CIRIA C648 recommends designing the outfall from the ponds to accommodate 1 in 10 years storm event, for this Proposed Development the outfalls will be designed to accommodate flows associated with 1 in 100-year event. The settlement ponds will be 1.0m deep. The proposed size of the settlement ponds is provided in the Surface Water Management Plan (SWMP) contained in the CEMP in Appendix 2.1, Volume III.

The existing access roads, where required, will be upgraded. Where the existing drainage infrastructure does not prevent mixing of clean and dirty water, it is proposed to improve drainage at these locations by implementing drainage methodology proposed for new access roads.

Further details on hydrology and drainage are contained in Chapter 12 Hydrology and Water Quality, the Surface Water Management Plan (SWMP) which is contained in the CEMP in Appendix 2.1 and on accompanying planning application drawings. The proposed drainage is shown on Planning Drawings Series- 0100 and 0500.

### 2.3.7 Waste Management

A Waste Management Plan for the Proposed Development has been included in the CEMP, Volume III.

The Developer, in conjunction with appointed contractor, will prevent, reduce, reuse and recover as much of the waste generated on site as practicable and ensure the appropriate transport and disposal of residual waste to off-site licensed facilities. The location of these facilities are identified in **Error! Reference source not found.**. This is in line with the relevant National Waste Management Guidelines and the European Waste Management Hierarchy, as enshrined in the Waste Management Act 1996, as amended.

Any waste generated during the Proposed Development construction phase will be collected, source separated and stored in dedicated receptacles at the temporary compound during construction. It will be the responsibility of the contractor for the main construction works (when appointed) to nominate a suitable site representative such as a Project Manager, Site Manager or Site Engineer as Waste Manager who will have overall responsibility for the management of waste.

**Table 2-10: Licensed Waste Facilities in the Vicinity of Coumnagappul Wind Farm**

| Licensed Waste Facility Location | Type of Waste |
|---|---|
| Tony Kirwan Civil Engineering Contractors Ltd. Ballycraddock, Kilmeaden, Co. Waterford | Soil and stones |
| Kilbarry Developments Ltd. Lacken Road, Kilbarry, Co. Waterford | Soil and stone |
| Kereen Quarries Ltd. Kereen Lower, Cappoquin, Co. Waterford | Iron and steel, concrete, bricks, tiles and ceramics, mixture of concrete, bituminous mixtures, ferrous metal. |
| BIGbin Waste Tech Ltd. Circle K garage, Kilrush, Dungarvan, Co. Waterford | Bbiodegradable kitchen and canteen waste, mixed municipal waste |
| Friends of the Earth (Skip & Fuels) Ltd. Carriganard, Six Cross Roads, Co. Waterford | Paper and cardboard packaging, wooden packaging, concrete, bricks, wood, plastic, mixed construction and demolition wastes, plastics, metals, soil and stones, mixed municipal waste, bulky waste. |

Typical waste quantities generated during construction of similar-sized developments are included hereunder with typical recovery / reuse that can be achieved.

**Table 2-11: Typical Waste Quantities for Wind Farm Development**

| | | Reuse | | Recycle/Recovery | | Disposal | |
|---|---|---|---|---|---|---|---|
| Waste Type | Tonnes | % | Tonnes | % | Tonnes | % | Tonnes |
| Mixed C&D | 1200 | 10 | 120 | 80 | 960 | 10 | 120 |
| Timber/Wood | 1000 | 40 | 400 | 55 | 550 | 5 | 50 |
| Plasterboard | 360 | 30 | 108 | 60 | 216 | 10 | 36 |
| Metals | 300 | 85 | 255 | 10 | 30 | 5 | 15 |
| Concrete | 200 | 20 | 40 | 65 | 130 | 15 | 30 |
| Other | 540 | 20 | 108 | 60 | 324 | 20 | 108 |
| Total | 3600 | | 1031 | | 2210 | | 359 |

### 2.3.8 Temporary Site Compound

During the construction, it will be necessary to provide temporary facilities for construction personnel. Two temporary site compounds, the locations of which are shown on Figure 2.2, Volume IV will be constructed. Wheel wash facilities will be provided within the site near the site entrance point.

Facilities to be provided in the temporary site compounds will include the following:

- site offices, of Portacabin type construction;
- Portaloos;
- bottled water for potable supply;
- a water tanker to supply water used for other purposes;
- canteen facilities;
- material/non-fuel storage areas;
- employee parking;
- bunded fuel storage
- contractor lock-up facility;
- diesel generator;
- waste management areas.

The construction compounds will be established by removing topsoil down to a firm substrate, laying down geotextile material and then constructing a working surface of stone sourced from within the Site, and surrounded by security fencing. The topsoil will be removed and stored in accordance with the Spoil Management Plan contained within the CEMP in Appendix 2.1.

Temporary facilities will be removed, and the lands reinstated on completion of the construction phase.

## 2.4 Operation

Wind farm commissioning can take in the region of three months to complete from the erection of the final turbine to the commercial exportation of power to the national grid. It involves electrical and mechanical testing and control measures to check that the wind farm will perform and export power to the national grid, as designed and commissioning engineers working through an entire schedule of SCADA (Supervisory Control and Data Acquisition).

During the operational period, the turbines will operate automatically on a day-to-day basis, responding by means of anemometry equipment and control systems to changes in wind speed and direction. The turbine manufacturer or a service company will carry out regular maintenance of the turbines. Scheduled services will typically occur twice a year.

The operation of the wind turbines will be monitored remotely, and an operative working from a remote headquarters will oversee the day to day running of the proposed wind farm.

The applicant requests the grant of permission is on the basis of a 40-year operational period from the date of full operational commissioning of the wind farm. With permission for the onsite substation and grid connection sought in perpetuity given that the substation will form part of the national electricity network. Therefore, the substation will be retained as a permanent structure and will not be removed.

40 years is the anticipated minimum useful lifespan of wind turbines which are being produced for the market today. The lifespan of wind turbines has been increasing steadily in recent years and allowing this duration will improve the overall carbon balance of the development, therefore maximising the amount of fossil fuel usage that will be offset by the wind farm. Leaving the wind turbines in-situ until the end of their useful lifespan would be optimum from an environmental viewpoint, particularly in relation to carbon savings.

**Routine Maintenance**

Wind farms are designed to operate largely unattended and during the operational phase the wind farm will normally be unmanned. Each turbine will have its own in-built supervision and control system that will be capable of starting the turbine, monitoring its operation and shutting down the turbine in the case of fault conditions.

Supervisory operational and monitoring activities will be carried out remotely with the aid of computers connected via a telephone modem link.

Visits will be necessary to carry out routine inspection and preventive maintenance. A light vehicle will be required for routine access, occurring about once weekly, and in the event of any unscheduled fault conditions. In the unlikely event of a major component failure, a mobile crane will be required on site.

Routine inspection of the bridge crossings within the Site will be carried out in accordance with EIRSPAN Bridge Management System Routine M45aintenance Manual (Transport Infrastructure Ireland, September 2022)

## 2.5 Decommissioning

On decommissioning, cranes will disassemble the above ground turbine components which will be removed off site for recycling. All the major component parts are bolted together, so this is a relatively straightforward process.

The foundation pedestals will be covered over and allowed to re-vegetate naturally. Leaving the turbine foundations in situ is considered a more environmentally sensible option as to remove the reinforced concrete associated with each turbine would result in environmental nuisances such as noise and vibration and dust.

It is proposed that all the internal site access tracks and turbine hard standings will be left in place. These will continue to be used for forestry and agriculture. Turbine foundation pedestals and hardstanding areas will be covered over with topsoil previously stripped and used for landscaping purposes during the construction stage and left to revegetate naturally.

The temporary accommodation works along the TDR will not be required for the decommissioning phase as turbine components can be dismantled on site and removed using standard HGVs.

Grid connection infrastructure including the on-site substation and ancillary electrical equipment will form part of the national grid and will be left in situ.

The mast will be decommissioned using a similar methodology as the construction except in reverse.

It is expected that the decommissioning phase will take no longer than 6 months to complete.

The key site targets are as follows;

- Ensure decommissioning works and activities have minimal impact/disturbance to local landowners and the local community;
- Ensure decommissioning works and activities have minimal impact on the natural environment;
- Adopt a sustainable approach to decommissioning; and,
- Provide adequate environmental training and awareness for all project personnel.

The key site objectives are as follows;

- Using recycled materials if possible, e.g. soil and overburden material for backfilling and reinstatement;
- Ensure sustainable sources for materials supply where possible;
- Avoidance of any pollution incident or near miss as a result of working around or close to existing watercourses and having emergency measures in place;
- Avoidance of vandalism;
- Keeping all watercourses free from obstruction and debris;
- Correct implementation of the sustainable drainage system (SuDS) drainage design principles;
- Keep impact of decommissioning works to a minimum on the local environment, watercourses, and wildlife;
- Correct fuel storage and refuelling procedures to be followed;
- Good waste management and housekeeping to be implemented;

- Air and noise pollution prevention to be implemented;
- Monitoring of the works and any adverse effects that it may have on the environment. Decommissioning methods will be altered where it is found there is the potential to have an adverse effect on the environment.

**Wind Turbines**

Prior to any works being undertaken on wind turbines, they will be disconnected from the grid by the site operator in conjunction with ESB Networks and EirGrid. The dismantling and removal of wind turbines of this scale is a specialist operation which will be undertaken by the turbine supplier that completed the installation where possible. Turbine dismantling will be undertaken in reverse order to methodology employed during their construction. A number of large-scale cranes will be brought back to site utilising the existing hard stand areas. The dismantling of turbines will be bound by the same safety considerations as was the case during construction in terms of weather conditions where works will not be undertaken during adverse weather conditions and in particular not during high winds.

The turbines will most likely be removed from site in a similar manner to how they were transported to the site originally in extended articulated trucks. The destination of the turbines post decommissioning is unclear at this time and will be subject to an assessment of potential for recovery of parts.

The transport of disassembled turbines from the site will be undertaken in accordance with a Transport Management Plan which will be issued to and agreed with the competent authority at that time as part of a permit application for the delivery of abnormal loads using the local roads under the Road Traffic (Special Permits for Particular Vehicles) Regulations 2007. The Transport Management Plan will provide for all necessary safety measures, including a convoy and Garda escort as required, off-peak turning/reversing movements and any necessary safety controls.

**Turbine Foundations**

On the dismantling of turbines, it is not intended to remove the concrete foundation from the ground. It is considered that its removal will be the least preferred options in terms of having potential effects on the environment. Therefore, the nine turbine foundations will be backfilled and covered with soil material from areas of earthworks. The soil will be spread and graded over the foundation using a tracked excavator and revegetation allowed to occur naturally.

**On-site Underground Cabling (for Turbines)**

The electrical and fibre optic cabling that connects each turbine will be removed from the cable ducting. The cabling will be pulled from the cable duct using a mechanical winch which will extract the cable and re-roll it on to a cable drum. This will be undertaken at each of the joint bays/pull pits along the cable. The road will be excavated using a mechanical excavator at each cable pulling pit location and will be fully re-instated once the cables are removed. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance for an underground element that is not visible.

The 110 kV cable and substation will remain in situ and will become an ESB networks asset and will be part of the national electricity grid and therefore it is not proposed to remove this cable.

### Transport Route Accommodation Works

During the construction of the Proposed Development , a number of road and junction improvements and the provision of a turbine delivery accommodation roadway will have been completed to provide access to the site during turbine delivery. These accommodation areas will likely require reuse during decommissioning and turbine component removal.

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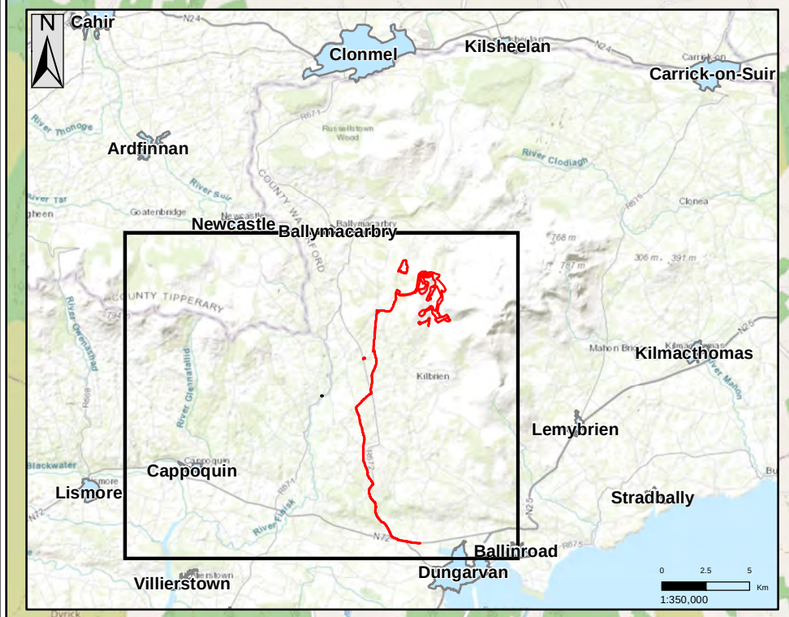


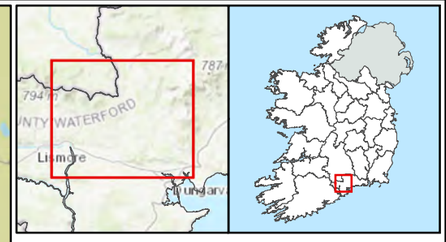


## Legend

- Proposed Development Boundary
- Dungarvan 110kV Substation

| | | | |
|---|---|---|---|
| **TITLE:** Proposed Development Boundary and Location | | | |
| **PROJECT:** Coumnagappul Wind Farm, Co. Waterford | | | |
| **FIGURE NO:** | 2.1 | | |
| **CLIENT:** | EM Power | | |
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FEHILY TIMONEY EMPower

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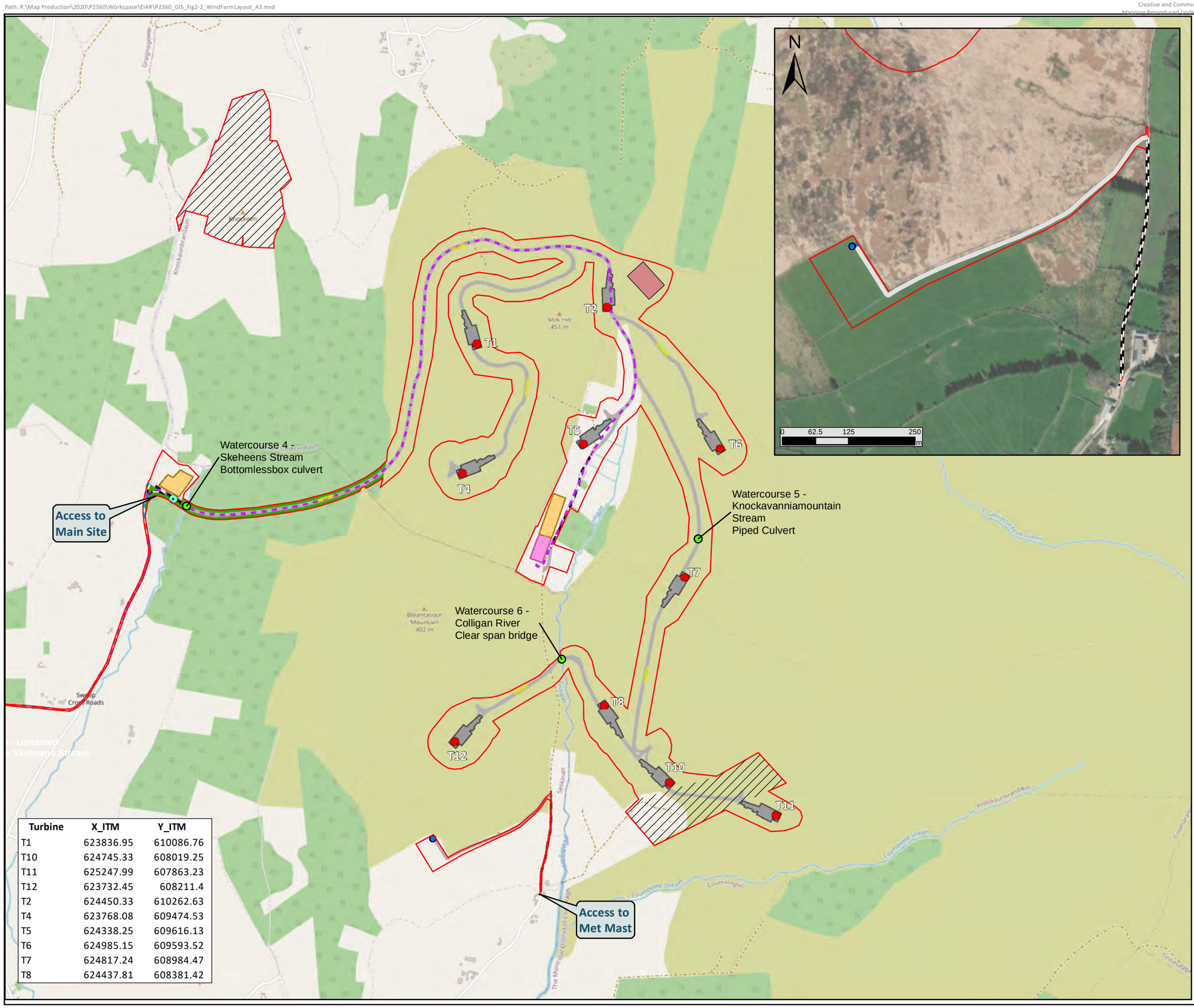


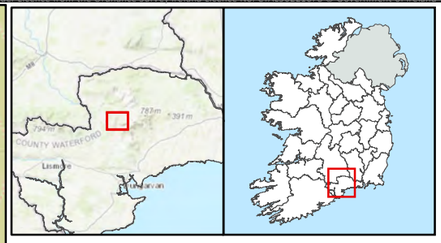


## Legend

- Proposed Development Boundary
- Habitat Enhancement Lands
- Watercourse Crossings
- Met Mast
- Proposed Turbine Location
- Wheel Wash Location
- Existing Tracks to be Uprgraded
- Proposed New Access Track
- Turbine Delivery Route
- Grid Connection Route
- 110kV Substation
- Temporary Construction Compound
- Turbine Hardstanding Area
- Passing Bays
- Borrow Pit / Spoil Management Area
- Area of Forestry Felling

| Turbine | X_ITM | Y_ITM |
|---|---|---|
| T1 | 623836.95 | 610086.76 |
| T10 | 624745.33 | 608019.25 |
| T11 | 625247.99 | 607863.23 |
| T12 | 623732.45 | 608211.4 |
| T2 | 624450.33 | 610262.63 |
| T4 | 623768.08 | 609474.53 |
| T5 | 624338.25 | 609616.13 |
| T6 | 624985.15 | 609593.52 |
| T7 | 624817.24 | 608984.47 |
| T8 | 624437.81 | 608381.42 |

N W E S
0 200 400 800 Meters

| | | | |
|---|---|---|---|
| **TITLE:** | Wind Farm Layout | | |
| **PROJECT:** | Coumnagappul Wind Farm, Co. Waterford | | |
| **FIGURE NO:** | 2.2 | | |
| **CLIENT:** | EM Power | | |
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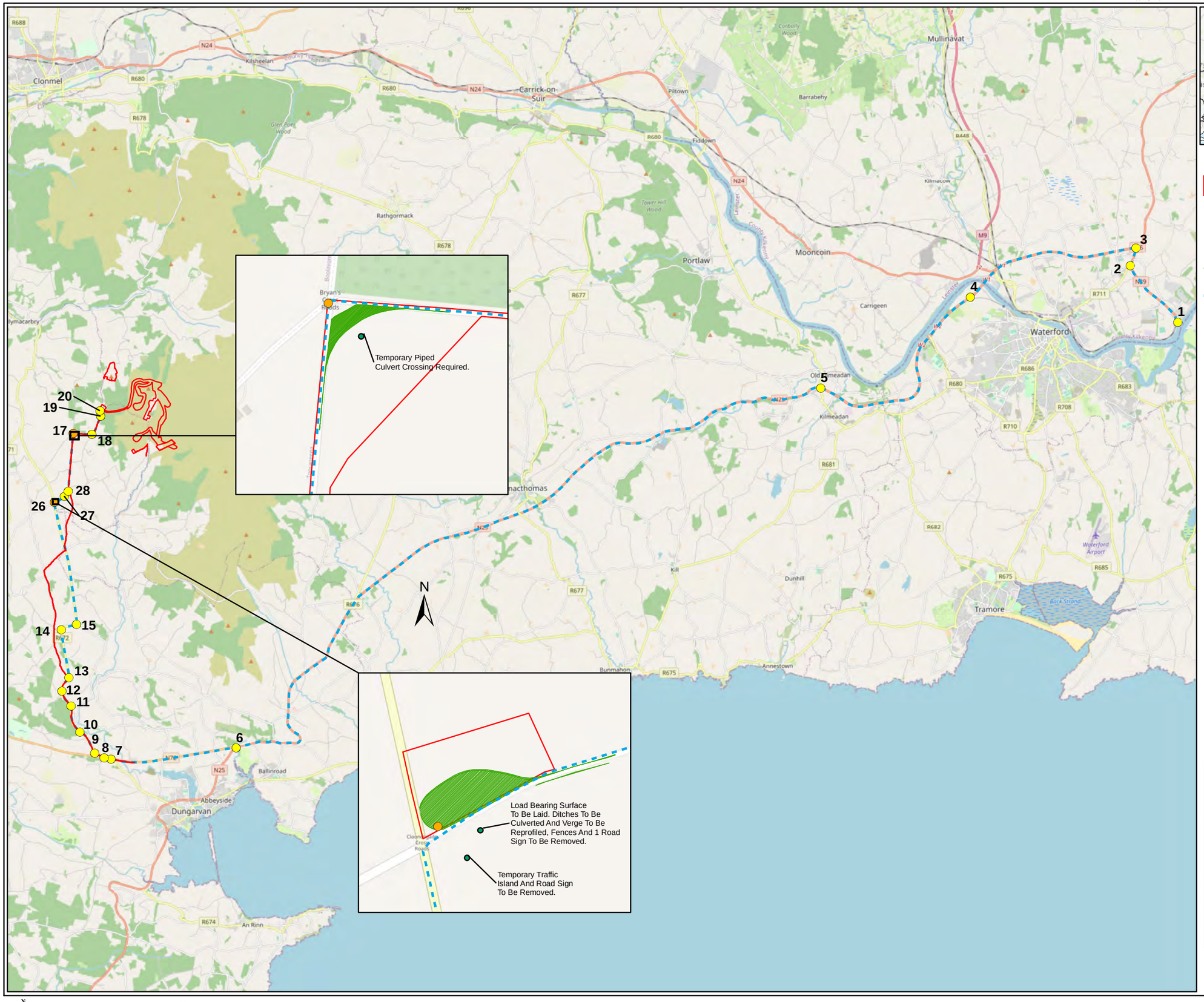


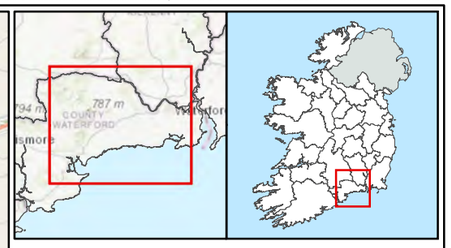

## Legend

- Proposed Development Boundary
- TDR - Points of Interest
- TDR - Accomodation Works
- TDR - Accomodation Works
- Turbine Delivery Route (TDR)

Note: Points of Interest
17 & 26 represent accomodation works.

| | | | |
|---|---|---|---|
| **TITLE:** | Turbine Delivery Route and Accomodation Works | | |
| **PROJECT:** | Coumnagappul Wind Farm, Co. Waterford | | |
| **FIGURE NO:** | 2.3 | | |
| **CLIENT:** | EM Power | | |
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0 1.25 2.5 5 Kilometers

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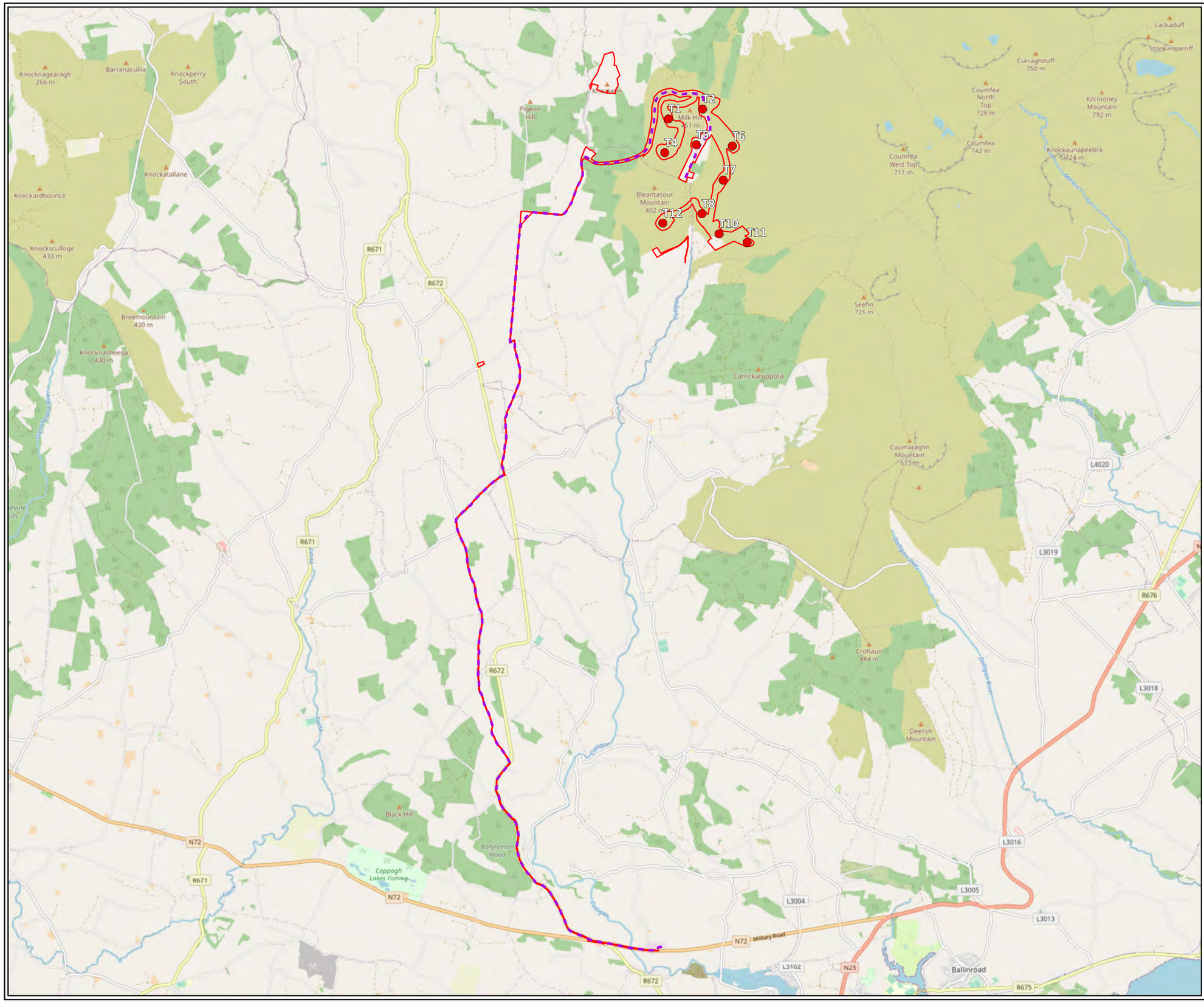


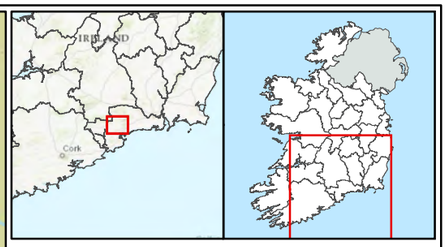


**Legend**

- Proposed Development Boundary
- Proposed Turbine Location
- Grid Connection Route

| | | | |
|---|---|---|---|
| **TITLE:** | Grid Connection | | |
| **PROJECT:** | Coumnagappul Wind Farm, Co. Waterford | | |
| **FIGURE NO:** | 2.4 | | |
| **CLIENT:** | EM Power | | |
| **SCALE:** | 1:67062 | **REVISION:** | 0 |
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FEHILY TIMONEY

MPower

N W E S

0 0.5 1 2 Kilometers

## 2.6 Potential Interactions of the Project with the Natural Environment / Project Impact Factors

Having regard to the guidance set out in '*Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*', (European Commission, 2021), the features of the Proposed Development with potential for interaction with the natural environment are set out relative to the following headings:

- Size / Land-take / Overall Affected Area;
- Physical changes to the environment / change in existing environmental pressures;
- Resource requirements;
- Emissions, wastes and residues;
- Transportation requirements;
- Duration of project
- Operation Phase;
- Cumulative impacts with other projects and plans.

These project features are further examined in defining the likely Zone of Influence (ZoI) of the project and in determining likely potential for significant effects through Source-Pathway-Receptor assessment (Section 3).

**Table 2-12: Proposed Development Features and Potential Impact Factors**

| Project Feature | Description | Potential Impact |
|---|---|---|
| **Size and scale/ Land-take / Overall Affected Area** | *Construction*<br>Site<br><br>Site clearance will be required within and around the wind farm infrastructure to accommodate the construction of turbines, hardstands, crane pads, access tracks and the proposed onsite substation.<br><br>GCR<br><br>The majority of the cable route will be within existing road, with limited requirement for vegetation removal. Where excavation is required within the road verge or road boundary (predominantly hedgerow) to accommodate the installation of the grid cable, the vegetation will be reinstated as part of the Local Authority requirement for road reinstatement. Any disturbance to vegetation will be temporary and localised.<br><br>TDR<br><br>Habitat disturbance to accommodate turbine delivery is limited to laying of temporary hardcore along road verges and grassed areas, lowering of walls, trimming of vegetation, hedgerow cutting and tree felling. There is limited requirement for vegetation removal to accommodate turbine delivery. Vegetation will be reinstated following the works.<br><br>*Operation*<br><br>The site will comprise 10 no. wind turbines with a tip height of 185m and a hub height of 104m. No further excavation works would be required and therefore there will be no further land-take required.<br><br>*Decommissioning*<br><br>Internal site access tracks and turbine hard standings will be left in place. | The construction of access roads, temporary compound, on-site substation, foundations and hard standings as well as the excavation of cable trenches will result in a degree of habitat damage and loss. The habitat loss will be the total area covered by the access tracks (new sections and upgrading of existing tracks), plus the footprint associated with each of the 10 proposed turbines (foundations, hard standings, note the turbines have been positioned such that associated bat felling buffers do not require any tree removal) and all other wind farm infrastructure (refer to Table 2-1).<br><br>The most abundant habitat type within the Proposed Development Boundary is wet heath (57.99 ha). This is followed by dry siliceous heath (51.83 ha) and wet grassland (20.57 ha).<br><br>Approximately 0.11 ha of Improved agricultural grassland (GA1) will be lost within the proposed development footprint. Due to its artificial character and intensive management, GA1 has low intrinsic value in ecological terms and as such is not considered a key ecological receptor. Wet grassland (GS4) is also species poor and heavily grazed onsite and is not a key ecological receptor. Approximately 4.49 Ha of GS4 will be lost within the proposed development footprint.<br><br>A range of semi-natural grassland habitats and mosaics are present in Proposed Development Boundary. In terms of collective loss of all heathland habitats, c. 13.19 ha of this grouping will be lost. The most abundant type, wet heath, will be subject to loss of c. 5.94 ha. It is noted that there will be no loss of Annex I- linked wet heath, with the heath onsite heavily burned and grazed. A Long-term Slight Reversible effect at the Local scale is predicted for this habitat. Dry siliceous heath will be subject to loss of c. 7.25 ha. A Long-term Slight Reversible effect at Local scale is predicted.<br><br>The only woodland habitat loss will apply to conifer plantation, with 5.4 ha of this habitat lost. Commercial conifer plantation, a monoculture commercial crop, is not a key receptor however, due to its artificial nature and low floristic diversity. It has low intrinsic value in ecological terms and as such is not a key ecological receptor.<br><br>Dense bracken, with 1.73 ha of this habitat lost, is not a key receptor, due to its low floristic diversity. The only exposed siliceous rocks habitat loss will apply to the hardstand area of T04, with 0.56 ha of this habitat type lost. This habitat is of low floristic diversity due to burning and grazing and is not considered a key ecological receptor.<br><br>Dense bracken/ Scrub mosaic is also present within the proposed footprint, with 0.1 ha of this habitat type to be lost. This will be due to clearance of the bank vegetation for the clear span bridge crossing. This habitat mosaic will be subject to Permanent Imperceptible Irreversible effects at the Local scale.<br><br>Approximately 150 m of stone wall/hedgerows will be lost within the development footprint at the Site with an additional 100m to be removed at TDR PoI 26. This is considered to translate into a Long-term Moderate Reversible effect at the Local scale.<br><br>The construction compound will require the temporary infilling of wet grassland with aggregate hard standings. This will be in place for the duration of the construction works (expected to take between 24 months). This hardstanding will be removed following the works, and reinstated as wet grassland.<br><br>Vegetation disturbance associated with the GCR and TDR will be localised and temporary. The vegetation to be disturbed is marginal and of low ecological value.<br><br>Decommissioning will reinstate turbine locations with topsoil and allowed to revegetate naturally. |

| Project Feature | Description | Potential Impact |
|---|---|---|
| **Physical changes to the environment / change in existing environmental pressures** | *Construction*<br><br>A number of drainage ditches are intersected by the proposed internal access tracks within the Site. These minor watercourses and drains within the Site will be crossed using interceptor drains and cross drains and will not alter the existing site hydrology.<br><br>Watercourse crossings proposed are as follows:<br>• Watercourse 1 - Coligan River (COLLIGAN_040) – in road HDD cable crossing of N72 - Bridge Crossing (TII bridge: WD-N72-007.00)<br>• Watercourse 2 - Ballynaguilkee Lower stream (FINISK_020) - Existing culverted stream, cable crossing by removing and replacing culvert.<br>• Watercourse 3 - Unnamed tributary of the Skeheens Stream (COLLIGAN_010). cable will cross the stream utilising a Horizontal Directional Drilling (HDD stream undercrossing). Entry and exit pits will be within the adjacent agricultural lands. TDR will also cross this stream using a temporary piped culvert crossing.<br>• Watercourse Crossing 4 - Skeheens Stream (COLLIGAN_010) - Open-bottomed box Culvert to replace existing river ford on forest access track. The river comprises a cobble, gravel, silt and boulder substrate upstream and downstream of the ford. Flows are characterised by riffles and glides. In-stream works will be required to remove the existing concrete ford and replace with appropriate bed material. Bankside works (on existing forest road) will be required for culvert footings.<br>• Watercourse Crossing 5 - Knockavanniamountain Stream tributary of the Colligan River (COLLIGAN_010). Piped Culvert of small stream comprising boulder cobble and gravel. Will require instream works to place the culvert and will result in temporary disturbance to bed material. Note IFI requirements for culverts to be buried 500m below bed level.<br>• Watercourse Crossing 6 - Colligan River (COLLIGAN_010). Clear Span Bridge c. 15m in length. High energy watercourse with bed substrate comprising boulder cobble and gravel. No in-stream works are necessary other than that necessary to divert the river flow (by fluming or overpumping).<br><br>The excavations for turbine foundations can have the effect of temporarily drawing down the local groundwater table. The Scottish Environmental Protection Agency (2017) specifies the zone of influence for Ground Water Dependent Terrestrial Ecosystems (GWDTE) from excavations deeper than 1m to be a 250m buffer around the works area. There are no GWDTE within this zone.<br><br>During construction there will be an increased level of activity within the site with potential for disturbance to species. | There will be a permanent loss of aquatic habitat associated with the installation of culverts within their footprint. There will be some disturbance to the streams/ drains immediately adjacent to the culvert locations caused by excavation. These areas will be reinstated following the culvert installation.<br><br>Construction of the Colligan River bridge crossing and the installation of culverts on the drainage ditches / small watercourses within the Site will result in the permanent loss of habitat within the footprint of the bridge foundations.<br><br>Ruddock & Whitfield (2007) notes that animals' avoidance of humans or human activities can have several adverse effects on their distribution and abundance. The development of the wind farm has the potential to result in displacement of birds /mammals due to on-site construction activities coupled with long-term loss of suitable feeding and/or breeding/wintering habitat associated with site clearance.<br><br>Potential for bird collision with turbine towers, blades (moving or stationary) and/or associated infrastructure; and barrier to dispersal, regular movements or migration for migratory bird species. |
| **Resource requirements** | The stone required for the construction of the internal access roads will be sourced from within the Site borrow pit and from licenced quarries in the vicinity of the Proposed Development. The location of licensed quarries and haulage routes are identified in Chapter 14: Traffic and Transportation and in Figure 14.3, Volume IV of the EIAR. | As the proposed wind farm development is located outside any European site, there are no direct effects as a result of excavation and resource requirements.<br><br>Potential for significant effects has been excluded.<br><br>Potential indirect effects arising from excavations associated with the proposed development are dealt with under Physical Changes and Emissions in this table. |

| Project Feature | Description | Potential Impact |
|---|---|---|
| **Emissions - Dust** | *Construction*<br><br>The principal sources of potential air emissions during the construction of the Site will be from dust arising from earthworks, tree felling activities, trench excavation along cable routes, construction of the new and upgrade of existing access tracks, the temporary storage of excavated materials, the movement of construction vehicles, loading and unloading of aggregates/materials, the movement of material around the site and nutrient release from felled areas.<br><br>*Operation*<br><br>Once the proposed wind farm and grid connection are constructed there will be no significant direct emissions to atmosphere. A diesel generator will be located at the proposed wind farm substation; however, this will only be operated as a back-up/emergency power supply in the unlikely event of an emergency. The emissions expected from the diesel generator include cardon dioxide($CO_2$), nitrogen oxide ($NO_x$), and particulate matter. The generator if in use will produce approximately 2.6kg of $CO_2$ per litre of diesel which is not considered to be significant.<br><br>*Decommissioning*<br><br>The decommissioning phase of the project will have much less potential for dust effects than the construction phase given the reduced level of ground disturbance required.<br><br>There will be truck movements associated with removing the wind turbines from the wind farm resulting in vehicular emissions and also dust.<br><br>However, the number of truck movements would be significantly less than the construction phase. There will also be emissions from machinery on site including for the movement of soil to cover the foundations. | The Institute of Air Quality Management 'Guidance on the Assessment of dust from demolition and construction' (Holman et al, 2014) states that "*Dust can have two types of effect on vegetation: physical and chemical. Direct physical effects include reduced photosynthesis, respiration and transpiration through smothering. Chemical changes to soils or watercourses may lead to a loss of plants or animals for example via changes in acidity. Indirect effects can include increased susceptibility to stresses such as pathogens and air pollution. These changes are likely to occur only as a result of long-term demolition and construction works adjacent to a sensitive habitat. Often impacts will be reversible once the works are completed, and dust emissions cease*". The guidance prescribes potential dust emission risk classes to ecological receptors. The guidance specifies that, for sensitive ecological receptors, sensitivity to dust is 'High' up to 20m from the source and reduces to 'Medium' over 50m from the source.<br><br>The guidance (Holman et al, 2014) also stipulates that trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The windfarm site would be considered a large site, as such the dust effects from tract out are likely to occur within 500m from the site exit. |
| **Emissions - Noise** | *Construction*<br><br>There will be a short-term increase in noise levels during construction (expected to take between 12 - 18 months).<br><br>The main aspects of the construction phase with the potential to generate noise include:<br><br>• the construction of the turbine foundations,<br>• the erection of the turbines,<br>• the excavation of trenches for cables,<br>• the construction of associated hard standings and access tracks, and construction of the substation,<br>• the delivery of the turbine components,<br>• the delivery of construction materials, notably aggregates, concrete and steel reinforcement, and<br>• works associated with grid connection.<br><br>*Operation*<br><br>The wind turbines will introduce a new source of noise to the locality.<br><br>*Decommissioning*<br><br>The main aspects of the decommissioning phase with the potential to generate noise are similar to that of the construction phase, however a number of elements will be left in situ (see above) therefore impacts from noise will be lesser than during construction. | Disturbance to noise varies between species and is dependent on the nature of the noise source and sensitivity of the species e.g. the potential effects of anthropogenic sound on fish can range from direct mortality to no obvious behavioural responses and are dependent on the class of sound i.e. either continuous or impulsive (Popper et al. 2014, Popper & Hawkins 2019). Similarly, for birds disturbance response (e.g. becoming alert or a flight response) can vary depending on season, species sensitivity, and weather.<br><br>The construction and demolition of the proposed wind farm has potential for noise disturbance to terrestrial and aquatic species.<br><br>A level of acclimatisation to noise from the operation of the turbines would be expected over time. |

| Project Feature | Description | Potential Impact |
|---|---|---|
| **Emissions – Water Pollution** | *Construction*<br><br>Vegetation clearance / tree felling, new access tracks and upgrade of existing agricultural tracks, turbine hardstanding areas, the on-site substation, bridge/culvert crossings have the potential to contribute to the increase in runoff from the Site. An increase in surface water runoff from the Site during construction, particularly from areas of exposed soil, has the potential to result in increased sedimentation of the drains and watercourses within the site. Similarly, water in excavations could contain an increased concentration of suspended solids as a result of the disturbance of the underlying soils, dewatering of excavations has a potential to result in sedimentation of nearby drains / watercourses.<br><br>One single-span concrete bridge is proposed within the Site to allow the access tracks to cross the Colligan River. The bridge design is such that it does not require in-stream works for its installation. Notwithstanding this, the site preparation works for the bridge installation will require ground disturbance. Two culverts will be installed on site which will require in-stream works with potential for sedimentation and pollution.<br><br>Three watercourse crossings (an unnamed tributary of Skeheens Stream, Ballynaguilkee_Lower, the Colligan River) are required for the installation of the GCR outside the site. Two of these are along the existing road crossings. The Ballynaguilkee_Lower may require the existing culvert to be removed. The proposed crossing method for the unnamed tributary of Skeheens Stream is by HDD.<br><br>Cement based product will be used in turbine and substation foundations and hardstandings and will also be used for constructing new watercourse /drain crossing structures (in particular for blinding of foundations). Cement-based products could lead to contamination of nearby watercourses.<br><br>Refuelling activities / storage of fuel could result in fuel spillages which could pollute underground and surface water.<br><br>*Operation*<br><br>Due to the grassing over of the drainage swales and revegetation of other exposed surfaces, and the non-intrusive nature of operations, there is a negligible risk of sediment release to the watercourses during the operational stage.<br><br>The proposed development is located within areas of 'Low' susceptibility for slope slippage. There will be further disturbance of overburden post-construction. There is a low probability for slope failure during operation.<br><br>*Decommissioning*<br><br>The internal site access tracks and turbine hard standings will be left in place.<br><br>Grid connection infrastructure including substation and ancillary electrical equipment will form part of the national grid and will be left in situ.<br><br>Temporary accommodation works along the TDR will not be required for the decommissioning phase as turbine components can be broken up on site and removed using standard HGVs. | Sedimentation of watercourses runoff has potential to temporarily degrade the quality of these watercourses and as such reduce the carrying capacity of the watercourses for aquatic species.<br><br>The replacement of a culvert for the GCR will require in stream works, if necessary. This would lead to sedimentation of the downstream watercourses and as such reduce the carrying capacity of the watercourses for aquatic species.<br><br>HDD crossing of a watercourse for the GCR has potential to cause frac-out (an unintentional loss of drilling fluids during a drilling operation) which could result in a degradation of aquatic habitat quality.<br><br>The release of cement / concrete to an aquatic environment can have the effect of altering the levels of pH, nitrate, phosphate, total solid, total suspended solids, total dissolved solids, turbidity and biological oxygen demand in the water. Cement products are particularly harmful to aquatic life due to the associated change in alkalinity in the water, which can cause burns to fish skin.<br><br>Hydrocarbons are toxic to flora and fauna, including fish, and these chemicals tend to be persistent in the environment. It is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in death of aquatic organisms. |
| **Emissions - Waste** | It is envisaged that the following categories of waste will be generated during the construction of the project:<br>• Municipal solid waste (MSW) from the office and canteen<br>• Construction and demolition waste<br>• Waste oil/hydrocarbons<br>• Paper/cardboard<br>• Timber<br>• Steel | Sedimentation runoff has potential to temporarily degrade the quality of the watercourses and as such reduce the carrying capacity of the watercourse for aquatic species.<br><br>The release of generated waste to an aquatic environment can have the effect of altering the levels of pH, nitrate, phosphate, total solid, total suspended solids, total dissolved solids, turbidity and biological oxygen demand in the water. |

| Project Feature | Description | Potential Impact |
|---|---|---|
| | When possible, materials will be re used onsite for other suitable purposes e.g.:<br>• Re-use of shuttering etc. where it is safe to do so;<br>• Re-use of rebar cut-offs where suitable;<br>• Re-use of excavated materials for screening, berms etc.;<br>• Re-use of excavated material etc. – where possible will be used as suitable fill elsewhere on site for site tracks, the hardstanding areas and embankments where possible; | |
| **Transportation Requirements (Refer to Chapter 14 of the EIAR)** | All transport (e.g. plant and deliveries etc) for the Proposed Development will by via road.<br>The construction phase for the entire project will lead to 42,742 additional HGV trips (two-way) over the duration of the construction works.<br>Average daily increase of 92 HGV trips per day over a construction period of 24 months. This increases to an average of 195 HGV trips per day during the peak month which occurs in month 6 of the programme for HGV traffic.<br>An average workforce of 30 persons is anticipated, increasing to 40 persons during peak periods. This is estimated to give rise to an increase of LGV traffic of 44 trips per day on average rising to 56 trips during peak construction periods which occur for LGV traffic during months 6 and 7.<br>The combined HGV and LGV average daily increase is 161 trips per day throughout the construction programme. | A significant air quality impact will not occur due to traffic associated with the proposed wind farm. The increase in traffic volumes fall below the screening criteria set out in the UK DMRB guidance (UK Highways Agency 2007). The guidance states that road links meeting one or more of the following criteria can be defined as being 'affected' by a project and should be included in the local air quality assessment:<br>• Road alignment change of 5 metres or more;<br>• Daily traffic flow changes by 1,000 AADT or more;<br>• HGVs flows change by 200 vehicles per day or more;<br>• Daily average speed changes by 10 km/h or more; or<br>• Peak hour speed changes by 20 km/h or more.<br>The combined HGV and LGV average daily increase is 161 trips per day. Therefore, the model is not required in this instance. |
| **Duration of construction, operation, decommissioning / temporal aspects** | The planning application is for a 10 year planning permission and 40 year operational life from the date of commissioning of the entire wind farm.<br>The construction phase is estimated at 24 months.<br>The decommissioning phase will take no longer than 6 months to complete. | Potential for seasonal displacement of birds due to loss of suitable feeding and/or breeding/wintering habitat during the construction and decommissioning stages. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997).<br>Potential for seasonal displacement of QI species (i.e. otter) due to disturbance during key seasonal stages of the lifecycle during the construction and decommissioning stages. Disturbance to otter can occur up to 150m from the proposed works area (NRA guidance 2008).<br>Potential for displacement of bird species due to the barrier effect of active wind farms, impacting regular movements or migration routes for migratory bird species causing species to exert more energy going around the site and finding new suitable locations.<br>Potential for collision as the turbines will be much greater in height than the existing surrounding landscape. |
| **In-combination with other plans and projects** | The potential impacts of the Proposed Development are considered in combination with other relevant plans or projects within the zone of influence.<br>A search was undertaken for all projects submitted for consent within the last 5 years. The search radius for large and energy project applications (including wind farms and large infrastructure) was 20km from the Site. The search radius for residential applications was 2km from the Site. The search radius for applications along the GCR and TDR was 250m.<br>There is one operational wind farm within 20 km of the proposed development, There are also two privately owned single turbines within 20 km, Tierney and Kilnagrance. There is an additional granted wind farm and a granted private turbine within 20km of the site. A proposed windfarm (by EMPower) is also within 20km of the site. | If the construction of the Site were to occur in parallel with any or all of the projects within the search radius that have connectivity with the same European sites, there is potential for cumulative impacts to occur.<br>The Site and GCR are predominantly located within forestry and agricultural land. Potential impacts could arise if previously fertilised land were to be disturbed and mismanagement allowing nutrients / sediment to escape the site. Cumulative effects could occur if felling and construction activities at the Site are undertaken in parallel with off-site forestry activities (particularly harvesting) and agricultural activities (particularly manure spreading) within the same catchment. |

| Project Feature | Description | Potential Impact |
|---|---|---|
| | Large Scale/Infrastructure Projects include:<br>• Six solar farms<br>• 110kV transmission line<br>• 33kV Grid Connection<br><br>The majority of housing consent applications pertain to one-off residential dwelling or farm building along the regional roads. There are also nine applications for >20 no. residential units.<br><br>Waterford City and County Development Plan:<br><br>The County Development Plan is currently under review. The Waterford City and County Development Plan 2022-2028 has recently been published which will ultimately replace the current Plan once adopted.<br><br>The current plan includes several policies for the protection of wildlife and European sites, encouraging the appropriate assessment of potential effects from future development. | |

# 3 SCREENING FOR APPROPRIATE ASSESSMENT

## 3.1 Introduction

This section of the report aims to determine if the Proposed Development is likely to have a significant effect upon European sites either alone or in combination with other plans or projects in view of the site's conservation objectives.

The screening assessment comprises the following steps:

1. Description of the plan or project subject to assessment (section 2.2 of this report)
2. Existing baseline of the plan or project study area (section 2.1 of this report)
3. Identification of relevant European sites (section 3.2 of this report)
4. Assessment of the likely significant direct, indirect and in-combination effects on the conservation objectives of the European site(s) of concern in relation to the proposed plan or project (Section 3.3 of this report)
5. Screening conclusion (section 3.4 of this report)

**The Proposed Development is not directly connected with or necessary to the management of a European site**.

## 3.2 Identification of European Sites That May be Affected by the Project

European Commission Notice (2021) on the 'Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC, states that in identifying European sites (Natura 2000 sites) which may be affected by the project, the following should be identified:

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

The European sites within the likely zone of influence (ZoI) of the project were identified having regard to CIEEM (2018) 'Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine'. This guideline defines the ZoI as "… the area over which ecological features may be affected by biophysical changes as a result of the Proposed Development and associated activities." The likely spatial and temporal biophysical changes associated with the impacts (which was determined with reference to relevant published literature and guidance documents) are set out in Table 2-12.

However, as a precautionary approach in defining the ecological features which may be affected, an initial buffer of 15km was first examined using Geographic Information System (GIS) Mapping (refer to Figure 9.2) and the conservation interests of these European sites were examined in order to ascertain whether there could be potential physical or ecological connectivity to the project and the associated likely project impacts. Additionally, any European sites beyond the initial 15km buffer with hydrological or physical connectivity were also identified for further examination. The findings of the ZoI assessment are presented in Table 3-1.

**Table 3-1: European Sites Within the Potential ZoI**

| European Site (code) | List of Qualifying Interest/Special Conservation Interest | Distance from Proposed Development (km) | Pathway | Considered further in screening Y/N |
|---|---|---|---|---|
| **Comeragh Mountains SAC (001952)** | Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]<br>Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]<br>Northern Atlantic wet heaths with *Erica tetralix* [4010]<br>European dry heaths [4030]<br>Alpine and Boreal heaths [4060]<br>Blanket bogs (* if active bog) [7130]<br>Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) [8110]<br>Calcareous rocky slopes with chasmophytic vegetation [8210]<br>Siliceous rocky slopes with chasmophytic vegetation [8220]<br>Slender Green Feather-moss (*Hamatocaulis vernicosus*) [6216]<br><br>https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001952.pdf | 0.74 km to closest turbine | No Annex I habitats within the Site, no hydrological connectivity between the Site and the SAC.<br><br>Upstream from any hydrological/ hydrogeological connectivity to TDR and GCR | N |

| European Site (code) | List of Qualifying Interest/Special Conservation Interest | Distance from Proposed Development (km) | Pathway | Considered further in screening Y/N |
|---|---|---|---|---|
| **Nier Valley Woodlands SAC (000668)** | Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]<br><br>https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000668.pdf | 2.9 km to closest turbine | No. Having regard to the spatial scale of the potential project impacts set out in Table 2-12 and given the distance of the European site from project, coupled with the fact that there are no mobile conservation interests associated and there is no ecological continuity between these terrestrial habitats and the project site, the European Site is assessed as outside of the ZoI of the project. | N |
| **Lower River Suir SAC (002137)** | Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]<br>Mediterranean salt meadows (Juncetalia maritimi) [1410]<br>Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]<br>Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]<br>Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]<br>Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]<br>*Taxus baccata* woods of the British Isles [91J0]<br>Freshwater Pearl Mussel (*Margaritifera margaritifera*) [1029] | 4.29km to closest turbine<br>2km in-stream distance from TDR Node 5 (0.3km distance from works to stream across grassland)<br>3.3km in-stream distance from TDR Node 25 | Freshwater aquatic QI habitats and species are highly susceptible to potential changes in water quality as a result of potential emissions to air, water and waste emissions. Otter are also susceptible to disturbance during works.<br>The internal access tracks, turbine hardstandings and GCR are within the same sub-catchment and are hydrologically linked to the SAC.<br>The closest proposed works along the TDR will be non-invasive, being limited to some minor vegetation trimming/ removal and laying of load bearing surfaces.<br>Therefore, it is determined that there is potential for emissions released to the drainage network to ultimately enter the SAC, and disturbance to mobile QIs. Therefore, the SAC is within the ZoI. | Y |

| European Site (code) | List of Qualifying Interest/Special Conservation Interest | Distance from Proposed Development (km) | Pathway | Considered further in screening Y/N |
|---|---|---|---|---|
| | White-clawed Crayfish (*Austropotamobius pallipes*) [1092]<br>Sea Lamprey (*Petromyzon marinus*) [1095]<br>Brook Lamprey (*Lampetra planeri*) [1096]<br>River Lamprey (*Lampetra fluviatilis*) [1099]<br>Twaite Shad (*Alosa fallax fallax*) [1103]<br>Salmon (*Salmo salar*) [1106]<br>Otter (*Lutra lutra*) [1355]<br><br>https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002137.pdf | | | |
| **Blackwater River (Cork/Waterford) SAC (002170)** | Estuaries [1130]<br>Mudflats and sandflats not covered by seawater at low tide [1140]<br>Perennial vegetation of stony banks [1220]<br>Salicornia and other annuals colonising mud and sand [1310]<br>Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]<br>Mediterranean salt meadows (Juncetalia maritimi) [1410]<br>Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] | 5.48 km to closest turbine<br>1.64 km to Grid Connection, downstream distance of 2.2km from closest water crossing | Freshwater aquatic QI habitats and species are highly susceptible to potential changes in water quality as a result of potential emissions to air, water and waste emissions. Otter are also susceptible to disturbance during works.<br>The proposed works along the GCR will be minor, including excavation works to lay cable. Where the GCR crosses the Ballynaguilkee_Lower, the existing culvert will be removed and instreams work required. This may lead to sedimentation of downstream waterbodies.<br>Therefore, it is determined that there is potential for emissions released to the drainage network to ultimately enter the SAC, and disturbance to mobile QIs. Therefore, the SAC is within the ZoI. | Y |

| European Site (code) | List of Qualifying Interest/Special Conservation Interest | Distance from Proposed Development (km) | Pathway | Considered further in screening Y/N |
|---|---|---|---|---|
| | Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]<br>Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]<br>Freshwater Pearl Mussel (*Margaritifera margaritifera*) [1029]<br>White-clawed Crayfish (*Austropotamobius pallipes*) [1092]<br>Sea Lamprey (*Petromyzon marinus*) [1095]<br>Brook Lamprey (*Lampetra planeri*) [1096]<br>River Lamprey (*Lampetra fluviatilis*) [1099]<br>Twaite Shad (*Alosa fallax fallax*) [1103]<br>Salmon (*Salmo salar*) [1106]<br>Otter (*Lutra lutra*) [1355]<br>Killarney Fern (*Trichomanes speciosum*) [1421]<br><br>https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002170.pdf | | | |

| European Site (code) | List of Qualifying Interest/Special Conservation Interest | Distance from Proposed Development (km) | Pathway | Considered further in screening Y/N |
|---|---|---|---|---|
| **Glendine Wood SAC (002324)** | Killarney Fern (*Trichomanes speciosum*) [1421]<br><br>https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002324.pdf | 11.06 km to closest turbine | No hydrological connectivity between Site, TDR Nodes or GCR. Having regard to the spatial scale of the potential project impacts set out in Table 2-12 and given the distance of the European site from project, coupled with the fact that there are no mobile conservation interests associated and there is no ecological continuity between these habitats and the project site, the European Site is assessed as outside of the ZoI of the project. | N |
| **Dungarvan Harbour SPA (004032)** | Great Crested Grebe (*Podiceps cristatus*) [A005]<br>Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]<br>Shelduck (*Tadorna tadorna*) [A048]<br>Red-breasted Merganser (*Mergus serrator*) [A069]<br>Oystercatcher (*Haematopus ostralegus*) [A130]<br>Golden Plover (*Pluvialis apricaria*) [A140]<br>Grey Plover (*Pluvialis squatarola*) [A141]<br>Lapwing (*Vanellus vanellus*) [A142]<br>Knot (*Calidris canutus*) [A143]<br>Dunlin (*Calidris alpina*) [A149]<br>Black-tailed Godwit (*Limosa limosa*) [A156]<br>Bar-tailed Godwit (*Limosa lapponica*) [A157]<br>Curlew (*Numenius arquata*) [A160]<br>Redshank (*Tringa totanus*) [A162]<br>Turnstone (*Arenaria interpres*) [A169] | 12.74 km to closest turbine<br>0.36 km in-stream distance from TDR Node 6 (0.08 km distance from works to stream across road/ grassland)<br>0.67 km to Grid Connection, downstream distance of 1.7 m from closest water crossing | The SCI bird species are susceptible to habitat loss, noise and human presence during the construction and decommissioning stage.<br>During the operational stage the SCI bird species are highly susceptible to collision risk with turbine towers, blades (moving or stationary) and/or associated infrastructure and the barrier effect to regular movements.<br>The proposed site is outside the core and maximum foraging range (a defined range according to SNH 2016 and Johnson et al 2014) of the Dungarvan SPA SCIs, with Golden plover having the largest foraging ranges (core: 3km and maximum: 11km). | Y |

| European Site (code) | List of Qualifying Interest/Special Conservation Interest | Distance from Proposed Development (km) | Pathway | Considered further in screening Y/N |
|---|---|---|---|---|
| | Wetland and Waterbirds [A999]<br><br>https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004032.pdf | | There is hydrological connectivity between the site, GCR and TDR Nodes and the SPA, via the Colligan River, and there is potential for a reduction in water quality due to siltation as well as the spread of invasive species. This could have an indirect negative impact on the wetland habitats and food availability for the waterbirds within the SPA.<br>Therefore, in adopting the Precautionary Principle it is considered that wetland and waterbirds for Dungarvan Harbour SPA are within the ZoI. | |
| **Mid-Waterford Coast SPA (004193)** | Cormorant (*Phalacrocorax carbo*) [A017]<br>Peregrine (*Falco peregrinus*) [A103]<br>Herring Gull (*Larus argentatus*) [A184]<br>Chough (*Pyrrhocorax pyrrhocorax*) [A346]<br><br>https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004193.pdf | 15.17km to closest turbine<br><br>No hydrological connectivity between WF, TDR Nodes or GCR | The SCI bird species are susceptible to habitat loss, noise and human presence during the construction and decommissioning stage.<br>During the operational stage the SCI bird species are highly susceptible to collision risk with turbine towers, blades (moving or stationary) and/or associated infrastructure and the barrier effect to regular movements.<br>During ornithological surveys (see Appendix 1), peregrine falcon was recorded on eight occasions and was present in four of the seven survey seasons. All observations pertain to individual birds mainly flying over grassland moorland. The mean number of predicted collisions per year for Peregrine Falcon is 0.001. | Y |

| European Site (code) | List of Qualifying Interest/Special Conservation Interest | Distance from Proposed Development (km) | Pathway | Considered further in screening Y/N |
|---|---|---|---|---|
| | | | Herring gull was recorded on five occasions over the course of the whole survey period and present in two of the seven survey seasons. All activity pertains to individual adults either flying or soaring. The mean number of predicted collisions per year for Herring Gull is 0.002.<br>The proposed site is outside the core foraging range, (as defined range according to SNH 2016 and Johnson et al 2014) of the Dungarvan SPA, for peregrine having the core foraging range of up to 2km, but within the peregrines maximum range of 18km. | |

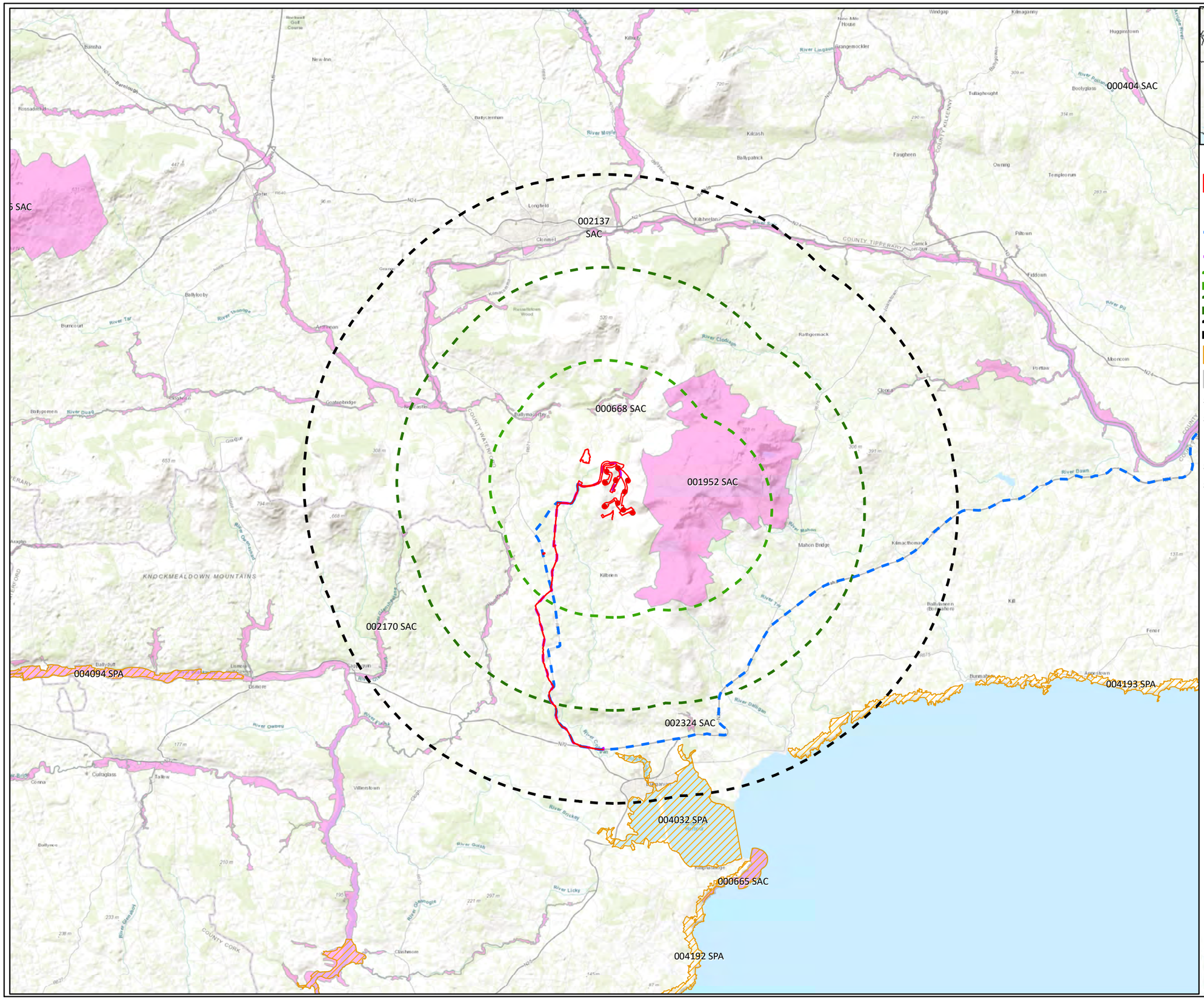
The supporting documents for the sites listed in Table 3-1, available through the protected sites portal https://www.npws.ie/protected-sites, were accessed in June 2023.

Having further examined the likely spatial and temporal biophysical changes associated with the Proposed Development impacts, it was determined that the following European Sites are within the ZoI of the project:

- Lower River Suir SAC
- Blackwater River (Cork/Waterford) SAC
- Dungarvan Harbour SPA
- Mid-Waterford Coast SPA

Once the ZoI is defined, an assessment must be made of the sensitivity of the qualifying interests to such impacts and as such the potential for significant effects. To that end, a 'Source-Pathway-Receptor' model was applied to determine European sites which may potentially be significantly affected having regard to the pathway for impact and the sensitivity of the conservation interests to the effect of the impact (see Table 3-2 to Table 3-5).

Path: R:\Map Production\2020\P2360\Workspace\EIAR\Ecology\P2360_GIS_Fig9-2_European Sites within 15km_A3.mxd




## Legend

- Proposed Development Boundary
- Proposed Turbine Layout
- Turbine Delivery Route
- Grid Connection Route
- 5km Buffer of Site
- 10km Buffer of Site
- 15km Buffer of Site
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)

**SPAs within 15km**

**Site Code: Site Name - Distance to Closest Turbine**

004032: Dungarvan Harbour SPA - 12.7km to T11

**SACs within 15km**

**Site Code: Site Name - Distance to Closest Turbine**

001952: Comeragh Mountains SAC - 0.8km to T11

000668: Nier Valley Woodlands SAC - 2.9km to T02

002137: Lower River Suir SAC - 4.3km to T01

002170: Blackwater River (Cork/Waterford) SAC - 10.7km to T12

002324: Glendine Wood SAC - 11.1km to T11

| | | | |
|---|---|---|---|
| **TITLE:** European Sites within 15km | | | |
| **PROJECT:** Coumnagappul Wind Farm, Co. Waterford | | | |
| **FIGURE NO:** | 9.2 | | |
| **CLIENT:** | EMPower | | |
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FEHILY TIMONEY EMPower

## 3.3 Assessment of Likely Significant Effects

### 3.3.1 Source-Pathway-Receptor Assessment & Potential for Significant Effects

The Office of the Planning Regulator's Practice Note PN01 recommends that the zone of influence of a project should be considered using the Source-Pathway-Receptor model.

European sites which may potentially be significantly affected by the Proposed Development are identified using the 'source-pathway-receptor' (S-P-R) conceptual model. The S-P-R model is a standard tool in environmental assessment to determine links between sensitive features and sources of impacts. In order for an effect to occur, all three elements of this mechanism must be in place. The absence of one of the elements of the mechanism means there is no likelihood for the effect to occur e.g. if there is no ecological pathway or functional link between the proposed development and the European site, there is no potential for impact and as such no potential for significant effects.

An impact may occur without having a significant effect. An impact is essentially the 'source' in the S-P-R assessment. It is the biophysical change caused to the environment by the project e.g. increase in sediment runoff due to ground disturbance. For the effect to be significant, the Qualifying Interests / Special Conservation Interests of the European site must be sensitive to the biophysical change. The likely impacts of the Proposed Development are set out in Section 2.10 of this report. The European sites within the Zone of Influence of these impacts are determined as outlined in Table 3.1. The potential for the Proposed Development to have significant effects on the aforementioned European sites are assessed hereunder on the basis of the source-pathway-receptor connectivity, and the sensitivity of the European sites qualifying interests to the effects of the impacts: Table 3-2 to Table 3-5.

**Table 3-2: Potential for Significant Effects on the Lower River Suir SAC**

| Source | Pathway | Receptor | Potential for Significant Effects |
|---|---|---|---|
| **Site and GCR** | | | |
| **Size and scale/ Land-take/ Overall Affected Area**<br>The Site will comprise the construction of the foundations for the 10 no. turbines and 1 no. permanent met mast along crane areas; new/upgrading of site tracks and associated drainage infrastructure; re-use or upgrading of existing and installation of new watercourse or drain crossings; and the construction of the electrical substation and associated compounds.<br><br>The proposed Site will result in the long-term removal of wet heath (7.1 ha or 3.4%), dry siliceous heath (6.8 ha or 4.9%), conifer plantation (1.4 ha or 1.1%), improved agricultural land (0.43 ha or 1.2%), dense bracken (1.6 ha or 1.6%), dense bracken/ scrub mosaic (0.11 ha or 0.9%) and exposed siliceous rocks (0.6 ha or 2.1%). Additionally, installation of drainage channels may alter surface water flow on the site. Therefore, changes to the environment are a potential impact resulting from the proposed Site.<br><br>The associated GCR will consist entirely of underground 110kV cable which will be laid within the existing road corridor or within private lands. | A section of proposed road and hardstand associated with Turbines 1 and 2 will be within the Nier sub-basins. Within the Nier_020 sub-basin, the Shanballyanne stream drains from within the site to the north-west. This drains into the Nier river, this in turn drains into the Suir river (sub-catchment Suir_SC_120). The SAC is c. 5km downstream of the site.<br><br>The Lower River Suir SAC is designated for several aquatic species.<br><br>Refer to Table 3-1 for the full list of pathways identified from the Proposed Development with potential to alter the physicochemical conditions of the Shanballyanne and Nier rivers which also have potential for similar effects in the downstream Lower River Suir SAC.<br><br>The grid connection is within the Nier sub-basins as it runs within the windfarm site. Within the Nier_020 sub-basin, the Shanballyanne stream drains from within the Site to the north-west. This drains into the Nier river, which in turn drains into the Suir river (sub-catchment Suir_SC_120). The SAC is c. 5km downstream of the site. | Given that the impact pathway is a hydrological one, the qualifying interests of the SAC which may be vulnerable to such impact are the aquatic habitats and species.<br><br>The aquatic qualifying interests of the SAC require particular environmental conditions such as physical habitat structure and water quality to support their conservation objectives within the SAC. The release of sediment or pollutants to the Shanballyanne and Nier rivers could potentially impact the attributes needed to support the qualifying interests. | Potential for Significant Effects |
| **Emissions - Dust**<br>Earth works and movement of materials during construction of the site and GCR; and decommissioning of the site will generate dust.<br><br>The Institute of Air Quality Management 'Guidance on the Assessment of dust from demolition and construction' (Holman et al., 2014) states that "Dust can have two types of effect on vegetation: physical and chemical. Direct physical effects include reduced photosynthesis, respiration and transpiration through smothering. Chemical changes to soils or watercourses may lead to a loss of plants or animals, for example via changes in acidity. Indirect effects can include increased susceptibility to stresses such as pathogens and air pollution. These changes are likely to occur only as a result of long-term demolition and construction works adjacent to a sensitive habitat. Often impacts will be reversible once the works are completed, and dust emissions cease". The guidance prescribes potential dust emission risk classes to ecological receptors. The guidance specifies that, for sensitive ecological receptors (i.e., European sites) sensitivity to dust is 'High' up to 20m from the source and reduces to 'Medium' over 50m from the source.<br><br>Therefore, the proposed Site has potential for disturbance due to dust. | There is no direct pathway between the European sites and the proposed site, due to distance between them.<br><br>Pathways identified include indirect hydrological pathways and movement patterns of mobile aquatic species. | As the SAC is beyond a distance of 50m, there is no potential for effects to the QI directly. However, mobile QI species at or adjacent to the proposed site and GCR may be receptors.<br><br>There may be indirect effects to QI species and habitats due to dust entering the watercourse (Refer to water emissions section below). | Likely Significant Effects |

| Source | Pathway | Receptor | Potential for Significant Effects |
|---|---|---|---|
| **Emissions – Noise**<br><br>Disturbance to noise varies between species and is dependent on the nature of the noise source and sensitivity of the species e.g., the potential effects of anthropogenic sound on fish can range from direct mortality to no obvious behavioural responses and are dependent on the class of sound i.e., either continuous or impulsive (Popper and Hawkins, 2019). Similarly, the disturbance response of birds (e.g., becoming alert or a flight response) can vary depending on season, species sensitivity, and weather.<br><br>Therefore, the proposed has potential for noise disturbance of aquatic species along with bird species. | Disturbance to noise varies between species and is dependent on the nature of the noise source and sensitivity of the species. However, levels of noise to be produced will not reach the QI therefore there is no direct pathway.<br><br>The QI species from the SAC are mobile aquatic species that may utilise watercourse surrounding the SAC. Therefore, there is potential for these species to occur in watercourses surrounding the proposed Site and GCR. | Mobile QI species at or adjacent to the proposed Site may be receptors. | Likely Significant Effects |
| **Emissions to Water**<br>Potential emissions to the local watercourse network from surface water include:<br>• Inappropriately managed / located<br>o Stockpiled materials (including brash)<br>o Excavated materials<br>o Wet concrete<br>o Wash down areas<br>o Municipal waste<br>o Extraction racks<br>• Pumped water from trenches (ingress of ground water) during excavation works<br>• Exposed topsoil (e.g. newly laid areas)<br>• Hydrocarbons<br>• Previous land management practices.<br>• New hardstanding redirecting surface water to new drainage network instead of allowing it enter the ground water table or existing drainage network<br><br>Sedimentation of watercourses from runoff has potential to degrade the quality of these watercourses and as such reduce the carrying capacity of the watercourses for aquatic species.<br><br>The release of concrete to an aquatic environment can have the effect of altering the levels of pH, nitrate, phosphate, total solids, total suspended solids, total dissolved solids, turbidity, and biological oxygen demand in the water. Cement products are particularly harmful to aquatic life due to the associated change in alkalinity in the water, which can cause burns to fish skin.<br><br>Therefore, the proposed site and GCR has potential for disturbance due to water pollution. | The identified pathway is the streams on site which enter the Shanballyane and Nier Rivers. These streams enter the River Suir respectively, which form part of the Lower River Suir SAC.<br><br>In addition to the hydrological pathway, there is also an indirect physical pathway via mobile freshwater species utilizing the rivers. | There are several QIs for which the SAC is designated which are sensitive to hydrological interactions. Therefore, further consideration is required. | Likely Significant Effects |

| Source | Pathway | Receptor | Potential for Significant Effects |
|---|---|---|---|
| **Duration of construction, operation, decommissioning/Temporal Aspects**<br><br>There is potential for displacement of QI species (i.e., otter) due to disturbance during key seasonal stages of the life cycle during construction. Disturbance to otter can occur up to 150m from the proposed works area (National Roads Authority, 2008). | In addition to the hydrological pathway, there is also an indirect physical pathway via mobile freshwater species using the watercourses on site. | Mobile freshwater species are the receptor for temporal aspects of construction. Key seasonal stages of the life cycles of salmon, sea lamprey, brook lamprey and river lamprey, may be impacted by construction. | Likely Significant Effects |
| **In-combination with other plans and projects**<br><br>Cumulative effects could occur if felling and construction activities at the Site are undertaken in parallel with other plans and projects, as well as off-site forestry activities (particularly harvesting) and agricultural activities (particularly manure spreading) within the same catchment, ultimately adding potential nutrients to the Blackwater River (Cork/Waterford) cSAC and further impacting the aquatic qualifying interests. | The identified pathway is the streams on site which enter the Shanballyane and Nier Rivers. These streams enter the River Suir respectively, which form part of the Lower River Suir SAC.<br><br>In addition to the hydrological pathway, there is also an indirect physical pathway via mobile freshwater species utilizing the rivers. | Given that the impact pathway is a hydrological and physical one, QIs of Lower River Shannon SAC which may be vulnerable to such impacts are the aquatic habitats and species. The release of sediment and pollutants to the watercourse network could potentially impact the attributes needed to support the qualifying interests. | Likely Significant Effects |
| **TDR** | | | |
| **No connectivity between the TDR Nodes and the SAC** | N/A | N/A | No Potential Significance Effects |

**Table 3-3: Potential for Significant Effects on the Blackwater River (Cork/Waterford) SAC**

| Source | Pathway | Receptor | Potential for Significant Effects |
|---|---|---|---|
| **Site and GCR** | | | |
| **Physical Changes to the Environment**<br>The associated GCR will consist entirely of underground 110kV cable which will be laid within the existing road corridor or within private lands. The GCR crosses the Ballynaguilkee_Lower Stream, where once culvert will be replaced. | There is no connectivity between the Site and the Blackwater River (Cork/Waterford).<br><br>The GCR crossing of the Ballynaguilkee_Lower Stream will require a culvert replacement and therefore instream works, c. 2.2km downstream of the River Finisk which forms part of the SAC.<br><br>The Blackwater River (Cork/Waterford) SAC is designated for several aquatic species.<br><br>The stream at this location is a small drainage ditch choked by vegetation, however, following the precautionary approach, there is potential for impacts to water quality of the downstream Blackwater River (Cork/Waterford) SAC. | Given that the impact pathway is a hydrological one, the qualifying interests of the SAC which may be vulnerable to such impact are the aquatic habitats and species.<br><br>The aquatic qualifying interests of the SAC require particular environmental conditions such as physical habitat structure and water quality to support their conservation objectives within the SAC. The release of sediment or pollutants to the Finisk river could potentially impact the attributes needed to support the qualifying interests. | Likely Significant Effects |

| Source | Pathway | Receptor | Potential for Significant Effects |
|---|---|---|---|
| **Dust**<br>Instream works during construction of the GCR Ballynaguilkee_Lower Stream.<br>The Institute of Air Quality Management 'Guidance on the Assessment of dust from demolition and construction' (Holman et al., 2014) states that "Dust can have two types of effect on vegetation: physical and chemical. Direct physical effects include reduced photosynthesis, respiration and transpiration through smothering. Chemical changes to soils or watercourses may lead to a loss of plants or animals, for example via changes in acidity. Indirect effects can include increased susceptibility to stresses such as pathogens and air pollution. These changes are likely to occur only as a result of long-term demolition and construction works adjacent to a sensitive habitat. Often impacts will be reversible once the works are completed, and dust emissions cease". The guidance prescribes potential dust emission risk classes to ecological receptors. The guidance specifies that, for sensitive ecological receptors (i.e., European sites) sensitivity to dust is 'High' up to 20m from the source and reduces to 'Medium' over 50m from the source.<br><br>Therefore, the proposed GCR has potential for disturbance due to dust. | There is no connectivity between the Site and the Blackwater River (Cork/Waterford).<br><br>There is no direct pathway between the SAC and the GCR, due to distance between them. Pathways identified include indirect hydrological pathways and movement patterns of mobile aquatic species. | As the SAC is beyond a distance of 50m, there is no potential for effects to the QI directly. The stream crossing at this location is a small drainage ditch choked by vegetation, with negligible fisheries value. However, following the precautionary approach, mobile QI species at or adjacent GCR may be receptors.<br><br>There may be indirect effects to QI species and habitats due to dust entering the watercourse (Refer to water emissions section below). | Likely Significant Effects |
| **Emissions – Noise**<br>Disturbance to noise varies between species and is dependent on the nature of the noise source and sensitivity of the species e.g., the potential effects of anthropogenic sound on fish can range from direct mortality to no obvious behavioural responses and are dependent on the class of sound i.e., either continuous or impulsive (Popper and Hawkins, 2019).<br>Therefore, the GCR has potential for noise disturbance of aquatic species. | There is no connectivity between the Site and the Blackwater River (Cork/Waterford).<br><br>Disturbance to noise varies between species and is dependent on the nature of the noise source and sensitivity of the species. However, levels of noise to be produced will not reach the QI therefore there is no direct pathway.<br><br>The QI species from the SAC are mobile aquatic species that may utilise watercourse surrounding the SAC. Therefore, there is potential for these species to occur in watercourses surrounding the GCR. | The stream crossing at this location is a small drainage ditch choked by vegetation, with negligible fisheries value. However, following the precautionary approach, mobile QI species at or within the vicinity of GCR may be receptors. | Likely Significant Effects |
| **Emissions to Water**<br>Potential emissions to the local watercourse network from surface water include:<br>• Inappropriately managed / located<br>o Stockpiled materials (including brash)<br>o Excavated materials<br>o Wet concrete<br>o Wash down areas<br>o Municipal waste<br>o Extraction racks<br>• Pumped water from trenches (ingress of ground water) during excavation works<br>• Exposed topsoil (e.g. newly laid areas)<br>• Hydrocarbons<br>• Previous land management practices.<br>• New hardstanding redirecting surface water to new drainage network instead of allowing it enter the ground water table or existing drainage network<br><br>**Sedimentation of watercourses from runoff has potential to degrade the quality of these watercourses and as such reduce the carrying capacity of the watercourses for aquatic species.** | There is no connectivity between the Site and the Blackwater River (Cork/Waterford).<br><br>The identified pathway is the GCR crossing of the Ballynaguilkee_Lower Stream which enters the Finisk Rivers, c. 2.2km downstream, and forms part of the Blackwater River (Cork/Waterford) cSAC.<br><br>In addition to the hydrological pathway, there is also an indirect physical pathway via mobile freshwater species utilizing the rivers. | he stream crossing at this location is a small drainage ditch choked by vegetation, with negligible fisheries value. However, following the precautionary approach, mobile QI species at or within the vicinity GCR may be receptors.<br><br>There are several QIs for which the SAC is designated which are sensitive to hydrological interactions. Therefore, further consideration is required. | Likely Significant Effects |

| Source | Pathway | Receptor | Potential for Significant Effects |
|---|---|---|---|
| **The release of concrete to an aquatic environment can have the effect of altering the levels of pH, nitrate, phosphate, total solids, total suspended solids, total dissolved solids, turbidity, and biological oxygen demand in the water. Cement products are particularly harmful to aquatic life due to the associated change in alkalinity in the water, which can cause burns to fish skin.**<br>Therefore, the proposed GCR has potential for disturbance due to water pollution. | | | |
| **Duration of construction, operation, decommissioning/Temporal Aspects**<br>There is potential for displacement of QI species (i.e., otter) due to disturbance during key seasonal stages of the life cycle during construction. Disturbance to otter can occur up to 150m from the proposed works area (National Roads Authority, 2008). | There is no connectivity between the Site and the Blackwater River (Cork/Waterford).<br><br>In addition to the hydrological pathway, there is also an indirect physical pathway via mobile freshwater species using the Ballynaguilkee_Lower Stream and downstream watercourses. | Mobile freshwater species are the receptor for temporal aspects of construction. Key seasonal stages of the life cycles of salmon, sea lamprey, brook lamprey and river lamprey, may be impacted by construction. | Likely Significant Effects |
| **In-combination with other plans and projects**<br>Cumulative effects could occur if felling and construction activities at the Site are undertaken in parallel with other projects including off-site forestry activities (particularly harvesting) and agricultural activities (particularly manure spreading) within the same catchment, ultimately adding potential nutrients to the Blackwater River (Cork/Waterford) cSAC and further impacting the aquatic qualifying interests. | There is no connectivity between the Site and the Blackwater River (Cork/Waterford).<br><br>The identified pathway is the GCR crossing of the Ballynaguilkee_Lower Stream which enters the Finisk Rivers, c. 2.2km downstream, and forms part of the Blackwater River (Cork/Waterford) cSAC.<br><br>In addition to the hydrological pathway, there is also an indirect physical pathway via mobile freshwater species utilizing the rivers. | Given that the impact pathway is a hydrological and physical one, QIs of Blackwater River (Cork/Waterford) cSAC which may be vulnerable to such impacts are the aquatic habitats and species. The release of sediment and pollutants to the watercourse network could potentially impact the attributes needed to support the qualifying interests. | Likely Significant Effects |
| **TDR** | | | |
| **No connectivity between the TDR Nodes and the SAC** | N/A | N/A | No Potential Significant Effects |

**Table 3-4: Potential for Significant Effects on the Dungarvan Harbour SPA**

| Source | Pathway | Receptor | Potential for Significant Effects |
|---|---|---|---|
| **Site and GCR** | | | |
| **Physical Changes to the Environment**<br>The Site will comprise the construction of the foundations for the 10 no. turbines and 1 no. permanent met mast along crane areas; new/upgrading of site tracks and associated drainage infrastructure; re-use or upgrading of existing and installation of new watercourse or drain crossings; and the construction of the electrical substation and associated compounds.<br><br>The proposed Site will result in the long-term removal of wet heath (7.1 ha or 3.4%), dry siliceous heath (6.8 ha or 4.9%), conifer plantation (1.4 ha or 1.1%), improved agricultural land (0.43 ha or 1.2%), dense bracken (1.6 ha or 1.6%), dense bracken/ scrub mosaic (0.11 ha or 0.9%) and exposed siliceous rocks (0.6 ha or 2.1%). Additionally, installation of drainage channels may alter surface water flow on the site. Therefore, changes to the environment are a potential impact resulting from the proposed Site.<br><br>Potential for bird collision with turbine towers, blades (moving or stationary) and/or associated infrastructure; and barrier to dispersal, regular movements or migration for migratory bird species.<br><br>The associated GCR will consist entirely of underground 110kV cable which will be laid within the existing road corridor or within private lands. There will be one new watercourse crossing of an unnamed tributary of Skeheens Stream, which will be crossed by HDD. | A majority of the Site (1.94 km2 out of 3.28 km2) is within the Colligan_SC_010 subcatchment. Within the Colligan_010 sub-basin, five tributaries drain from within the site. The Kilkeanymountain stream drains to the west near the western boundary of the site into Skeheens Stream which in turn drains into the Colligan river. The Knockavanniamountain stream and Coumnagappul stream drains in a south-west direction near the centre of the site, flowing into the Colligan river near boundary of the site. The Glennaneanemountain stream and Carrigbrack stream flows in a south-west direction into the Colligan river near the southern boundary of the site. The Colligan River flows into Dungarvan Harbour, which is forms Dungarvan Harbour SPA.<br><br>The Dungarvan Harbour SPA is designated for wetlands and waterbirds.<br><br>While the Site is outside the core feeding range (a defined range according to SNH 2016 and Johnson et al 2014) of the SCI golden plover, there is potential for this species to utilise the site. Therefore, there is an ecological pathway.<br><br>The GCR crosses Skeheens Stream within the Colligan_010 sub-catchment, and the Colligan River within the Colligan_040 sub-catchment. | Given that the impact pathway is a hydrological one, the qualifying interests of the SPA which may be vulnerable to such impact are the aquatic habitats and species.<br><br>The aquatic qualifying interests of the SAC require particular environmental conditions such as physical habitat structure and water quality to support their conservation objectives within the SPA. The SCI waterbirds rely on the quality of these habitats for roosting and foraging. The release of sediment or pollutants to the Colligan river could potentially impact the attributes needed to support the wetlands and waterbirds.<br><br>However, given the intervening hydrological distance from the Site, the scale of the works at the GCR, and that silting up or accretion are natural processes in estuarine and marine environments, with estuarine/marine habitats experiencing fluctuations in sediment on a daily basis. Sediment movement is a natural process that occurs within the marine environment and associated marine organisms will be adapted to the natural processes of sediment movement, erosion and deposition, including the increased levels of sediment movement reached during storms. Therefore, the habitats as a whole will naturally adjust or reach equilibrium in response to any minor local changes.<br><br>Mobile SCIs at the site will be receptors. Given golden plover were recorded during surveys at the site, changes to the habitats onsite would likely cause indirect effects on ex-situ foraging species. | Likely Significant Effects |
| **Emissions - Dust**<br>Earth works and movement of materials during construction of the site and GCR; and decommissioning of the site will generate dust. | There is no direct pathway between the SPA and the Site or GCR, due to distance between them.<br><br>Pathways identified include indirect hydrological pathways. | As the SAC is beyond a distance of 50m, there is no potential for effects to the habitats directly. | No Likely Significant Effects |

| Source | Pathway | Receptor | Potential for Significant Effects |
|---|---|---|---|
| The Institute of Air Quality Management 'Guidance on the Assessment of dust from demolition and construction' (Holman et al., 2014) states that "Dust can have two types of effect on vegetation: physical and chemical. Direct physical effects include reduced photosynthesis, respiration and transpiration through smothering. Chemical changes to soils or watercourses may lead to a loss of plants or animals, for example via changes in acidity. Indirect effects can include increased susceptibility to stresses such as pathogens and air pollution. These changes are likely to occur only as a result of long-term demolition and construction works adjacent to a sensitive habitat. Often impacts will be reversible once the works are completed, and dust emissions cease". The guidance prescribes potential dust emission risk classes to ecological receptors. The guidance specifies that, for sensitive ecological receptors (i.e., European sites) sensitivity to dust is 'High' up to 20m from the source and reduces to 'Medium' over 50m from the source.<br><br>Therefore, the proposed Site has potential for disturbance due to dust. | | There may be indirect effects to SCI species and habitats due to dust entering the watercourse (Refer to water emissions section below). However, given the intervening hydrological distance from the Site, the scale of the works at the GCR, and that silting up or accretion are natural processes in estuarine and marine environments, with estuarine/marine habitats experiencing fluctuations in sediment on a daily basis. Sediment movement is a natural process that occurs within the marine environment and associated marine organisms will be adapted to the natural processes of sediment movement, erosion and deposition, including the increased levels of sediment movement reached during storms. Therefore, the habitats as a whole will naturally adjust or reach equilibrium in response to any minor local changes. | |
| **Emissions - Noise**<br>Disturbance to noise varies between species and is dependent on the nature of the noise source and sensitivity of the species e.g., the potential effects of anthropogenic sound on fish can range from direct mortality to no obvious behavioural responses and are dependent on the class of sound i.e., either continuous or impulsive (Popper and Hawkins, 2019). Similarly, the disturbance response of birds (e.g., becoming alert or a flight response) can vary depending on season, species sensitivity, and weather.<br><br>Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Platteeuw & Henkensj 1997). Therefore, displacement equates to habitat loss for the lifetime of the Proposed Wind Farm for these species.<br><br>Therefore, the proposed has potential for noise disturbance of mobile SCI species. | Noise impacts to bird species can occur up to 500m from the source. The SPA is located outside the zone of influence for noise from the site. Therefore, there is no direct pathway for noise to the SCIs present at the SPA. However, there is an indirect pathway via the bird species that may be foraging at or around the proposed site.<br><br>The SCI species from the SPA are mobile species that may utilise watercourse surrounding the GCR, particularly at the Colligan Crossing. Therefore, there is potential for these species to occur in watercourses surrounding the proposed GCR. | The SCIs of the SPA, in particular golden plover, are vulnerable to noise if in ex-situ foraging habitats within 500m of the site.<br><br>Mobile SCI species at or adjacent to the proposed GCR may be receptor. However, given the works are short term and minor and given the baseline environment of the GCR on operational roads, increases in noise are not likely to cause significant effects on SCI species. | Likely Significant Effects |
| **Emissions to Water**<br>Potential emissions to the local watercourse network from surface water include:<br>• Inappropriately managed / located<br>o Stockpiled materials (including brash)<br>o Excavated materials<br>o Wet concrete<br>o Wash down areas<br>o Municipal waste<br>o Extraction racks<br>• Pumped water from trenches (ingress of ground water) during excavation works<br>• Exposed topsoil (e.g. newly laid areas)<br>• Hydrocarbons<br>• Previous land management practices. | The identified pathway is the streams on site which enter the Colligan River. The Colligan River enters the Dungarvan Harbour SPA. | The wetland habitats which the SPA is designated which are sensitive to hydrological interactions. However, given the intervening hydrological distance from the Site, the scale of the works at the GCR, and that silting up or accretion are natural processes in estuarine and marine environments, with estuarine/marine habitats experiencing fluctuations in sediment on a daily basis. Sediment movement is a natural process that occurs within the marine environment and associated marine organisms will be adapted to the natural processes of sediment movement, erosion and deposition, including the increased levels of sediment movement reached during storms. Therefore, the habitats as a whole will naturally adjust or reach equilibrium in response to any minor local changes.<br><br>The release of Himalayan balsam into the Colligan river from the GCR crossing will have deleterious effects on the designated wetland habitats. Therefore, further consideration is required. | Likely Significant Effects |

| Source | Pathway | Receptor | Potential for Significant Effects |
|---|---|---|---|
| • New hardstanding redirecting surface water to new drainage network instead of allowing it enter the ground water table or existing drainage network<br><br>Himalayan balsam is present at the GCR crossing of the Colligan river, 1.7km upstream of the SPA.<br><br>Sedimentation of watercourses and the release of invasive species from runoff has potential to degrade the quality of these watercourses and as such reduce the quality of the wetland habitats.<br><br>The release of concrete to an aquatic environment can have the effect of altering the levels of pH, nitrate, phosphate, total solids, total suspended solids, total dissolved solids, turbidity, and biological oxygen demand in the water. Cement products are particularly harmful to aquatic life due to the associated change in alkalinity in the water.<br><br>Therefore, the proposed site and GCR has potential for disturbance due to water pollution. | | | |
| **In-combination with other plans and projects**<br><br>Cumulative effects could occur if felling and construction activities at the Site are undertaken in parallel with other projects including off-site forestry activities (particularly harvesting) and agricultural activities (particularly manure spreading) within the same catchment, ultimately adding potential nutrients to the Blackwater River (Cork/Waterford) cSAC and further impacting the aquatic qualifying interests.<br><br>Cumulative effects could occur if the wind farms site is in operation in parallel with other windfarm sites within the maximum foraging range of the SCI observed on site, golden plover, ultimately adding to an increased collision risk and barrier effect. | The identified pathway is the streams on site which enter the Colligan River. The Colligan River enters the Dungarvan Harbour SPA.<br><br>The SCI species from the SPA are mobile species, with observations of golden plover at the Site. | The wetland habitats which the SPA is designated which are sensitive to hydrological interactions. Therefore, further consideration is required.<br><br>Mobile SCI species, golden plover, at or adjacent to the site may be receptor. Therefore, further consideration is required. | Likely Significant Effects |
| **TDR** | | | |
| **Emissions to Water**<br>Potential emissions to the Colligan River at Points of interest (POI) 17 and 19 from surface water include increased sedimentation.<br><br>The works proposed to be undertaken at POI 17 and 19 are hedgerow trimming/ removal of small sections of riparian vegetation to facilitate oversail. Therefore in-stream works are not required and any potential impacts will be minor and short term (less than 1 day). | Inappropriate site management of excavations and accidental spillages could lead to loss of silt laden run-off, suspended solids and/or pollution and as such has potential to alter the physicochemical conditions of the Colligan River with potential for similar effects in the SPA. However, POI 17 is >10km and POI 19 is >19km upstream of the SPA, and due to the scale of the works, hydrological impacts are likely to be localised. Additionally, the works proposed are minor and short term (expected to be less than 1 day), therefore potential impacts will be limited and short term. | Given the works are short term and minor and do not include any in-steam works, emissions to water are expected to be assimilated into the stream bed before reaching the SPA. | No Likely Significant Effects |

**Table 3-5: Potential for Significant Effects on the Mid-Waterford Coast SPA**

| Source | Pathway | Receptor | Potential for Significant Effects |
|---|---|---|---|
| **Site and GCR** | | | |
| **Physical Changes to the Environment**<br>The Site will comprise the construction of the foundations for the 10 no. turbines and 1 no. permanent met mast along crane areas; new/upgrading of site tracks and associated drainage infrastructure; re-use or upgrading of existing and installation of new watercourse or drain crossings; and the construction of the electrical substation and associated compounds.<br>The proposed Site will result in the long-term removal of wet heath (7.1 ha or 3.4%), dry siliceous heath (6.8 ha or 4.9%), conifer plantation (1.4 ha or 1.1%), improved agricultural land (0.43 ha or 1.2%), dense bracken (1.6 ha or 1.6%), dense bracken/ scrub mosaic (0.11 ha or 0.9%) and exposed siliceous rocks (0.6 ha or 2.1%). Additionally, installation of drainage channels may alter surface water flow on the site. Therefore, changes to the environment are a potential impact resulting from the proposed Site.<br>Potential for bird collision with turbine towers, blades (moving or stationary) and/or associated infrastructure; and barrier to dispersal, regular movements or migration for migratory bird species.<br>The associated GCR will consist entirely of underground 110kV cable which will be laid within the existing road corridor or within private lands. There will be one new watercourse crossing of an unnamed tributary of Skeheens Stream, which will be crossed by HDD. | There is no hydrological connectivity between the Site and the Mid-Waterford Coast SPA.<br>The SPA is designated for cormorant, peregrine, herring gull and chough.<br>Peregrine and herring gull have been recorded within the Site. | Mobile SCIs at the site will be receptors. Given peregrine and herring gull were recorded during surveys at the site, and that the site is within the maximum foraging range for peregrine falcon, changes to the habitats onsite would likely cause indirect effects on SCI species. | Likely Significant Effects |
| **Emissions - Dust**<br>Earth works and movement of materials during construction of the site and GCR; and decommissioning of the site will generate dust.<br>The Institute of Air Quality Management 'Guidance on the Assessment of dust from demolition and construction' (Holman et al., 2014) states that "Dust can have two types of effect on vegetation: physical and chemical. Direct physical effects include reduced photosynthesis, respiration and transpiration through smothering. Chemical changes to soils or watercourses may lead to a loss of plants or animals, for example via changes in acidity. Indirect effects can include increased susceptibility to stresses such as pathogens and air pollution. These changes are likely to occur only as a result of long-term demolition and construction works adjacent to a sensitive habitat. Often impacts will be reversible once the works are completed, and dust emissions cease". The guidance prescribes potential dust emission risk classes to ecological receptors. The guidance specifies that, for sensitive ecological receptors (i.e., European sites) sensitivity to dust is 'High' up to 20m from the source and reduces to 'Medium' over 50m from the source.<br>Therefore, the proposed Site has potential for disturbance due to dust. | There is no direct or indirect pathway between the SPA and the Site or GCR, due to distance between them. | N/A. | No Likely Significant Effects |
| **Emissions - Noise** | There is no direct pathway between the SPA and the Site, due to distance between them. | Mobile SCI species, peregrine falcon and herring gull, at or adjacent to the site may be receptor. Therefore, further consideration is required. | Likely Significant Effects |

| Source | Pathway | Receptor | Potential for Significant Effects |
|---|---|---|---|
| Disturbance to noise varies between species and is dependent on the nature of the noise source and sensitivity of the species e.g., the potential effects of anthropogenic sound on fish can range from direct mortality to no obvious behavioural responses and are dependent on the class of sound i.e., either continuous or impulsive (Popper and Hawkins, 2019). Similarly, the disturbance response of birds (e.g., becoming alert or a flight response) can vary depending on season, species sensitivity, and weather.<br><br>Therefore, the proposed has potential for noise disturbance of aquatic species along with bird species. | Disturbance to noise varies between species and is dependent on the nature of the noise source and sensitivity of the species. However, levels of noise to be produced will not reach the SCI therefore there is no direct pathway.<br><br>The SCI species from the SPA are mobile species, with observations of peregrine and herring gull utilising the Site. | | |
| **Emissions to Water**<br>Potential emissions to the local watercourse network from surface water include:<br>• Inappropriately managed / located<br>o Stockpiled materials (including brash)<br>o Excavated materials<br>o Wet concrete<br>o Wash down areas<br>o Municipal waste<br>o Extraction racks<br>• Pumped water from trenches (ingress of ground water) during excavation works<br>• Exposed topsoil (e.g. newly laid areas)<br>• Hydrocarbons<br>• Previous land management practices.<br>• New hardstanding redirecting surface water to new drainage network instead of allowing it enter the ground water table or existing drainage network.<br><br>Himalayan balsam is present at the GCR crossing of the Colligan river, 1.7km upstream of the SPA.<br><br>Sedimentation of watercourses and the release of invasive species from runoff has potential to degrade the quality of these watercourses and as such reduce the quality of the wetland habitats.<br><br>The release of concrete to an aquatic environment can have the effect of altering the levels of pH, nitrate, phosphate, total solids, total suspended solids, total dissolved solids, turbidity, and biological oxygen demand in the water. Cement products are particularly harmful to aquatic life due to the associated change in alkalinity in the water.<br><br>Therefore, the proposed site and GCR has potential for disturbance due to water pollution. | There is no direct or indirect pathway between the SPA and the Site or GCR, due to distance between them. | N/A | No Likely Significant Effects |
| **In-combination with other plans and projects**<br><br>Cumulative effects could occur if felling and construction activities at the Site are undertaken in parallel with other projects including off-site forestry activities (particularly harvesting) and agricultural activities within the maximum foraging range of the SCI observed on site, peregrine and herring gull, ultimately adding to increased disturbance. | There is no direct pathway between the SPA and the Site.<br>The SCI species from the SPA are mobile species, with observations of peregrine and herring gull utilising the Site. | Mobile SCI species, peregrine falcon and herring gull, at or adjacent to the site may be receptor. Therefore, further consideration is required. | Likely Significant Effects |

| Source | Pathway | Receptor | Potential for Significant Effects |
|---|---|---|---|
| Cumulative effects could occur if the wind farms site is in operation in parallel with other windfarm sites within the maximum foraging range of the SCI observed on site, peregrine and herring gull, ultimately adding to an increased collision risk and barrier effect. | | | |
| **TDR** | | | |
| No connectivity between the TDR Nodes and the SAC | N/A | N/A | No Potential Significance Effects |

## 3.4 Conclusion Regarding Likely Significant Effects

The competent authority shall determine that an appropriate assessment of a proposed development is required if it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site.

Measures intended to avoid or reduce the harmful effects of the proposed development on European sites (i.e. "mitigation measures") or best practice measures have not been taken into account in the screening stage appraisal.

In conclusion it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on the following European sites:

- Lower River Suir SAC (002137)
- Blackwater River (Cork/Waterford) SAC (002170)
- Dungarvan Harbour SPA (004032)
- Mid-Waterford Coast SPA (004193)

# 4 NATURA IMPACT STATEMENT

## 4.1 Introduction

The screening assessment (Section 3 of this report) carried out to determine the likelihood of significant effects on European sites from the proposed development has concluded as follows:

There is the possibility that there could be negative effects on the Lower River Suir SAC, Blackwater River (Cork/Waterford) SAC, Dungarvan Harbour SPA, and Mid-Waterford Coast SPA as a result of direct and/ or indirect effects from the Proposed Development. In the absence of mitigation measures (which have not been considered at the screening stage), likely significant effects on the qualifying interests of the Lower River Suir SAC, Blackwater River (Cork/Waterford) SAC, Dungarvan Harbour SPA, and Mid-Waterford Coast SPA cannot be excluded on the basis of objective scientific information.

Further consideration is given in this Natura Impact Statement (NIS) to the elements of the Proposed Development which might have adverse effects on the integrity of the aforementioned European sites with respect to each site's conservation objectives.

Due to the works proposed along the TDR no potential for significant effects were identified during the appropriate assessment screening, therefore the TDR route has not been carried forward within the Stage 2 Appropriate Assessment (Natura Impact Statement).

Refer to section 2 for the project description and baseline environment.

## 4.2 European Site Description

### 4.2.1 Lower River Suir SAC

The River Suir has its source on in the Devil's Bit Mountain in County Tipperary, and flows for 184 kilometres. The river catchment area covers approximately 3,542 square kilometres. Lower River Suir SAC consists of the freshwater stretches of the River Suir immediately south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford, and many tributaries including the Clodiagh in Co. Waterford, the Lingaun, Anner, Nier, Tar, Aherlow, Multeen and Clodiagh in Co. Tipperary. The Suir and its tributaries flow through the counties of Tipperary, Kilkenny and Waterford (NPWS 2013).

The Lower River Suir SAC is selected for alluvial wet woodlands and yew woodlands, priority habitats on Annex I of the E.U. Habitats Directive (92/43/EEC), 1992, as amended. The site is also selected as a SAC for Atlantic salt meadows, Mediterranean salt meadows, floating river vegetation, hydrophilous tall herbs and old oak woodlands, all habitats listed on Annex I of the E.U. Habitats Directive.

As well as habitats, the SAC has been selected due to the presence of invertebrate, fish and mammal species which are listed under Annex II of the EU Habitats Directive, including freshwater pearl mussel (*Margaritifera margaritifera*), freshwater crayfish (*Austropotamobius pallipes*), Atlantic salmon (*Salmo salar*), twaite shad (*Alosa fallax fallax*), the three Irish Lamprey species - sea (*Petromyzon marinus*), brook (*Lampetra planeri*) and river (*Lampetra fluviatilis*), and Eurasian otter (*Lutra lutra*).

The main threats and pressures which may impact the Lower River Suir SAC are set out in the Natura 2000 Data Form and are presented in Table 4-1. The qualifying interests of the SAC and their potential to occur within the area of the proposed TDR nodes are presented in Table 4-2.

**Table 4-1: Threats, Pressures and Activities with Impacts on the Lower River Shannon SAC**

| High Level (inside site) | High Level (inside site) | High Level (both inside and outside site) | Medium Level (both inside and outside site) | Low Level (inside site) | Low Level (outside site) | Low Level (both inside and outside site) |
|---|---|---|---|---|---|---|
| J02.12.02 Dykes and flooding defence in inland water systems | A08 Fertilisation in agriculture | H01 Pollution to surface waters (limnic, terrestrial, marine & brackish) | J02.01 Landfill, land reclamation and drying out, general | A01 Agricultural cultivation | B Forestry | D03.01 Port areas |
| | | E01 Urbanisation and human habitation | | I01 Invasive non-native species | | |
| | | E03 Discharges (household/industrial) | | J02.01.02 Reclamation of land from sea, estuary or marsh | | |

*Source: Lower River Suir SAC (002137) Natura 2000 Data Form,* https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF002137.pdf (Accessed 12th July 2023)

**Table 4-2: Summary of the potential occurrence of qualifying interests of the Lower River Suir SAC within the ZoI of the Proposed Development**

| | Natura Code | Item Description | Occurrence |
|---|---|---|---|
| Habitats | 91A0 | Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles | The area of this designated habitat mapped by NPWS in Map 4 of the Conservation Objectives (NPWS, 2017) is located at Portlaw Wood within the Curraghmore Estate and other small pockets within the SAC. This habitat does not occur within or in the vicinity of the proposed works and there is no connectivity between this terrestrial habitat and the proposed works. |
| | 91E0 | Alluvial forests with *Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)* | There are areas of this habitat mapped in Map 5 of the Conservation Objectives (NPWS, 2017). This habitat occurs downstream of the proposed works, downstream of Carrick-on-Suir (the closest mapped habitat is c.55km downstream of the site). |
| | 91J0 | *Taxus baccata* woods of the British Isles* | The distribution of this terrestrial designated habitat has not been mapped in detail and is currently unknown. An area of this woodland is known to occur in Cahir Park, upstream of the proposed works. This habitat does not occur within or in the vicinity of the proposed works and there is no connectivity between this terrestrial habitat and the proposed works. |
| | 3260 | Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation | The distribution of this designated habitat is currently unknown, but it is considered to occur in lowland, depositing and tidal rivers. The uncommon, protected opposite-leaved pondweed (*Groenlandia densa*) was recorded in the SAC from floodplain ditches of the Suir near Carrick on-Suir and Clonmel (NPWS, 2017). |
| | 1330 | Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) | A coastal habitat –present in the lower reaches downstream of Waterford City (NPWS, 2017). This habitat occurs downstream of the proposed works (the closest mapped habitat is c.82km downstream of the site). |
| | 1410 | Mediterranean salt meadows (*Juncetalia maritimi*) | A coastal habitat –present in the lower reaches downstream of Waterford City (NPWS, 2017). This habitat occurs downstream of the proposed works (the closest mapped habitat is c.82km downstream of the site). |
| | 6430 | Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels | The distribution of this designated habitat is currently unknown, but it is considered to occur in association with some riverside woodlands, areas of open marsh or wet grassland within the SAC (NPWS, 2011). Taking the precautionary approach, this habitat could be downstream of the propped site. |

| | Natura Code | Item Description | Occurrence |
|---|---|---|---|
| Species | 1095 | Sea lamprey (*Petromyzon marinus*) | These species are known to occur in the lower stretches of the River Suir (NPWS, 2017). Lamprey were not recorded during Aquatic surveys in the vicinity of the site (Appendix 6), or upstream of Clonmel in the Suir during 2018 IFI surveys. |
| | 1096 | Brook lamprey (*Lampetra planeri*) | |
| | 1099 | River lamprey (*Lampetra fluviatilis)* | |
| | 1106 | Atlantic salmon (*Salmo salar)* | This species is known to occur in the lower stretches of the River Suir (NPWS, 2017). Salmon were recorded 7km downstream of the Site in the Nier river 2013 during surveys by IFI. |
| | 1103 | Twaite shad (*Alosa alosa*) | This species is known to occur in the lower stretches of the River Suir and largely associated with estuaries (NPWS, 2017). |
| | 1355 | Otter (*Lutra lutra*) | It is likely otters utilise the River Suir SAC from estuary to headwater (NPWS, 2017). While no signs of otter activity were identified within or in the vicinity of the proposed works during the field surveys, there is potential for otter to be present in the River Suir and Rathpartick stream adjacent to the proposed works. |
| | 1092 | White-clawed crayfish (*Austropotamobius pallipes*) | This species once occurred extensively on the River Suir and on many of its tributaries. There are areas of this species in Map 7 of the Conservation Objectives (NPWS, 2017). The closest mapped area to the proposed works is 14km downstream from the Site. |
| | 1029 | Freshwater pearl mussel (*Margaritifera margaritifera*) | The conservation objective applies to the Clodiagh freshwater pearl mussel population, which is listed on The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. (S.I. 296 of 2009). The Clodiagh catchment is upstream of the main channel of the River Suir, with a direct path distance of 17.5km between the Clodiagh/Suir confluence and the closest hydrologically linked node. As such there is no direct hydrological connectivity. |

Having regard to Table 4-2 the qualifying interests of the Lower River Suir SAC which may potentially be within the zone of influence of the Proposed Development are:

- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
- Lamprey
- Atlantic salmon (*Salmo salar)*
- White-clawed crayfish (*Austropotamobius pallipes*)
- Otter (*Lutra lutra*)

### 4.2.2 Blackwater River (Cork/Waterford) SAC

The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and five ranges of mountains. In times of heavy rainfall the levels can fluctuate widely by more than 12 feet on the gauge at Careysville. The peaty nature of the terrain in the upper reaches and of some of the tributaries gives the water a pronounced dark colour. The site consists of the freshwater stretches of the River Blackwater as far upstream as Ballydesmond, the tidal stretches as far as Youghal Harbour and many tributaries, the larger of which include the Licky, Bride, Flesk, Chimneyfield, Finisk, Araglin, Awbeg (Buttevant), Clyda, Glen, Allow, Dalua, Brogeen, Rathcool, Finnow, Owentaraglin and Awnaskirtaun. The portions of the Blackwater and its tributaries that fall within this SAC flow through the counties of Kerry, Cork, Limerick, Tipperary and Waterford. Nearby towns include Rathmore, Millstreet, Kanturk, Banteer, Mallow, Buttevant, Doneraile, Castletownroche, Fermoy, Ballyduff, Rathcormac, Tallow, Lismore, Cappoquin and Youghal. (NPWS 2016).

The Lower River Suir SAC is selected for alluvial wet woodlands, priority habitats on Annex I of the E.U. Habitats Directive (92/43/EEC), 1992, as amended. The site is also selected as a SAC for estuaries, mudflats and sandflats, perennial vegetation of stony banks, *Salicornia* muds, Atlantic salt meadows, Mediterranean salt meadows, floating river vegetation, and old oak woodlands, all habitats listed on Annex I of the E.U. Habitats Directive.

As well as habitats, the SAC has been selected due to the presence of botanical, invertebrate, fish and mammal species which are listed under Annex II of the EU Habitats Directive, including Killarney fern (*Trichomanes speciosum*), freshwater pearl mussel (*Margaritifera margaritifera*), freshwater crayfish (*Austropotamobius pallipes*), Atlantic salmon (*Salmo salar*), twaite shad (*Alosa fallax fallax*), the three Irish Lamprey species - sea (*Petromyzon marinus*), brook (*Lampetra planeri*) and river (*Lampetra fluviatilis*), and Eurasian otter (*Lutra lutra*).

The main threats and pressures which may impact the Blackwater River (Cork/Waterford) SAC are set out in the Natura 2000 Data Form and are presented in Table 4-3. The qualifying interests of the SAC and their potential to occur within the area of the proposed GCR are presented in Table 4-4.

**Table 4-3: Threats, Pressures and Activities with Impacts on the Blackwater River (Cork/Waterford) SAC**

| High Level (inside site) | High Level (both inside and outside site) | Medium Level (inside site) | Medium Level (outside site) | Medium Level (both outside and inside site) | Low Level (inside site) | Low Level (outside site) |
|---|---|---|---|---|---|---|
| A03 Mowing / cutting of grassland | A04 Grazing | F02.03 Leisure fishing | B Forestry | I01 Invasive non-native species | B Sylviculture, forestry | C01.01 Sand and gravel extraction |
| | A08 Fertilisation in agriculture | | E01 Urbanisation and human habitation | | D01.02 Roads, motorways | G02 Sport and leisure structures |
| | | | E02 Industrial or commercial areas | | D01.04 Railway lines, TGV | J02.01 Landfill, land reclamation and drying out, general |
| | | | J02.01 Landfill, land reclamation and drying out, general | | E03.01 Disposal of household/ recreational facility waste | K01.01 Erosion |
| | | | | | G01.01 Nautical sports | |

**Table 4-4: Summary of the potential occurrence of qualifying interests of the Blackwater River (Cork/ Waterford) SAC within the ZoI of the Proposed Development**

| | Natura Code | Item Description | Occurrence |
|---|---|---|---|
| Habitats | 91A0 | Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles | This habitat does not occur within or in the vicinity of the proposed works and there is no connectivity between this terrestrial habitat and the proposed works. |
| | 91E0 | Alluvial forests with *Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)* | A riparian habitat –present in the lower reaches, downstream of Cappoquin (NPWS, 2012). The closest mapped habitat is c.18km downstream of the proposed watercourse crossing. |
| | 1130 | Estuaries | A tidal habitat –present in the lower reaches, downstream of Cappoquin (NPWS, 2012). The closest mapped habitat is c.18km downstream of the proposed watercourse crossing. |
| | 1140 | Mudflats and sandflats not covered by seawater at low tide | A tidal habitat –present in the lower reaches, upstream of Youghal (NPWS, 2012). The closest mapped habitat is c.34km downstream of the proposed watercourse crossing. |
| | 1220 | Perennial vegetation of stony banks | Extent of this habitat is not yet mapped; however it is unlikely that this coastal habitat is within the vicinity of or directly downstream from the GCR works |
| | 1310 | Salicornia and other annuals colonising mud and sand | Extent of this habitat is not yet mapped; however it is unlikely that this tidal habitat is within the vicinity of or directly downstream from the GCR works |
| | 1330 | Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) | A tidal habitat –present in the lower reaches, upstream of Youghal (NPWS, 2012). The closest mapped habitat is c.34 km downstream of the proposed watercourse crossing. |
| | 1410 | Mediterranean salt meadows (*Juncetalia maritimi*) | A tidal habitat –present in the lower reaches, upstream of Youghal (NPWS, 2012). The closest mapped habitat is c.35 km downstream of the proposed watercourse crossing. |
| | 3260 | Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation | The distribution of this designated habitat is currently unknown, but it is considered to occur in lowland, depositing and tidal rivers |

| | Natura Code | Item Description | Occurrence |
|---|---|---|---|
| | 1421 | Killarney Fern (*Trichomanes speciosum*) | Two locations are known, both upstream of the proposed GCR works. |
| Species | 1095 | Sea lamprey (*Petromyzon marinus*) | River/ brook lamprey species has been recorded downstream of the proposed GCR watercourse crossing, with the closest record 5.5km downstream of the works. There are no records of sea lamprey downstream of the works. |
| | 1096 | Brook lamprey (*Lampetra planeri*) | |
| | 1099 | River lamprey (*Lampetra fluviatilis)* | |
| | 1106 | Atlantic salmon (*Salmo salar)* | This species occurs in the rivers throughout the SAC. Salmon were recorded 6km downstream of the Site in the Finisk river in 2017 during surveys by IFI. |
| | 1103 | Twaite shad (*Alosa alosa*) | This species spends most of its life in estuaries. No records within the vicinity of GCR works. |
| | 1355 | Otter (*Lutra lutra*) | It is likely otters utilise the River Suir SAC from estuary to headwater (NPWS, 2017). Therefore, there is potential for otter to be present in the downstream of the proposed works. |
| | 1092 | White-clawed crayfish (*Austropotamobius pallipes*) | This species is limited to the Awbeg River. As records of this species are situated in a different catchment, upstream from the Finisk/Blackwater confluence, there is no direct hydrological connectivity. |
| | 1029 | Freshwater pearl mussel (*Margaritifera margaritifera*) | The conservation objective applies to freshwater pearl mussel populations in two tributaries, Owentaraglin and Allow. These designated tributaries are located upstream from the proposed GCR works. As such there is no direct hydrological connectivity. |

Having regard to Table 4-4 the qualifying interests of the Lower River Suir SAC which may potentially be within the zone of influence of the Proposed Development are:

- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
- Lamprey
- Atlantic salmon (*Salmo salar)*
- Otter (*Lutra lutra*)

### 4.2.3 Dungarvan Harbour SPA

Dungarvan Harbour SPA is located in south-west Co. Waterford and lies at the eastern end of the former valley of the River Blackwater - this river now turns south at Cappoquin, vacating its original course. The site includes Dungarvan Harbour as far east as Ballynacourty Point and west to include the tidal sections of the River Brickey. Three rivers flow into Dungarvan Harbour - the Colligan River, which runs south from the Comeragh Mountains, enters the bay by Dungarvan town, the River Brickey, which flows into the harbour from the west, and the Glendine River which enters from the north. The absence of a large river entering the site means that the bay is essentially a marine habitat, although it dries out at low tide to give extensive mud and sand flats. The inner bay is extremely sheltered, being almost closed off by the linear Cunnigar spit to the east.

Dungravan Harbour SPA is an important site for wintering waterfowl, and regularly supports an assemblage of over 20,000 wintering waterbirds. The site supports nationally important populations of (qualifying interests) light bellied brent goose and black-tailed godwit. In addition, it holds nationally important populations of golden plover and bar-tailed godwit, both Annex I species.

A further eleven species occur here in nationally important numbers - Great Crested Grebe, Shelduck, Redbreasted Merganser, Oystercatcher, Grey Plover, Lapwing, Knot, Dunlin, Curlew, Redshank and Turnstone.

The main threats and pressures which may impact the Kilcolman Bog SPA are set out in the Natura 2000 Data Form and are presented in Table 4-5. The qualifying interests of the SPA and their potential to occur within the area of the Proposed Development are presented in Table 4-6.

**Table 4-5: Threats, Pressures and Activities with Impacts on the Dungarvan Harbour SPA**

| High Level (outside site) | Medium Level (inside site) | Medium Level (outside site) | Low Level (inside site) |
|---|---|---|---|
| E01: Urbanisation and human habitation | G01.02 walking, horseriding and non-motorised vehicles | A08: Fertilisation | F02.03: Leisure fishing |
| | F01: Marine and Freshwater Aquaculture | | |

*Source: Dungarvan Harbour SPA (004032) Natura 2000 Data Form,* https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004032.pdf (Accessed 12th July 2023)

#### *4.2.3.1 Avifauna Surveys*

##### 4.2.3.1.1 Desktop Study results

The search for historical records of bird species from NPWS and NBDC identified curlew, golden plover and lapwing present within a 10 km search radius of the study area.

##### 4.2.3.1.2 Field Survey results

During vantage point surveys conducted inside the flight activity survey area, golden plover were recorded onsite. Golden plover is an SCI of Dungarvan Harbour SPA. Golden plover was recorded on 12 separate occasions over the course of the whole survey period and was observed at all VP locations. Five of the observations pertain to flocks of 40 birds or greater flying over 100m with two occasions relating to a single bird.

**Table 4-6: Summary of the potential occurrence of Species of Conservation Interests of the Dungarvan Harbour SPA within the area of the Proposed Development**

| Species Code | Item Description | Occurrence |
|---|---|---|
| **A005** | Great Crested Grebe *Podiceps cristatus* | SPA designated for over wintering Great Crested Grebe. No records of wintering species within 10 km2 of site (NBDC). Grebe which is associated with the coast, large loughs and slow flowing rivers. Unlikely to be present within the Site. |
| **A069** | Red-breasted Merganser *Mergus serrator* | SPA designated for over wintering Red-breasted Merganser. No records of wintering species within 10 km2 of site (NBDC). Duck which is largely coastal and generally found near estuaries. Unlikely to be present within the Site. |
| **A141** | Grey Plover *Pluvialis squatarola* | SPA designated for over wintering Grey Plover. No records of wintering species within 10 km2 of site (NBDC). Exclusively coastal species. Unlikely to be present within the Site. |
| **A140** | Golden Plover *Pluvialis apricaria* | SPA designated for over wintering Golden Plover. Records of wintering species within 10 km2 of site (NBDC). Feed on inland improved agricultural fields and usually feed on coastal habitats. Identified within the study area through desktop study and field surveys. |
| **A048** | Shelduck *Tadorna tadorna* | SPA designated for over wintering Shelduck. No records of wintering species within 3 km of site (NBDC). The proposed wind farm unsuitable for this winter visitor that will primarily winter on the coast in sheltered estuaries and tidal mudflats. Unlikely to be present within the Site. |
| **A157** | Bar-tailed Godwit *Limosa lapponica* | SPA designated for over wintering Bar-tailed Godwit. No records of wintering species within 10 km2 of site (NBDC). Wader which is coastal and generally found near estuaries. Unlikely to be present within the Site. |
| **A046** | Light-bellied Brent Goose *Branta bernicla hrota* | SPA designated for wintering of Light-bellied Brent geese. No records of wintering species within 10 km2 of site (NBDC). Primarily coastal species. Unlikely to be present within the Site. |

| Species Code | Item Description | Occurrence |
|---|---|---|
| **A156** | Black-tailed Godwit<br>*Limosa limosa* | SPA designated for over wintering Black-tailed Godwit. No records of wintering species within 10 km2 of site (NBDC). Species winters along coastal (particularly estuaries) and inland wetlands. Proposed wind farm unsuitable for this winter visitor which is primarily a coastal (particularly estuaries) and inland wetlands inhabitant. Unlikely to be present. |
| **A160** | Curlew<br>*Numenius arquata* | SPA designated for over wintering Curlew. Records of wintering species within 10 km2 of site, but no records within 2km2 ( (NBDC). Wader that uses both coastal and inland wetlands. They breed on upland and lowland bogs, wet grassland and unimproved/semi-improved pasture. In addition to bogs, damp pastures grazed lightly by cattle with a mixed sward height and a scattering of rush or tussocks is a favoured habitat. As this species was not recorded during the two-year bird surveys, this species is unlikely to be present within the Site. |
| **A164** | Turnstone<br>*Arenaria interpres* | SPA designated for over wintering Turnstone. No records of wintering species within 10 km2 of site (NBDC). Coastal wader, therefore unlikely to be present within the Site. |
| **A162** | Redshank<br>*Tringa totanus* | SPA designated for over wintering Redshank. No records over wintering within 10 km of site (NBDC). Mainly coastal wader (though it will use lakes and large rivers). Unlikely to be present within the Site. |
| **A142** | Lapwing<br>*Vanellus vanellus* | SPA designated for over wintering Lapwing. Records of wintering species within 10 km of site, but no records within 2km2 (NBDC). Large flocks regularly recorded in a variety of habitats, including most of the major wetlands, pasture and rough land adjacent to bogs. As this species was not recorded during the two-year bird surveys, this species is unlikely to be present within the Site. |
| **A143** | Knot<br>*Calidris canutus* | SPA designated for over wintering Knot. No records of wintering species within 10 km2 of site (NBDC). Coastal wader, therefore unlikely to be present within the Site. |
| **A130** | Oystercatcher<br>*Haematopus ostralegus* | SPA designated for over wintering Oystercatcher. No records of wintering species within 10 km2 of site (NBDC). Coastal wader, therefore unlikely to be present within the Site. |
| **A149** | Dunlin<br>*Calidris alpina* | SPA designated for over wintering Dunlin. No records of breeding species within 10 km of site (NBDC). Coastal wader, unlikely to be present within the Site. |
| **A999** | *Wetlands* | Direct hydrological connection from project site to SPA. All waterbodies on site drain into the Colligan River (EPA code: IE_SE_17C010150), which forms hydrological link to Dungarvan Harbour SPA, with an in-stream distance of c. 17km from the site to the SPA. Downstream of the GCR the Colligan River, via an existing clear-span bridge, where Himalayan balsam is present. The habitat type is identified as a resource for the regularly-occurring migratory waterbirds that utilise it. |

Having regard to Table 4-6 the qualifying interests of the Dungarvan Harbour SPA which may potentially be within the zone of influence of the Site, GCR and TDR are:

- Golden Plover
- Wetlands – hydrologically linked to the GCR, via Colligan River

### 4.2.4 Mid-Waterford Coast SPA

The Mid-Waterford Coast SPA encompasses the areas of high coast and sea cliffs in Co. Waterford between Newtown Cove to the east and Ballyvoyle to the west. The site includes the sea cliffs and the land adjacent to the cliff edge. Sea cliffs are the predominant habitat of the site; these occur along its length and are generally well-vegetated by a suite of typical sea cliff species. Above the cliffs areas of heath, improved grassland, unimproved wet and dry grassland, and woodland occur.

The site supports an internationally important population of breeding Chough, and a nationally important Peregrine and Herring Gull population. Other breeding seabird populations include Fulmar, Shag, Guillemot, Razorbill and Black Guillemot.

The main threats and pressures which may impact the Mid-Waterford Coast SPA are set out in the Natura 2000 Data Form and are presented in Table 4-7. The qualifying interests of the SPA and their potential to occur within the area of the Proposed Development are presented in Table 4-8.

**Table 4-7: Threats, Pressures and Activities with Impacts on the Mid-Waterford Coast SPA**

| Low Level (inside site) | Low Level (outside site) |
|---|---|
| A04.03 abandonment of pastoral systems, lack of grazing | E05: Storage of materials |
| A02: modification of cultivation practices | E04.01: Agricultural structures, buildings in the landscape |

*Source: Stack's to Mid-Waterford Coast SPA (004193) Natura 2000 Data Form, https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004193.pdf (Accessed 12th July 2023)*

#### *4.2.4.1 Avifauna Surveys*

##### 4.2.4.1.1 Desktop Study Results

The search for historical records of bird species from NPWS and NBDC identified curlew, golden plover and lapwing present within a 10 km search radius of the study area.

##### 4.2.4.1.2 Field Survey results

Peregrine, a SCI of Mid-Waterford Coast SPA, was recorded on six separate occasions over the course of the whole survey period and was observed at all VP locations. All flights pertain to individual birds flying over mainly grassland moorland and all activity occurred partially or completely within the site boundary.

The first four observations occurred in winter 2019/20. On 29th November 2019, an adult in a south-easterly direction at a height of 17-18m. On 19th December 2019, a juvenile was seen flying at speed. The bird flew in a north-easterly direction over into the valley at 30m. On 11th January 2020, an individual was seen flying directly down the valley at 80-100m heading south. On 16th February 2020, an adult was seen flying at 150m in a south-westerly direction before veering round to head back east.

During the summer 2020 survey period there was one observation. On 24th April, an adult male was observed flying over an area of grassland moorland in a westerly direction at 15m before going out of view.

Herring gull, a SCI of Mid-Waterford Coast SPA, was recorded on two occasions over the course of the whole survey period and was observed at VP1 and VP3 only. Both observations occurred in summer 2020 in the month of June and one flight path was within the site and the other crossing through the site boundary. On the 8th an adult was seen soaring at 100m above grassland moorland heading in a northerly direction. On the 11th an adult was seen flying at 150m over grassland moorland. The bird flew north-westerly before veering round to head back southeast.

**Table 4-8: Summary of the potential occurrence of Species of Conservation Interests of the Mid-Waterford Coast SPA within the area of the proposed site**

| Species Code | Item Description | Occurrence |
|---|---|---|
| **A017** | Cormorant<br>*Phalacrocorax carbo* | SPA designated for cormorant. No records of species within 10 km2 of site (NBDC). It is associated with the coast, large rivers and lakes. Not recorded during two-year bird surveys of study area, and unlikely to be present within the Site. |
| **A103** | Peregrine<br>*Falco peregrinus* | Site not within the core foraging range of Mid-Waterford Coast SPA for this species, it is however within the maximum foraging range from nest sites. Additionally, peregrine have been identified within 10km2 of the site (NBDC) and within the Site itself, through field surveys. |
| **A184** | Herring Gull<br>*Larus argentatus* | Herring gull have been identified within 10km2 of the site (NBDC) and within the Site itself, through field surveys. Therefore, this species is being carried forward within the assessment. |
| **A346** | Chough<br>*Pyrrhocorax pyrrhocorax* | No records of species within 10 km2 of site (NBDC). It is associated with the coast and was not recorded during two-year bird surveys of the Site. It is therefore unlikely to be present within the Site. |

Having regard to Table 4-8 the qualifying interests of the Dungarvan Harbour SPA which may potentially be within the zone of influence of the Site are:

- Peregrine
- Herring Gull

## 4.3 Potential For Adverse Effects on Site Integrity

The potential for the Proposed Development (in the absence of mitigation) to adversely affect the integrity of the Lower River Suir SAC (002137), Blackwater River (Cork/Waterford) cSAC (002170), Dungarvan Harbour SPA (004032) and Mid-Waterford Coast (004193) is assessed hereunder.

The conservation conditions required by these species are defined by attributes and targets set out in the Conservation Objectives Reports. No other qualifying interests of the aforementioned European sites were determined to be within the zone of influence of the Proposed Development having regard to the potential for the affected areas to support the qualifying features.

NPWS, in their Article 17 reporting (NPWS, 2019b) and Article 12 reporting (NPWS 2012) define the favourable conservation status of an Annex I habitat as achieved when:

- its natural range, and area it covers within that range, are stable or increasing,
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of an Annex II species (habitats Directive) and Annex I species (Birds Directive) is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### 4.3.1 Potential Impacts

The elements of the Proposed Development which were identified as posing a pressure on the Shanballyanne stream (upstream of the Nier and Suir rivers), the Ballynaguilkee_lower stream (upstream of Finisk River and Blackwater [Munster]) (GCR), and Colligan River (GCR):

The qualifying interests of the Lower River Suir SAC further considered are:

- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
- Lamprey
- Atlantic salmon (Salmo salar)
- White-clawed crayfish (Austropotamobius pallipes)
- Otter (Lutra lutra)

The qualifying interests of the Blackwater River (Cork/Waterford) SAC further considered are:

- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
- Lamprey species
- Atlantic salmon
- Otter

The qualifying interests of the Dungarvan Harbour SPA further considered are:

- Golden Plover
- Wetlands and waterbirds

The qualifying interests of the Mid-Waterford Coast SPA further considered are:

- Peregrine
- Herring Gull

Emissions to water via the following pathways:

*Construction*

**Surface water runoff**

Tree felling, new access tracks and upgrade of existing tracks, turbine hardstanding areas, the on-site substation and all other new hard surfaces have the potential to contribute to the increase in runoff.

**Suspended solids**

Potential sources of sediment laden water include:

Standing water in excavations could contain an increased concentration of suspended solids as a result of the disturbance of the underlying soils.

- Haul roads passing close to watercourses could allow the migration of silt laden runoff into watercourses.
- Silt carried on the wheels of vehicles leaving the Site could be carried onto the public road.
- A blockage in the proposed roadside drains could allow a break out of silt laden runoff to reach adjacent watercourses or streams.
- Runoff from the borrow pit area could be silt laden, with the risk of draining into receiving watercourses, given the exposed nature of the borrow pit areas due to the excavation and haulage of stone from the area.
- Overland flow entering excavations could increase the quantity of surface water to be treated for sediment removal.
- Inappropriate management of excavations could lead to loss of suspended solids to surface waters.
- Inappropriate management of the excavated material could lead to loss of suspended solids to surface waters.

- Surface water inflows and minor groundwater seepages may occur in turbine base excavations. Pumped water from the excavations will most likely contain suspended solids.
- To accommodate the access to the locations of the proposed turbines, a total of three new crossing over the Site watercourses will be constructed. It is proposed to install one single-span bridge and two open bottomed box culvert crossings on these watercourses. During the construction there is a potential to release suspended solids into the watercourse. Works leading to erosion of the river banks/bed could result in the release of suspended solids.
- Horizontal directional drilling (HDD) for the GCR water crossing of the unnamed tributary of Skeheens Stream. Watercourses crossed by directional drilling are at risk of suspended solid releases, hydrocarbon pollution and escapement of drilling lubricants (e.g. bentonite).

**Release of hydrocarbons**

- Refueling activities could result in fuel spillages which could pollute underground and surface water, especially during the construction of new culverts/bridges.
- There is the potential for fuel spill/leaks from storage tanks which will be stored on Site for plant machinery. Fuel spill/leaks could infiltrate underground and pollute underground water. Fuel spills/ leaks could be drained to watercourses and pollute them.
- Tree felling process require trafficking of heavy machinery which can lead to pollution of watercourses due to spillage of fuels and hydrocarbons

**Contamination from Wastewater Disposal**

Release of effluent from domestic wastewater treatment systems has the potential to impact surface. For low permeability of the subsoils at the site, surface waters are more vulnerable to impact rather than groundwater.

**Release of Cement-Based Products**

Cement-based products could lead to contamination of receiving waters and groundwaters.

**Release of Nutrients**

Tree felling could lead to an increase in sediment and nutrients in the surface water runoff, if the brash is left in place in the riparian buffer zones.

**Potential Impacts Associated with Construction GCR**

The following potential impacts could result from the construction activities related to grid route installation and watercourse crossings:

- Suspended solids drained to watercourse could potentially lead to siltation and physical effect on flora and fauna.
- Excavated soil could be mobilised in the surface water runoff during an extreme rainfall event.
- The excavation of trenches for cable laying, and the launch and reception areas for directional drilling, could lead to silt laden surface water run-off.
- Inadequate storage of fuels and oils could lead to contamination of surface water.
- Refuelling activities could result in fuel spillage.
- Works leading to erosion of the riverbanks/bed could negatively impact on the fisheries habitat.
- Drilling fluids associated with watercourse crossing works could pollute watercourse.

- Sediment laden runoff during the launch pit and reception pit excavation works.
- Hydrocarbons.

Himalayan balsam, a high impact Third Schedule INNS, has been recorded along the GCR at the N71 bridge that crosses the Colligan. Due to the locations of the Himalayan balsam, there is potential for spread within the Proposed Development working areas.

*Operation and Maintenance*

During the operation stage, small quantities of oil will be used in cooling the transformers associated with the facility. There is therefore a potential for small oil spills during maintenance works.

*Decommissioning*

In the event of decommissioning, activities would take place in a similar fashion to the construction phase. Potential impacts would be similar to the construction phase but to a lesser degree.

There would be increased traffic and an increased risk of disturbance to underlying soils at the wind farm, during the decommissioning phase, in this instance, leading to the potential for silt laden run-off entering receiving watercourses from the wheels of vehicles.

Any such potential impacts would be likely to be less than during the construction stage as the drainage swales would be fully mature and would provide additional filtration of runoff. Any diesel or fuel oils stored on Site would be bunded.

For access tracks and turbine foundations it is proposed that they are left in place and covered with local topsoil and revegetated. Removal of this infrastructure would result in considerable disruption to the local environment in terms of an increased possibility of sedimentation. It is considered that leaving the turbine foundations hardstanding areas in-situ will cause less environmental damage than removing them.

The on-site substation and grid connection cables will be left in the ground, therefore no potential impacts during decommissioning stage are likely to occur.

### 4.3.2 Plans and Projects which Might Act In-combination

**Plans**

The National Biodiversity Action Plan 2017-2021

Ireland's National Biodiversity Action Plan sets out actions through which a range of government, civil and private sectors will undertake to achieve Ireland's 'Vision for Biodiversity' and follows on from the work of the first and second National Biodiversity Action Plans.

A total of 119 targeted actions are contained in the Plan, underpinned by seven strategic objectives. The objectives lay out a clear framework for Ireland's national approach to biodiversity, ensuring that efforts and achievements of the past are built upon, while looking ahead to what can be achieved over the next five years and beyond.

They include:

1. Mainstreaming biodiversity across the decision-making process in the State;
2. Strengthening the knowledge base underpinning work on biodiversity issues;
3. Increasing public awareness and participation;
4. Ensuring conservation of biodiversity in the wider countryside;
5. Ensuring conservation of biodiversity in the marine environment;
6. Expanding and improving on the management of protected areas and protected species;
7. Enhancing the contribution to international biodiversity issues.

Irelands 4th National Biodiversity Action Plan (2023-2027) - Draft for Public Consultation

Ireland's 4th National Biodiversity Action Plan is currently in development and undergoing a public consultation process. This plan will outline the agenda for national biodiversity for 2023 to 2017.

The draft plan is underpinned by 10 key thematic areas, with 6 objectives containing a series of targetable Actions. These objectives are:

1. Adopt a Whole of Government, Whole of Society Approach to Biodiversity
2. Meet Urgent Conservation and Restoration Needs
3. Secure Nature's Contribution to People
4. Embed Biodiversity at the Heart of Climate Action
5. Enhance the Evidence Base for Action on Biodiversity
6. Strengthen Ireland's Contribution to International Biodiversity Initiatives

Waterford City & County Development Plan 2022-2028

The Cork City Development plan includes a series of objectives, which include:

*BD04 BD 04: Appropriate Assessment*

*All projects and plans arising from this Plan will be screened for the need to undertake Appropriate Assessment under Article 6 of the Habitats Directive. A plan or project will only be authorised after the competent authority has ascertained, based on scientific evidence, Screening for Appropriate Assessment, and subsequent Appropriate Assessment where necessary, that:*

> *1. The plan or project will not give rise to significant direct, indirect or secondary effects on the conservation objectives of any European site (either individually or in combination with other plans or projects); or*
>
> *2. The plan or project will have significant adverse effects on the integrity of any European site (that does not host a priority natural habitat type/and or a priority species) but there are no alternative solutions and the plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature. In this case, it will be a requirement to follow procedures set out in legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000; or*

*3. The plan or project will have an adverse effect on the integrity of any European site (that hosts a natural habitat type and/or a priority species) but there are no alternative solutions and the plan or project must nevertheless be carried out for imperative reasons for overriding public interest, restricted to reasons of human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest. In this case, it will be a requirement to follow procedures set out in legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000.*

- *Protection of European Sites*
  *Projects giving rise to adverse effects on the integrity of European sites (cumulatively, directly or indirectly) arising from their size or scale, land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects shall not be permitted except as provided for in Article 6(4) of the Habitats Directive, viz. There must be a) no alternative solution available, b) imperative reasons of overriding public interest for the project to proceed; and c) Adequate compensatory measures in place.*

## Projects

As part of the assessment of in combination effects a search was undertaken for all projects submitted for consent within the last 10 years.

The search radius for large and energy project applications (including wind farms and large infrastructure) was 20km. The search radius for residential applications was 2km. The search radius for applications along the GCR and TDR was 250m. These study areas were considered appropriate due to the limited size and extent of the project, the nature of the impacts and the limited extent of the potential impacts associated with the various aspects of the project, including the works proposed at the Site and GCR, and the works associated with the TDR. The following sources were referred:

- Waterford County Council planning viewer https://www.waterfordcouncil.ie/departments/planning/planning-enquiries/online-planning-enquiries.htm;
- Kilkenny County Council planning viewer https://planning.kilkennycoco.ie/searchtypes;
- Tipperary County Council planning viewer https://www.tipperarycoco.ie/planning/category-search-planning-records;
- An Bord Pleanála (Strategic infrastructure development (SID) applications, Strategic Housing Development (SHD) applications and major project applications including wind farms) https://www.pleanala.ie/en-ie/home;
- Irish Wind Energy Association (IWEA) https://www.iwea.com/
- Department of Department of Housing, Local Government and Heritage's EIA Portal https://www.gov.ie/en/publication/9f9e7-eia-portal/.

Only the projects identified as having potential for in-combination effects are set out hereunder.

### Developments

A number of operational wind farms exist within 20km of the Site; these are detailed and discussed below. Projects along the GCR and TDR were also considered.

There is one operational wind farm within 20 km of the proposed development, Woodhouse Wind Farm (I & II). There are also two privately owned single turbines within 20 km, Tierney and Kilnagrance. There is an additional granted wind farm, a granted private turbine and a proposed windfarm (by EMPower) within 20km of the site.

The following existing and planned wind farms within 20 km of the proposed development were examined for potential cumulative effects on Biodiversity with the proposed development.

**Table 4-9: Existing and permitted/ proposed wind farms within 20 km of the proposed development.**

| Wind Farm Name | Number of turbines | Distance and Direction from proposed site | Status |
|---|---|---|---|
| Tierney Single Turbine | 1 | 5.1km west of Site | Operational<br><br>Privately owned operational (since 2015) single 150 kW turbine (hub height 30 m, tip height 44 m) |
| Kilnagrance Single Turbine | 1 | 14km east of Site | Operational<br><br>Privately owned (KWT Energy Ltd) operational (since 2016) single turbine with a 60 m tip height |
| Woodhouse Wind Farm | 8 | 17.2km west of Site | Operational<br><br>Woodhouse Wind Farm (ESB) is an operational wind farm (since 2015) and was constructed in 2 phases comprising a total of 8 no. wind turbines with a 126 m tip height (45m blade length). |
| Knocknamona Wind Farm | 8 | 17.6 km west of Site | Permitted<br><br>Was granted permission in September 2022 (PL93.309412) and is located immediately south of the existing Woodhouse Wind Farm. The Knocknamona Wind Farm will comprise 8 no. wind turbines with a 146.3 m tip height. |
| Dyrick Hill Wind Farm | 12 | 7.9 km southwest of Site | Proposed (at planning)<br><br>Proposed private development (EMPower) submitted for planning in June 2020 (Case reference: PA93.317265) comprising a 12-turbine array with a 185m tip height. |

The construction phase of Coumnagappul Wind Farm has the greatest potential to contribute suspended solids/pollutants to nearby watercourses due to excavation works and general construction works.

The granted Knocknamona Wind Farm is within the Colligan river catchment, however, is not upstream of the Colligan River, and the hydrologically connected Brickey River enters Dungarvan Harbour at a different point to the Colligan. As such, if both wind farms were constructed at the same time, there could be potential for cumulative effects on the aquatic receiving environment of Dungarvan Harbour only. The potential for cumulative effects on habitats, flora and less mobile species of fauna are considered negligible.

The potential for cumulative impacts to bats from both existing and proposed turbines within 20 km is considered further below.

Large Scale/ Infrastructure Projects:

The following projects within c. 20km of the proposed site are consented:

Housing Developments

An application for completion of 361 no. residential units (207 no. houses and 154 no. apartments), creche and associated site works permitted under planning Case reference: TA93.304423 in Knockboy, Co. Waterford is permitted, located c. 3 km south west from the Site.

An application for completion of 115 no. residential units (68 no. houses and 47 no. apartments), creche and associated site works permitted under planning Case reference: TA92.311290 in Croan Lower, Co. Tipperary is permitted, located c. 11.6 km north from the Site.

An application for c the demolition of existing buildings and the construction of 61 dwellings permitted under planning Case Reference PL92.308934 in Clonmel, Co. Tipperary is permitted, located c. 12.6 km north from the Site.

An application for completion of 44 houses which comprise of 22 detached and 22 semidetached houses permitted under planning Case reference: PL92.304695 in Clonmel, Co. Tipperary is permitted, located c. 12.8 km north from the Site.

An application for completion of 218 no. residential units (176 no. houses, 42 no. apartments), creche and associated site works permitted under planning Case reference: TA93.310782 in Duckspool, Co. Waterford is permitted, located c. 16.8 km south from the Site.

An application for completion of 138 no. residential units, 24 no. 'step down/independent living' units and associated site works permitted under planning Case reference: TC92.303786 in Clonmel, Co. Tipperary is permitted, located c. 13.6 km north from the Site.

The construction of 25 no. dwelling houses (Case reference: PL92.309325) in Carrickbeg, Co. Tipperary is permitted, located c. 18.1 km northeast from the Site.

The only housing development within the same sub catchment as the proposed Comnagappul Wind Farm is in Duckspool, Co. Waterford, within the Colligan_SC_010. However, it is not hydrologically linked to the site, with the closest waterbody to Dusckspool being the Deelish Stream, which enters Dungarvan Harbour at a different point to the Colligan River. This, along with a separation distance of 16.8 km, indicates that cumulative impacts between the site and the development in Duckspool are unlikely.

Other Renewable Energy Developments

There are six solar farm applications located within 20 km of the proposed wind farm site:

1. Cooltubbrid West, Co. Waterford (Ref 248413; permitted) (11.6 km from wind farm)
2. Poulbautia, Co. Waterford (Ref 18598; permitted) (12.1 km from wind farm)
3. Curraghduff and Mothel, Co. Waterford (Ref 19183; permitted) (14.5 km from wind farm) (NIS submitted)
4. Rathnaskilloge (E.D. Ballylaneen), Glen West (E.D. Fox's Castle) , & Curraheen (E.D. Stradbally), Co. Waterford (Ref. 19290; permitted) (14.9 km from wind farm)
5. Ballynagrana and Deerparklodge, Co. Tipperary (Ref 16600640; permitted) (18.7 km from wind farm) (NIS Submitted)
6. Baskilloge (E.D. Ballylaneen), Glen West (E.D. Fox's Castle) , & Curraheen (E.D. Stradbally), Co. Waterford

An electrical substation and associated 110kV and MV infrastructure required to connect ground mounted solar PV generation to the electricity transmission system with all associated ancillary site development work. Rathnaskilloge, Stradbally, Co. Waterford VA93.304558

There is a 10-year permission for a 110kV electricity substation, two control buildings, radio mast, four number lattice towers, modifications and connection to the existing on-site 110kV transmission line, perimeter fencing and access gate and all ancillary development services and works at the Townland of Curraghduff, Co. Waterford. VA93.303930.

The application for the development of Knocknamona Windfarm Grid Connection (KWF Grid Connection) development comprises; a)1940m of underground medium voltage electrical cabling(up to 33kV), in Keereen Upper & Knocknamona townlands, linking Knocknamona Windfarm (to be constructed) & Woodhouse 110kV Substation (operational).

In terms of acting cumulatively with the proposed development, the most relevant projects are those that may be constructed at the same time as the proposed Coumnagappul Wind Farm project and are within the same catchment, as this increases the likelihood of impacts acting cumulatively. Solar farms have no moving parts and installation of panels creates minimal disturbance to the ground. No cumulative effects are envisaged in this regard.

The above solar farms and other electrical infrastructure applications are located in a different sub-catchment and as such no cumulative effects are likely.

**Farming**

Intensive grassland management is prevalent in parts of the wind farm site and is the dominant land use along the GCR and TDR. The diversity of flora within the habitats has been reduced dramatically by drainage, reseeding, fertilisation and intensive grazing by cattle. The main potential impact would be an increase in nutrient levels of local watercourses. There is potential for the proposed wind farm to contribute to a cumulative effect on water quality in drains within the site and local watercourses further downstream of the site, through the potential for sediments and other pollutants entering the watercourses as a result of felling, construction activities in addition to ongoing farming operations.

The risk of such effects would, for example, greatly increase if such works were taking place during the winter months or times of very high rainfall. Due to the small sizes and fisheries values of the watercourses draining the proposed development site, any additional pressures such as release of suspended solids and or nutrients as a result of the construction, operational and or decommissioning phases could result in further effects.

**Forestry**

Forestry is one of the main land uses within the wind farm site and is relatively common within the greater area, particularly on hillsides at higher elevations. Conifer plantation is common within the proposed site at surrounding area. Effects often associated with forestry on the local environment are habitat loss, habitat alteration and potential reduction in water quality.

While forestry may have resulted in a reduction in water quality locally closer to the time of establishment, the water quality in the majority of the streams within the study area is more closely dependent on agricultural activities.

There is potential for felling and construction activities at the wind farm site to act cumulatively with other forestry activities in the same catchment, particularly harvesting operations. While it is difficult to quantify the level of resultant effects with certainty, in-combination effects are considered likely. These would include the increased release of sediments and nutrients to receiving watercourses.

In the absence of mitigation potential indirect cumulative effects to the rivers draining the proposed site could occur further downstream and a Medium-term Moderate Reversible Cumulative effect is considered likely.

### 4.3.3 Potential for Adverse Effects

An assessment of the Proposed Development to have adverse effects on the integrity of the identified European sites is presented hereunder with respect to the qualifying interests which have been identified to be within the zone of influence of the project. An evaluation as to whether there is potential for the conservation objectives to be affected by the Proposed Development in-combination with other plans or projects is also included.

**Table 4-10: Conservation Objectives and Structure and Functions for Relevant Qualifying Interests / Species of Conservation Interest.**

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| Lower River Suir SAC (002137) | Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] | To maintain the favourable conservation condition of Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation in Lower River Suir SAC | Habitat area | Kilometres | Area stable or increasing, subject to natural processes. | **Potential for Adverse Effects**<br>This habitat type was not recorded within or downstream of the project site during aquatic surveys. However, as this habitat within the SAC is not mapped, it is potentially downstream of the Site.<br>In the event of emissions, as explained in section 5.3.1, reaching the Suir River, resulting in a degradation of water quality due to sedimentation. Reduction in the quality of the watercourse for this habitat type is possible in the absence of appropriate mitigation. | Yes<br>Potential to affect this target by contributing to a cumulative deterioration in water quality exists. | Temporary due to the duration of the project. | Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Habitat distribution | Occurrence | No decline, subject to natural processes. | | | | |
| | | | Hydrological regime: river flow | Metres per second | Maintain appropriate hydrological regimes | | Yes<br>potential to affect this target by contributing to a deterioration on river flow exists. | | |
| | | | Hydrological regimes: groundwater discharge | Metres per second | Maintain appropriate hydrological regimes | | | | |
| | | | Hydrological regime: tidal influence | Daily water level fluctuations - metres | Maintain natural tidal regime | | No<br>The tidal extent of the objective does not include the upper section of the Suir River. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Substratum composition: particle size range | Millimetres | Maintain appropriate substratum particle size range, quantity and quality, subject to natural processes. | | Yes<br>potential to affect this target by contributing to an altered substratum composition exists. | Temporary due to the duration of the project. | Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Water quality | Various | Maintain appropriate water quality to support the natural structure and functioning of the habitat | | Yes<br>potential to affect this target by contributing to a cumulative increase in nutrients exists. | | |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | Typical species | Occurrence | Maintain typical species in good condition, including appropriate distribution and abundance | | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in species type and condition exists. | | |
| | | | Floodplain connectivity | Hectares | Maintain floodplain connectivity necessary to support the typical species and vegetation composition of the habitat | | Yes<br><br>potential to affect this target by contributing to a cumulative alteration to floodplain area exists. | | |
| | | | Fringing habitats | Hectares | Maintain marginal fringing habitats that support the typical species and vegetation composition of the habitat | | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in species type and condition exists. | | |
| | Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels | To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in Lower River Suir SAC | Habitat area | Hectares | Area stable or increasing, subject to natural processes. | **Potential for Adverse Effects**<br>This habitat type was not recorded within or downstream of the project site during aquatic surveys. However, as this habitat within the SAC is not mapped, it is potentially downstream of the Site.<br>In the event of emissions reaching the Suir River, resulting in a degradation of water quality due to sedimentation. Reduction in the quality of the watercourse for this habitat type is possible in the absence of appropriate mitigation. | Yes<br><br>Potential to affect this target by contributing to a cumulative deterioration in water quality exists. | Temporary due to the duration of the project | Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Habitat distribution | Occurrence | No decline, subject to natural processes. | | | | |
| | | | Hydrological regime: flooding depth/ height of water table | Metres per second | Maintain appropriate hydrological regimes. | | Yes<br><br>potential to affect this target by contributing to a deterioration on river flow exists. | | |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | Vegetation composition: positive indicator species | Number of species at a representative number of monitoring stops | At least three positive indicator species present. | | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in species type and condition exists. | | |
| | | | Vegetation composition: positive indicator species | % cover at a representative number of monitoring stops | Cover of positive indicator species at least 40%. | | | | |
| | | | Vegetation composition: non-native species | % cover at a representative number of monitoring stops | Cover of non-native species not more than 1%. | | | | |
| | | | Vegetation composition: negative indicator species | % at a representative number of monitoring stops | Cover of negative indicator species not more than 33%. | | | | |
| | | | Vegetation composition: scrub, bracken and heath | % at a representative number of monitoring stops | Cover of scrub, bracken (Pteridium aquilinum) and heath not more than 5%. | | | | |
| | | | Vegetation structure: height | Height (cm) at a representative number of monitoring stops | Herb height at least 50cm | | | | |
| | | | Physical structure: bare soil | % at a representative number of monitoring stops | Cover of bare soil not more than 10%. | | | | |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | Physical structure: grazing and disturbance | m2 in local vicinity of a representative number of monitoring stops | Area of the habitat showing signs of serious grazing or disturbance less than 20 m2. | | No<br><br>There are no projects or plans which involve the direct disturbance to this habitat | N/A | No potential for the project to affect the integrity of this habitat either alone or in-combination with other plans or projects exists. |
| | *Petromyzon marinus (*Sea Lamprey) [1095] | To restore the favourable conservation condition of Sea Lamprey in Lower River Suir SAC | Distribution: extent of anadromy | % of river accessible | Greater than 75% of main stem length of rivers accessible from estuary | **No Potential for Adverse Effects**<br>No works proposed within the Carrigower River or SAC that will impede movement of the species. | No<br><br>No projects (including those within plans) identified for in-combination impacts that would impede river access. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Population structure of juveniles | Number of age/size groups | At least three age/size groups present | **Potential for Adverse Effects**<br>The Suir River contains physical habitat suitable for lamprey spawning, and both larval habitat and ammocetes are present downstream of the site.<br><br>In the event of emissions reaching the Suir River as explained in section 5.3.1, a potential negative effect resulting in a degradation of water quality and habitat heterogeneity, thereby reducing the carrying capacity of the watercourse for lamprey is possible in the absence of appropriate mitigation. | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in number of age/size groups for lamprey exists. | Temporary due to the duration of a potential emissions event and the duration of the project. | Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists |
| | | | Juvenile density in fine sediment | Juveniles/m² | Juvenile density at least 1/m² | | Yes<br>potential to affect this target by contributing to a cumulative reduction in juvenile density of lamprey exists. | | |
| | | | Extent and distribution of spawning habitat | m² and occurrence | No decline in extent and distribution of spawning beds | | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in extent and distribution of lamprey spawning habitat exists. | | |
| | | | Availability of juvenile habitat | Number of positive sites in 3rd order channels (and greater), downstream of spawning areas | More than 50% of sample sites positive | | Yes<br>potential to affect this target by contributing to a cumulative reduction in extent and availability of juvenile lamprey habitat exists. | | |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | *Lampetra planeri* (Brook Lamprey) [1096] | To restore the favourable conservation condition of Brook Lamprey in Lower River Suir SAC | Distribution | Percentage of river accessible | Access to all water courses down to first order streams | **No Potential for Adverse Effects**<br>No works proposed within the Suir River or SAC that will impede movement of the species. | No<br>No projects (including those within plans) identified for in-combination impacts that would impede river access. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Population structure of juveniles | Number of age/size groups | At least three age/size groups of brook/river lamprey present | **Potential for Adverse Effects**<br>The Suir River contains physical habitat suitable for lamprey spawning, and both larval habitat and ammocetes are present downstream of the site.<br><br>In the event of emissions reaching the Suir River as explained in section 5.3.1, a potential negative effect resulting in a degradation of water quality and habitat heterogeneity, thereby reducing the carrying capacity of the watercourse for lamprey is possible in the absence of appropriate mitigation. | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in number of age/size groups for lamprey exists. | Temporary due to the duration of a potential emissions event and the duration of the project. | Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Juvenile density in fine sediment | Juveniles/m² | Mean catchment juvenile density of brook/river lamprey at least 2/m² | | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in juvenile density of brook/river lamprey exists. | | |
| | | | Extent and distribution of spawning habitat | m² and occurrence | No decline in extent and distribution of spawning beds | | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in extent and distribution of brook/river lamprey spawning habitat exists. | | |
| | | | Availability of juvenile habitat | Number of positive sites in 2nd order channels (and greater), downstream of spawning areas | More than 50% of sample sites positive | | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in extent and availability of juvenile brook/river lamprey habitat exists. | | |
| | *Lampetra fluviatilis* (River Lamprey) [1099] | To restore the favourable conservation condition of River Lamprey in Lower River Suir SAC | Distribution | Percentage of river accessible | Access to all water courses down to first order streams | **Potential for Adverse Effects**<br>The Suir River contains physical habitat suitable for lamprey spawning, and both larval habitat and ammocetes are present downstream of the site. | No<br><br>No projects (including those within plans) identified for in-combination impacts that would impede river access. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists. |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | Population structure of juveniles | Number of age/size groups | At least three age/size groups of river/brook lamprey present | In the event of emissions reaching the Suir River as explained in section 5.3.1, a potential negative effect resulting in a degradation of water quality and habitat heterogeneity, thereby reducing the carrying capacity of the watercourse for lamprey is possible in the absence of appropriate mitigation. | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in number of age/size groups for lamprey exists. | Temporary due to the duration of a potential emissions event and the duration of the project. | Yes, potential for the project to affect these targets either alone or in-combination with other plans or projects exists. |
| | | | Juvenile density in fine sediment | Juveniles/m² | Mean catchment juvenile density of brook/river lamprey at least 2/m² | | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in juvenile density of lamprey exists. | | |
| | | | Extent and distribution of spawning habitat | m² and occurrence | No decline in extent and distribution of spawning beds | | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in extent and distribution of lamprey spawning habitat exists. | | |
| | | | Availability of juvenile habitat | Number of positive sites in 2nd order channels (and greater), downstream of spawning areas | More than 50% of sample sites positive | | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in extent and availability of juvenile lamprey habitat exists. | | |
| | White-clawed Crayfish *Austropotamobius pallipes* (1092) | To maintain the favourable conservation condition of White-clawed Crayfish in Lower River Suir SAC | Distribution | Occurrence | No reduction from baseline | **Potential for Adverse Effects**<br>While no suitable habitat for white-clawed crayfish was recorded in waterbodies within the vicinity of the Site, the closest mapped area to the proposed works is 14km downstream from the Site (NPWS, 2017).<br><br>In the event of emissions reaching the Suir River as explained in section 5.3.1, a potential negative effect resulting in a degradation of water quality and habitat heterogeneity, thereby reducing the carrying capacity of the watercourses downstream for white-clawed crayfish is possible in the absence of appropriate mitigation. | Yes<br><br>potential to affect this target by contributing to a reduction in distribution exists. | Temporary due to the duration of a potential emissions event and the duration of the project. | Yes, potential for the project to affect these targets either alone or in-combination with other plans or projects exists. |
| | | | Population structure: recruitment | Occurrence of juveniles and females with eggs | Juveniles and/ or females with eggs in all occupied tributaries | | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in juvenile density exists. | | |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | Negative indicator species | Occurrence | No alien crayfish species | | No<br><br>No projects (including those within plans) identified for in-combination impacts that would increase risk of alien crayfish occurrence. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Disease | Occurrence | No instances of disease | | Yes<br><br>potential to affect this target by contributing to a cumulative increase in disease. | Temporary due to the duration of a potential emissions event and the duration of the project. | Yes, potential for the project to affect these targets either alone or in-combination with other plans or projects exists. |
| | | | Water quality | EPA Q value | At least Q3-4 at all sites sampled by EPA | | Yes<br><br>potential to affect this target by contributing to a cumulative deterioration in water quality exists. | | |
| | | | Habitat quality - heterogeneity | Occurrence of positive habitat features | No reduction in habitat heterogeneity or habitat quality | | Yes<br><br>potential to affect this target by contributing to a cumulative deterioration in habitat quality exists. | | |
| | *Salmo salar* (Salmon) [1106] | To restore the favourable conservation condition of Atlantic Salmon in Lower River Suir SAC | Distribution: extent of anadromy | Percentage of river accessible | 100% of river channels down to second order accessible from estuary | **No Potential for Adverse Effects**<br>No works proposed within the Suir River or SAC that will impede movement of the species. | No<br><br>No projects (including those within plans) identified for in-combination impacts that would impede river access. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Adult spawning fish | Number | Conservation limit (CL) for each system consistently exceeded | **Potential for Adverse Effects**<br>The Suir River contains physical habitat that is very suitable for salmonid spawning and nursery. | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in availability of spawning habitat for adult salmon exists. | | |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | Salmon fry abundance | Number of fry/5 minutes electrofishing | Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling | Two electrofishing sites surveyed by Triturus Environmental Ltd in 2021 identified salmon in the Shanballyane River and Knockavannia, both tributaries of the Suir. Salmon were also recorded 7km downstream of the Site in the Nier river 2013 during surveys by IFI.<br><br>Salmon need EPA Class A water: Q values Q4 to Q5. The downstream Nier River and further downstream Suir River is at this standard, with biological water quality ranging from Q4 to Q5.<br><br>In the event of emissions reaching the Suir River as explained in section 5.3.1, a potential negative effect resulting in a degradation of water quality and habitat heterogeneity, thereby reducing the carrying capacity of the watercourse for salmonids is possible in the absence of appropriate mitigation. | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in salmon fry abundance exists. | Temporary due to the duration of a potential emissions event and the duration of the project. | Yes, potential for the project to affect these targets either alone or in-combination with other plans or projects exists. |
| | | | Out-migrating smolt abundance | Number | No significant decline | | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in smolt abundance exists. | | |
| | | | Number and distribution of redds | Number and occurrence | No decline in number and distribution of spawning redds due to anthropogenic causes | | Yes<br><br>potential to affect this target by contributing to a cumulative reduction in the number and distribution of redds quality exists. | | |
| | | | Water quality | EPA Q value | At least Q4 at all sites sampled by EPA | | Yes<br><br>potential to affect this target by contributing to a cumulative deterioration in water quality exists. | | |
| | | | Population structure: age classes | Number of age classes | More than one age class presen | | Yes<br>potential to affect this target by contributing to a cumulative reduction in salmon age class exists. | | |
| | | | Extent and distribution of spawning habitat | $m^2$ and occurrence | No decline in extent and distribution of spawning habitats | | Yes<br>potential to affect this target by contributing to a cumulative reduction in spawning habitats exists. | | |

| QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|
| | | Water quality: oxygen levels | Milligrams per litre | No lower than 5mg/l | | Yes<br>potential to affect this target by contributing to a cumulative deterioration in water quality exists. | | |
| | | Spawning habitat quality: Filamentous algae; macrophytes; sediment | Occurrence | Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth | | Yes<br>potential to affect this target by contributing to a cumulative reduction in gravel substrate exists. | | |
| *Lutra lutra* (Otter) [1355] | To maintain the favourable conservation condition of Otter in Lower River Suir SAC | Distribution | Percentage positive survey sites | No significant decline | **No Potential for Adverse Effects**<br>No works proposed within the Suir River or SAC that will impede movement of the species or reduce existing mapped territory. | No<br><br>No projects (including those within plans) identified for in-combination impacts that would impede distribution of the species. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | Extent of terrestrial habitat | Hectares | No significant decline. Area mapped and calculated as 116.17ha above high water mark (HWM) and 726.61ha along river banks | | No<br><br>No projects (including those within plans) identified for in-combination impacts that would impede movement of the species or reduce existing mapped territory. | | |
| | | Extent of marine habitat | Hectares | No significant decline. Area mapped and calculated as 712.27ha | **No Potential for Adverse Effects**<br>No works proposed within the marine extent of the SAC | No, as the marine extent of the objective does not include the Suir River. | | |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | Extent of freshwater (river) habitat | Kilometres | No significant decline. Length mapped and calculated as 382.31km | No Potential for Adverse Effects<br>No works proposed within the Suir River or SAC that will reduce the extent of freshwater habitat. | No<br>No projects (including those within plans) identified for in-combination impacts that would reduce the extent of freshwater habitat. | | |
| | | | Couching sites and holts | Number | No significant decline | | No<br>No projects (including those within plans) identified for in-combination impacts that would reduce the extent of couching sites and holts. | | |
| | | | Fish biomass available | Kilograms | No significant decline | **Potential for Adverse Effects**<br>In the event of emissions, as explained in section 5.3.1, reaching the Suir River, a potential negative effect resulting in reduction in fish biomass availability may occur in the absence of appropriate mitigation. | Yes<br>potential to affect this target by contributing to a cumulative increase in works taking place exists. | Temporary due to the duration of the Proposed Development. | Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists |
| | | | Barriers to connectivity | Number | No significant increase | **No Potential for Adverse Effects**<br>No works proposed within the Suir River or SAC that will impede the movement of the species, reducing connectivity. | No<br>No projects (including those within plans) identified for in-combination impacts that would impede the movement of the species, reducing connectivity. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| **Blackwater River (Cork/Waterford) SAC 002170** | Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation | To maintain the favourable conservation condition of Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation in the Blackwater River (Cork/Waterford) SAC | Habitat area | Kilometres | Area stable or increasing, subject to natural processes. | **Potential for Adverse Effects**<br>This habitat type was not recorded within or downstream of the project site during aquatic surveys. However, as this habitat within the SAC is not mapped, it is potentially downstream of the Site.<br>In the event of emissions, as explained in section 5.3.1, reaching the Finisk River, resulting in a degradation of water quality due to sedimentation. Reduction in the quality of the watercourse for this habitat type is possible in the absence of appropriate mitigation | Yes<br>Potential to affect this target by contributing to a cumulative deterioration in water quality exists. | Temporary due to the duration of the project. | Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Habitat distribution | Occurrence | No decline, subject to natural processes. | | | | |
| | | | Hydrological regime: river flow | Metres per second | Maintain appropriate hydrological regimes | | Yes<br>potential to affect this target by contributing to a deterioration on river flow exists. | | |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | Hydrological regime: tidal influence | Daily water level fluctuations - metres | Maintain natural tidal regime | | No<br>The tidal extent of the objective does not include the Finisk River. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Substratum composition: particle size range | Millimetres | The substratum should be dominated by the particle size ranges, appropriate to the habitat sub-type (typically sands, gravels and cobbles). | | Yes<br>potential to affect this target by contributing to an altered substratum composition exists. | Temporary due to the duration of the project. | Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Water quality - nutrients | Mg per litre | The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition. | | Yes<br>potential to affect this target by contributing to a cumulative increase in nutrients exists. | | |
| | | | Vegetation composition: typical species | Occurrence | Typical species of the relevant habitat sub-type should be present and in good condition | | Yes<br>potential to affect this target by contributing to a cumulative reduction in species type and condition exists. | | |
| | | | Floodplain connectivity | Hectares | The area of active floodplain at and upstream of the habitat should be maintained | | Yes<br>potential to affect this target by contributing to a cumulative alteration to floodplain area exists | | |

| QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|
| Sea Lamprey *Petromyzon marinus* [1095] | To restore the favourable conservation condition of Sea Lamprey in the Blackwater River (Cork/Waterford) SAC | Distribution: extent of anadromy | % of river accessible | > than 75% of main stem length of rivers accessible from estuary. | **No Potential for Adverse Effects**<br>No works proposed within the Finisk River or SAC that will impede the movement of the species, reducing connectivity. | No<br>No projects (including those within plans) identified for in-combination impacts that would impede river access. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | Population structure of juveniles | Number of age/size groups | At least three age/size groups present | **Potential for Adverse Effects**<br>The Finisl River contains physical habitat suitable for lamprey spawning, and both larval habitat and ammocetes are present downstream of the site.<br><br>In the event of emissions reaching the Finisk River as explained in section 5.3.1, a potential negative effect resulting in a degradation of water quality and habitat heterogeneity, thereby reducing the carrying capacity of the watercourse for lamprey is possible in the absence of appropriate mitigation. | Yes<br>potential to affect this target by contributing to a cumulative reduction in number of age/size groups for lamprey exists. | Temporary due to the duration of a potential emissions event and the duration of the project. | Yes, potential for the project to affect these targets either alone or in-combination with other plans or projects exists. |
| | | Juvenile density in fine sediment | Juveniles/m² | Juvenile density at least 1/m² | | Yes<br>potential to affect this target by contributing to a cumulative reduction in juvenile density of lamprey exists. | | |
| | | Extent and distribution of spawning habitat | m² and occurrence | No decline in extent and distribution of spawning beds. | | Yes<br>potential to affect this target by contributing to a cumulative reduction in extent and distribution of lamprey spawning habitat exists. | | |
| | | Availability of juvenile habitat | Number of positive sites in 3rd order channels (and greater), downstream of spawning areas | More than 50% of sample sites positive. | | Yes<br>potential to affect this target by contributing to a cumulative reduction in extent and availability of juvenile lamprey habitat exists. | | |
| Brook Lamprey *Lampetra planeri* [1096] | To maintain the favourable conservation condition of Brook Lamprey in the Blackwater River | Distribution | % of river accessible | Access to all water courses down to first order streams | **No Potential for Adverse Effects**<br>No works proposed within the Finisk River or SAC that will impede the movement of the species, reducing connectivity. | No<br>No projects (including those within plans) identified for in-combination impacts that would impede river access. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists. |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | (Cork/Waterford) SAC | Population structure of juveniles | Number of age/size groups | At least three age/size groups of brook/river lamprey present | **Potential for Adverse Effects**<br>The Finisl River contains physical habitat suitable for lamprey spawning, and both larval habitat and ammocetes are present downstream of the site.<br><br>In the event of emissions reaching the Finisk River as explained in section 5.3.1, a potential negative effect resulting in a degradation of water quality and habitat heterogeneity, thereby reducing the carrying capacity of the watercourse for lamprey is possible in the absence of appropriate mitigation. | Yes<br>potential to affect this target by contributing to a cumulative reduction in number of age/size groups for lamprey exists. | Temporary due to the duration of a potential emissions event and the duration of the project. | Yes, potential for the project to affect these targets either alone or in-combination with other plans or projects exists. |
| | | | Juvenile density in fine sediment | Juveniles/m² | Mean catchment juvenile density of brook/river lamprey at least 2/m² | | Yes<br>potential to affect this target by contributing to a cumulative reduction in juvenile density of lamprey exists. | | |
| | | | Extent and distribution of spawning habitat | m² and occurrence | No decline in extent and distribution of spawning beds | | Yes<br>potential to affect this target by contributing to a cumulative reduction in extent and distribution of lamprey spawning habitat exists. | | |
| | | | Availability of juvenile habitat | Number of positive sites in 2nd order channels (and greater), downstream of spawning areas | More than 50% of sample sites positive. | | Yes<br>potential to affect this target by contributing to a cumulative reduction in extent and availability of juvenile lamprey habitat exists. | | |
| | River Lamprey *Lampetra fluviatilis* [1096] | To maintain the favourable conservation condition of River Lamprey in the Blackwater River (Cork/Waterford) SAC | Distribution | % of river accessible | Access to all water courses down to first order streams | **No Potential for Adverse Effects**<br>No works proposed within the Finisk River or SAC that will impede the movement of the species, reducing connectivity. | No<br>No projects (including those within plans) identified for in-combination impacts that would impede river access. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Population structure of juveniles | Number of age/size groups | At least three age/size groups of brook/river lamprey present | **Potential for Adverse Effects**<br>The Finisl River contains physical habitat suitable for lamprey spawning, and both larval habitat and ammocetes are present downstream of the site. | Yes<br>potential to affect this target by contributing to a cumulative reduction in number of age/size groups for lamprey exists. | | |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | Juvenile density in fine sediment | Juveniles/m² | Mean catchment juvenile density of brook/river lamprey at least 2/m² | In the event of emissions reaching the Finisk River as explained in section 5.3.1, a potential negative effect resulting in a degradation of water quality and habitat heterogeneity, thereby reducing the carrying capacity of the watercourse for lamprey is possible in the absence of appropriate mitigation. | Yes<br>potential to affect this target by contributing to a cumulative reduction in juvenile<br>density of lamprey exists. | Temporary due to the duration of a potential emissions event and the duration of the project. | Yes, potential for the project to affect these targets either alone or in-combination with other plans or projects exists. |
| | | | Extent and distribution of spawning habitat | m² and occurrence | No decline in extent and distribution of spawning beds | | Yes<br>potential to affect this target by contributing to a cumulative reduction in extent and<br>distribution of lamprey spawning habitat<br>exists. | | |
| | | | Availability of juvenile habitat | Number of positive sites in 2nd order channels (and greater), downstream of spawning areas | More than 50% of sample sites positive. | | Yes<br>potential to affect this target by contributing to a cumulative reduction in extent and<br>availability of<br>juvenile<br>lamprey habitat<br>exists. | | |
| | Atlantic salmon | To maintain the favourable conservation condition of Atlantic Salmon in the Blackwater River (Cork/Waterford) SAC | Distribution: extent of anadromy | % of river accessible | 100% of river channels down to second order accessible from estuary | No Potential for Adverse Effects<br>No works proposed within the Finisk River or SAC that will impede movement of the species. | No<br>No projects (including those within plans) identified for in-combination impacts that would impede river access. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists. |
| | | | Adult spawning fish | Number | Conservation limit (CL) for each system consistently exceeded | **Potential for Adverse Effects**<br>The Suir River contains physical habitat that is very suitable for salmonid spawning and nursery. | Yes<br>potential to affect this target by contributing to a cumulative reduction in availability of spawning habitat for adult salmon exists. | | |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | Salmon fry abundance | Number of fry/5 minutes electrofishing | Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling | One electrofishing sites surveyed by Triturus Environmental Ltd in 2021 identified salmon in the Ballynaguilkee Lower Streem, a tributary of the Finisk. Salmon were also recorded c. 6km downstream of the Site in the Finisk river 2017 during surveys by IFI.<br><br>Salmon need EPA Class A water: Q values Q4 to Q5. The downstream Finisk River is at this standard, with biological water quality ranging from Q4 to Q4-Q5.<br><br>In the event of emissions reaching the Finisk River as explained in section 5.3.1, a potential negative effect resulting in a degradation of water quality and habitat heterogeneity, thereby reducing the carrying capacity of the watercourse for salmonids is possible in the absence of appropriate mitigation. | Yes<br>potential to affect this target by contributing to a cumulative reduction in salmon fry abundance exists. | Temporary due to the duration of a potential emissions event and the duration of the project. | Yes, potential for the project to affect these targets either alone or in-combination with other plans or projects exists. |
| | | | Out-migrating smolt abundance | Number | No significant decline | | Yes<br>potential to affect this target by contributing to a cumulative reduction in smolt abundance exists. | | |
| | | | Number and distribution of redds | Number and occurrence | No decline in number and distribution of spawning redds due to anthropogenic causes | | Yes<br>potential to affect this target by contributing to a cumulative reduction in the number and distribution of redds quality exists. | | |
| | | | Water quality | EPA Q value | At least Q4 at all sites sampled by EPA | | Yes<br>potential to affect this target by contributing to a cumulative deterioration in water quality exists. | | |
| | Otter | To restore the favourable conservation condition of Otter in the Blackwater River (Cork/Waterford) SAC | Distribution | % positive survey sites | No significant decline | **No Potential for Adverse Effects**<br>No works proposed within the Finisk River or SAC that will impede movement of the species or reduce existing mapped territory. | No<br>No projects (including those within plans) identified for in-combination impacts that would impede distribution of the species | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | Extent of terrestrial habitat | Hectares | No significant decline. Area mapped and calculated as 103ha above high water mark (HWM) and 1165.7ha along river banks/ around ponds. | | No<br>No projects (including those within plans) identified for in-combination impacts that would impede movement of the species or reduce existing mapped territory. | | |
| | | | Extent of marine habitat | Hectares | No significant decline. Area mapped and calculated as 647.2ha | **No Potential for Adverse Effects**<br>No works proposed within the marine extent of the SAC | No, as the marine extent of the objective does not include the Finisk River. | | |
| | | | Extent of freshwater (river) habitat | Kilometres | No significant decline. Length mapped and calculated as 599.54km | **No Potential for Adverse Effects**<br>No works proposed within the Finisk River or SAC that will reduce the extent of freshwater, lake of terrestrial habitat. | No<br>No projects (including those within plans) identified for in-combination impacts that would reduce the extent of freshwater habitat. | | |
| | | | Extent of freshwater (lake) habitat | Hectares | No significant decline. Area mapped and calculated as 25.06ha | | No<br>No projects (including those within plans) identified for in-combination impacts that would reduce the extent of lake habitat. | | |
| | | | Couching sites and holts | Number | No significant decline | | No<br>No projects (including those within plans) identified for in-combination impacts that would reduce the extent of couching sites and holts. | | |
| | | | Fish biomass available | Kilograms | No significant decline | **Potential for Adverse Effects**<br>In the event of emissions, as explained in section 5.3.1, reaching the Finisk River, a potential negative effect resulting in reduction in fish biomass availability may occur in the absence of appropriate mitigation. | Yes<br>potential to affect this target by contributing to a cumulative increase in works taking place exists. | Temporary due to the duration of emissions to water | Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | Barriers to connectivity | Number | No significant increase | **No Potential for Adverse Effects**<br>No works proposed within the Finisk River or SAC that will impede the movement of the species, reducing connectivity. | No<br>No projects (including those within plans) identified for in-combination impacts that would impede the movement of the species, reducing | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists |
| Dungarvan Harbour SPA (004032) | Golden Plover (*Pluvialis apricaria*) [A140] | To maintain the favourable conservation condition of Golden Plover in Dungarvan Harbour SPA | Population trend | Percentage change | Long term population trend stable or increasing | **No Potential for Adverse Effects**<br>Recorded on vantage point surveys in the flight activity survey area, with 76,270 seconds logged in the potential collision height. Golden Plover breed on open upland habitats (which includes blanket bogs, heather dominated areas and marginal grasslands), where they are known to favour areas of short vegetation (<10 cm), particularly dominated by heather mixed with grasses (Parr, 1980; Whittingham et al., 2001). The species has a restricted range in Ireland, breeding in upland areas in the north-west. No birds were noted during the breeding season, and birds appear to use the site and surrounding areas only in the non-breeding season, thus suggesting that habitats are not suitable for breeding birds on site. All observations were of birds flying through the site without landing in potential suitable habitat. Looking at a worst-case scenario, there will be a loss of 13.19 Ha of suitable habitat which equates to 12% of total available suitable habitat for the species within the red line boundary (noting that the red line boundary has intentionally been kept tight to the footprint of the works so as to limit habitat damage).<br><br>Loss of wintering and/or foraging habitat will be a Long-term Slight Effect Locally and a Long-term Imperceptible to Slight Effect at a county level (Criteria: EPA, 2022).<br><br>Wind farm site not within the foraging range (Core range of 3km, with maximum range of 11km) of the Dungarvan Harbour SPA for this species.<br><br>Golden plover have been recorded in low numbers as collision fatalities at wind farms (Hoetker et al., 2006; Grunkorn 2011). The SNH guidance (SNH, 2018) does not provide a specific avoidance rate for golden plover, but states that for species not covered by the guidance “we recommend a default value of 98%“. However 3 years of post-construction monitoring sites included in the CRM (Appendix 5) indicates a much higher avoidance rate should be applied for non-breeding golden plover populations. The studies had robust survey methodologies and were carried out at wind farm sites with high levels of golden plover flight activity. The review considers that an avoidance rate of 99.8% is a suitable precautionary estimate for winter golden plover (Gittings 2022 ). | No<br>No projects (including those within plans) identified for in-combination impacts that would impede the movement of the species, reducing population percentage significantly.<br>Whilst it is not possible to determine with certainty, Dyrick Hill will likely have a cumulative impact on golden plover in terms of land-take and displacement/disturbance. In terms of collision risk, it will have a cumulative impact and would increase the predicted collision rate of 0.136 per annum to 6.346 per annum which increases the county local population loss by 0.18% (0.004% increases to 0.184%) per annum. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists |
| | | | Distribution | Number and range of areas used by waterbirds | There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation | | No<br>No projects (including those within plans) identified for in-combination impacts that would impede the movement of the species, reducing the number or range of areas used by golden plover. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | In further support of a high micro-avoidance rate, a study in the Netherlands of three operational wind farms where golden plovers were both diurnally and nocturnally active found no fatalities (Krijgsveld et al., 2009). Golden plovers were not recorded breeding within the 500 m turbine envelope during the survey period which reduces magnitude. The predicted number of collisions (assuming 99.8% avoidance) is 0.136 per year.<br><br>Predicted number of collisions (assuming 99.8% avoidance) is 0.136 per year (0.004% of the Dungarvan Bay SPA population and 0.008 % of the national population).<br><br>The proposed impact of collision risk will be a Long-term Imperceptible Effect (Criteria: EPA, 2022). | Whilst it is not possible to determine with certainty, Dyrick Hill will likely have a cumulative impact on golden plover in terms of land-take and displacement/disturbance. In terms of collision risk, it will have a cumulative impact and would increase the predicted collision rate of 0.136 per annum to 6.346 per annum which increases the county local population loss by 0.18% (0.004% increases to 0.184%) per annum. | | |
| | Wetlands [A999] | To maintain the favourable conservation condition of the wetland habitat in Dungarvan Harbour SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. | Wetland habitat area | Hectares | The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 2,219ha, other than that occurring from natural patterns of variation | **No Potential for Adverse Effects**<br>The Proposed Development will not reduce the permanent area occupied by wetland habitats. | No<br>No projects (including those within plans) identified for in-combination impacts that would reduce the permanent area occupied by wetland habitats. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists |
| **Mid-Waterford Coast SPA (004193)** | A103 Peregrine Falco peregrinus | To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA | N/A | N/A | N/A | **No Potential for Adverse Effects**<br>Recorded on eight occasions from VPs during winter vantage point surveys as. A total of 829 seconds were logged in the flight activity survey area, of which 110 seconds were in the potential collision. Peregrines require tall cliff-faces or man-made structures which resemble these, for breeding. No such habitats or structures occur on study area. Peregrines are aerial hunters which dive on prey from above and as such are not strictly limited to any particular habitat, instead they require sufficient numbers of avian prey. As such, there are no envisaged habitat loss impacts on the species.<br><br>Wind farm site not within the core foraging range (2km), but is within the maximum recorded distance (18km) of the Mid-Waterford SPA for this species. | No<br>No projects (including those within plans) identified for in-combination impacts that would favourable conservation condition of peregrine falcon. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists |

| | QI/ SCI | Conservation Objective | Attribute | Measure | Target | Potential For Adverse Effects on Site Integrity from Proposed Development | Potential effect in-combination with other plans or projects | Duration of Effect in the absence of mitigation | Conclusion |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Evidence of collision fatality is low, with only two birds recorded in published reviews of wind farm fatalities (Hoetker et al., 2006). The SNH recommended avoidance rate for collision-risk modelling is 98% (SNH, 2010), suggesting high micro-avoidance capabilities.<br><br>Predicted number of collisions (assuming avoidance) is 0.001 per year.<br><br>The proposed impact of collision risk will be a Long-term Imperceptible Effect (Criteria: EPA, 2022). | Whilst it is not possible to determine with certainty, the proposed Dyrick Hill Wind Farm will likely have a cumulative impact on peregrine in terms of land-take and displacement/disturbance. However, in terms of collision risk, the cumulative increase will be slight, from a rate of 0.001 per annum to 0.02 per annum. | | |
| | A184 Herring Gull Larus argentatus | | | | | **No Potential for Adverse Effects**<br>Recorded on five occasions during summer season vantage point surveys. A total of 150 were in the potential collision risk. Although this species nests primarily on the coast, it is also known to nest on buildings, in larger towns and cities. Birds nesting inland occur near larger waterbodies. Thus there is no scope for breeding on-site. Habitats on site are also largely unsuitable for foraging birds, and as such there is limited potential for foraging birds. Birds were only recorded flying through the site and not landing within the study area. It is worth noting that improved agricultural grassland is abundant in the area as is slurrying/ploughing. While there are some suboptimal areas within each habitat type, looking at a worst-case scenario, there will be a loss of 0.11 Ha of suitable habitat. which equates to 1.09% of total available suitable habitat for the species.<br><br>Disturbance and/or displacement will be a Short-term Slight Effect (Criteria: EPA, 2022).<br><br>A published review of the number of bird fatalities owing to collision with wind turbines showed there were 189 fatalities across 46 European wind farms (Hoetker et al., 2006). However, the published avoidance rate is 98% (SNH 2010), suggesting herring gulls exhibit high levels of micro-avoidance at wind farms.<br><br>Predicted number of collisions (assuming avoidance) is 0.002 per year.<br><br>The proposed impact of collision risk will be a Long-term Imperceptible Effect (Criteria: EPA, 2022). | No<br>No projects (including those within plans) identified for in-combination impacts that would favourable conservation condition of herring gull.<br>Whilst it is not possible to determine with certainty, the proposed Dyrick Hill Wind Farm will likely have a cumulative impact on peregrine in terms of land-take and displacement/disturbance. However, in terms of collision risk, the cumulative increase will be slight, from a rate 0.001 per annum to 0.05 per annum. | N/A | No potential for the project to affect this target either alone or in-combination with other plans or projects exists |

### 4.3.4 Conservation interests identified as needing to be mitigated

Having regard to Table 4-12 the qualifying interests of the European sites which may potentially be impacted by the Proposed Development in the absence of mitigation measures are:

- Lower River Suir SAC
  - Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation)
  - Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
  - Lamprey
  - White-clawed crayfish
  - Salmon
  - Otter
- Blackwater River (Cork/Waterford) cSAC
  - Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation)
  - Lamprey
  - Salmon
  - Otter

## 4.4 Mitigation

### 4.4.1 Mitigation by Avoidance and design

The following measures are incorporated into the proposed wind farm design to reduce impacts on designated sites, flora and fauna through avoidance and design:

- The hard-standing area of the wind farm has been kept to the minimum necessary for the maximum turbine envelope proposed, including all site clearance works to minimise land take of habitats and flora.
- Site design and layout deliberately avoided direct impacts on designated sites.
- All cabling for the project will be placed underground; this significantly reduces collision risk to birds over the lifetime of the wind farm (Drewitt and Langston, 2006).
- The grid connection routes have been selected to minimise land take of potentially sensitive habitats by following the site access tracks and public roads.
- Care has been taken to ensure that sufficient buffers are in place between wind farm infrastructure and hydrological features such as rivers and streams.
- Three new stream crossings will be required within the Site. A clear-span design has been selected to avoid instream works, and to minimise disturbance of banks and associated indirect effects such as siltation. Pre-cast concrete culverts will be used in the other two smaller streams.
- Directional drilling is the proposed installation method where the grid connection crosses an unnamed tributary of Skeheens Stream. As such, in-stream works will not be required and the potential for contaminant or pollutant input will be greatly reduced as a result.
- The grid cable will be incorporated in the culverted road where it crosses Ballynaguilkee_lower and the clear span bridge where it crosses the Colligan River.

- The design of the grid connection was also carried out with cognisance to ecological features. Cables are to be placed underneath public roads where possible to avoid impact to roadside hedgerows. Further mitigation measures for hedgerows/treelines that will be affected by the grid connection route are discussed further in Section 8.6.2.3.
- The design of TDR identified is constrained to the existing public road network with cognisance to ecological features.

Further mitigation measures prescribed to avoid or reduce potential for the Proposed Development to have an adverse effect on the integrity / conservation objectives of the Lower River Suir SAC (002137) and Blackwater River (Cork/Waterford) cSAC (002170) are assessed hereunder.

### 4.4.2 Mitigation Measures

**Table 4-11: Details of Mitigation Measures to be Implemented for Proposed Development**

| No. | Mitigation Measure | How Measure Will Avoid/Reduce Adverse Effects | Implementation of Mitigation Measure and Level of Success | Monitoring scheme to prevent mitigation failure |
|---|---|---|---|---|
| | | ***Mitigation Measures to be Implemented Prior to Construction*** | | |
| **1** | A Project Ecologist/Ecological Clerk of Works (ECoW)<br><br>The Project Ecologist/ECoW will ensure successful implementation of all mitigation measures for biodiversity management. | A Project Ecologist/Ecological Clerk of Works (ECoW) with appropriate experience and expertise (in implementing ecological mitigation measures for wind farm developments) will be employed for the duration of the construction and decommissioning phases to ensure that all the mitigation measures outlined in relation to the environment are implemented.<br><br>The Project Ecologist/ECoW will be awarded the authority to stop construction activity if there is potential for adverse ecological effects to occur. | A Project Ecologist/Ecological Clerk of Works (ECoW) will be employed by the Client through the Contractor awarded the contract to construct the wind farm. All mitigation will be implemented in full.<br><br>High probability of success. | The Project Ecologist/ECoW will monitor the implementation of the mitigation measures detailed below and in accordance with the relevant management plans within the CEMP.<br><br>Regular reporting to client and contractor as per each management plan. |
| **2** | Communication with IFI | A line of communication with IFI will be established by the ECoW and fisheries officers will be invited to inspect mitigation measures at the site.<br><br>This will ensure transparency, encourage proactive culture around implementation of measures and facilitate input from key stakeholders if required. | ECoW will open a line of communication upon appointment. Mitigation measure will be implemented in full.<br><br>High probability of success. | ECoW to provide reports of communication and/or site visit findings to update the client and contractor of input from key stakeholders. |
| **3** | Water baseline and monitoring<br><br>Establish baseline biological water quality in order to detect change throughout the lifetime of the Proposed Development. | Biological sampling (SSRS or Q sampling as applicable) will be carried out at the established baseline sampling points as determined within the aquatic ecology report (Appendix 6) for the duration of the construction and operational phases of the project.<br><br>Baseline biological water quality will be established so regular monitoring can detect any long-term changes in water and aquatic habitat quality which could be missed by grab sampling for physico-chemical parameters only. | Mitigation measure will be implemented in full by the Client. | Monitoring program will be bi-weekly for the duration of construction and decommissioning and will be yearly for the duration of the operation of the Proposed Development.<br><br>Regular reporting to client and contractor |
| **4** | Invasive Species<br><br>Eradication of invasive species will be completed prior to construction. Measures will be in accordance with the invasive species management plan (ISMP) (Appendix 7) and Regulation 49 of the EC (Birds & Natural Habitats) Regulations (2011). | Prior to works commencing a confirmatory invasive species survey will be undertaken in the previously identified areas of the project to reconfirm the extend of the non-native invasive species and to ensure they have not spread to any new areas within the footprint of the Proposed Development.<br><br>The invasive species management plan will be adhered to for all works in areas confirmed as containing non-native invasive species.<br><br>The plan is intended to be a working document and will be updated during the construction, operational and decommissioning phases.<br><br>The main objective of the invasive species management strategy are containment, treatment and eradication including:<br>• Cordoning off the area – this will include a buffer of 5m surrounding the area of infection to ensure that seeds are not transported to other sections of the site via vehicular traffic, equipment or PPE.<br>• No machinery or personnel will be allowed within this restricted area. Similarly, there shall be no storage of materials within or adjacent to this restricted area.<br>• There will be no vegetation clearance or trimming within the cordoned area (except where undertaken in accordance with the invasive species management plan) as this can lead to the species recolonising other areas via the wind, water if displaced into drains, or soil and vegetation attached to machinery, vehicles or personnel. | Mitigation measure will be implemented in full by the Client.<br><br>High probability of success. | The plan, which will include the measures set out in this row, will be updated and implemented prior to construction and then updated through all stages of the project lifecycle.<br><br>During construction, it will be updated by the contractor to form the detailed invasive species management plan which will form part of the detailed CEMP. Following construction, the plan will be updated for the operational phase, taking into account the results of the detailed construction invasive species management plan and operational maintenance requirements. During decommissioning it will be updated if new areas are identified to have been within the footprint of the works. |

| No. | Mitigation Measure | How Measure Will Avoid/Reduce Adverse Effects | Implementation of Mitigation Measure and Level of Success | Monitoring scheme to prevent mitigation failure |
|---|---|---|---|---|
| | | • No soil or vegetation will be removed from this area unless it is securely contained and is transported under licence to a suitably licenced facility for treatment.<br>• Informing all site staff through toolbox talk as part of site inductions.<br>• Any new sightings of the species shall by relayed to construction staff and the contractor via the project ecologist/ECoW.<br>These areas shall follow the same protocol as described above.<br>• Reporting sighting(s) to the NPWS and NBDC and liaising with the NPWS | | |
| **5** | Environmental Manager<br>The Environmental Manager will ensure successful implementation of all mitigation measures for water control and management. | A suitably qualified Environmental Manager (competent in the implementation and management of environmental mitigation measures for wind farms) will be appointed to ensure the effective operation and maintenance of drainage and other mitigation measures associated with water control and management during the construction process.<br><br>The operations management of the Proposed Development will include regular monitoring of the drainage system and maintenance.<br><br>The Environmental Manager will be awarded the authority to stop construction activity if there is potential for adverse effects to water control and/or management. | An environmental manager will be employed by the Client through the Contractor awarded the contract to construct the wind farm and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed below and in accordance with the relevant management plans within the CEMP ensuring successful implementation.<br><br>Regular reporting to client and contractor as per each management plan. |
| **6** | Silt traps and silt fencing<br>The main purpose of the silt traps and drain blocking is to slow water flow, increase residence time, and allow settling of silt in a controlled manner. | Silt traps and silt fencing measures for the proposed wind farm site will be provided at outfalls from roadside swales to silting ponds, at the end of the drainage channels, to the outside of the tree felling buffer zone and strategically placed down-gradient within forestry and agricultural drains near streams.<br><br>The traps and fences will be maintained regularly ensuring that they are clear of sediment build-up and are not severely eroded.<br><br>Additional silt fencing will be kept on site in case of an emergency break out of silt laden run-off.<br><br>This measure will reduce the risk of sediment runoff reaching waterways within the catchment of the main wind farm site. This in turn will avoid adverse effects on the surrounding water courses and aforementioned designated sites. | Mitigation measures will be implemented in full by the Client through the Contractor awarded the contract to construct the wind farm.<br><br>All required mitigation measures will be included as a contractual obligation on the contractor.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures as detailed and in accordance with the relevant management plans within the CEMP.<br><br>Regular reporting to client and contractor as per each management plan. |
| **7** | Settlement ponds<br><br>The main purpose of the settlement ponds is to increase residence time, and prevent sediment reaching the watercourses. | Settlement ponds as detailed in the surface water management plan within the CEMP, will be put in place in advance of works as construction progresses across the site.<br><br>The settlement ponds have a diffuse outflow and will mitigate any increase in surface water run-off and treat suspended solids in the surface water runoff. This will prevent sediment reaching the waterways within the catchment of the main wind farm site<br><br>This in turn will avoid adverse effects on the watercourse network. | Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm.<br><br>All required mitigation measures will be included as a contractual obligation on the contractor.<br><br>High probability of success | The Environmental Manager will monitor the implementation of the mitigation measures as detailed and in accordance with the relevant management plans within the CEMP.<br><br>Regular reporting to client and contractor as per each management plan.<br><br>Settlement ponds will be cleared of deposits regularly and when requested by the ECoW and/or the Environmental Manager to ensure their ongoing functioning and maintenance of excess capacity. |

| No. | Mitigation Measure | How Measure Will Avoid/Reduce Adverse Effects | Implementation of Mitigation Measure and Level of Success | Monitoring scheme to prevent mitigation failure |
|---|---|---|---|---|
| | | ***Construction Phase Mitigation Measures*** | | |
| **8** | Habitats or flora | The area of the proposed works will be kept to the minimum necessary, including all site clearance works, to minimise disturbance to habitats and flora. In this case, the footprint of the proposed development has been kept to the minimum necessary, including the use of layout design methods (e.g. existing roads and stream crossings to minimise excavation works).<br><br>No disturbance to habitats or flora outside the Proposed Development area will occur.<br><br>All works will be restricted to the immediate footprint of the development, which will be wholly within the development site boundary and kept separate from any key areas for biodiversity.<br><br>Machinery, and equipment will be stored within the site compound.<br><br>Designated access points will be established within the site and all construction traffic will be restricted to these locations, | A Project Ecologist/Ecological Clerk of Works (ECoW) will be employed by the Client through the Contractor awarded the contract to construct the wind farm. All mitigation will be implemented in full.<br><br>High probability of success. | The Project Ecologist/ECoW will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.<br><br>Regular reporting to client and contractor as per each management plan. |
| **9** | Avifauna | The removal of vegetation and scrub as well as trimming of trees along the TDR will be undertaken outside of the bird breeding season (March 1st to August 31st inclusive) in order to protect nesting birds. | Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm.<br><br>All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br>High probability of success. | The Project Ecologist/ECoW will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.<br><br>Regular reporting to client and contractor. |
| **10** | Lighting | Construction operations will take place during the hours of daylight to minimise disturbances to active nocturnal species. This is in line with best practice recommendations for mitigation measures in regard to nocturnal species (birds, bats, otters) and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt and Langston, 2006).<br><br>Limited operations such as concrete pours, turbine erection and installation of the grid connection require night-time operating hours; full consideration of BCT guidance note 08/18 will be implemented when determining appropriate lighting for works to take place during night-time hours.<br><br>Works will be supervised by the project ecologist/ECoW. | Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm.<br><br>All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br>High probability of success. | The Project Ecologist/ECoW will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.<br><br>Regular reporting to client and contractor. |
| **11** | Toolbox talk<br><br>Will ensure all personnel present receive the relevant information for the areas they are working on each given day. | Toolbox talks will be undertaken with construction staff on disturbance to key species during construction.<br><br>This will help minimise disturbance. | Toolbox talks will be provided to all staff by the ECoW daily before the start of any works. | The ECoW will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. |

| No. | Mitigation Measure | How Measure Will Avoid/Reduce Adverse Effects | Implementation of Mitigation Measure and Level of Success | Monitoring scheme to prevent mitigation failure |
|---|---|---|---|---|
| **12** | Plant and vehicles<br><br>Will prevent contamination within the site. | All site plant will be inspected at the beginning of each day prior to use. Defective plant will not be used until the defect is satisfactorily fixed.<br><br>All major repair and maintenance operations will take place off site.<br><br>Vehicles entering the site should be in good working order, free from leakage of fuel or hydraulic fluid. | Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm.<br><br>All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | Inspection of plant on site will be maintained throughout the lifetime of the project. |
| **13** | Pollution incident control response.<br>Will ensure appropriate training to all personnel and knowledge of emergency response plans | All personnel working on site will be trained in pollution incident control response.<br><br>An emergency response plan (refer to the CEMP) will ensure that appropriate information will be available on site outlining the spillage response procedure and a contingency plan to contain silt.<br><br>A regular review of weather forecasts of heavy rainfall (>10mm/hour) will be carried out.<br><br>A record will be kept of daily visual inspections of drains, silt ponds, etc on site and weekly inspections of streams which receive flows from the main wind farm site, during the construction phase. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans detailed in the CEMP.<br><br>Regular reporting to client and contractor as per each management plan. |
| **14** | Surface water | A self-imposed buffer zone of 50m will be maintained for all watercourses with the exception of watercourse crossings.<br><br>The site drainage has been designed to complement existing overland flow and existing onsite drainage.<br><br>A three-stage treatment train (swale – settlement pond – diffuse outflow) will be implemented to retain and treat the discharges from all hard surface areas.<br><br>Settlement ponds will be cleared of deposits generated by aggregate used for access tracks or other sediment regularly. Cleared material shall be interred securely to prevent ingress into the drainage network.<br><br>This measure will reduce the risk of sediment runoff or pollutants reaching waterways within the catchment of the Proposed Development. This in turn will avoid adverse effects on the surrounding water courses and aforementioned designated sites. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.<br><br>Daily visual inspections of drains, silt ponds, etc on site and weekly inspections of streams will be performed during the construction period. This will ensure suspended solids are not entering the streams and rivers alongside the work area. These inspections will identify any obstructions to channels and allow for appropriate maintenance of the existing roadside drainage regime. If suspended solids in water courses exceed the baseline levels construction work will be stopped, and remediation measures will be put in place immediately. |
| **15** | Main wind farm drainage | There will be three watercourse crossings across larger watercourses within the wind farm site. It is proposed to install one single-span bridge and two open bottomed box culvert crossings on these watercourses. Unmapped drains / streams within the Site that will be crossed via box culverts. Silt Protection Controls (SPCs) are proposed at the location of the drain crossings. It is recommended that the SPCs will consist of a minimum of silt traps containing filter stone and filter material staked across the width of the swales and upstream of the outfall to any watercourse. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. |

| No. | Mitigation Measure | How Measure Will Avoid/Reduce Adverse Effects | Implementation of Mitigation Measure and Level of Success | Monitoring scheme to prevent mitigation failure |
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| | | Where in stream works at the clear span bridge watercourse crossings are necessary, the works area will be isolated via fluming during the construction works. The associated drains will be diverted through piping, in order for an accidental spill to be controlled in the dry (IFI, 2016).<br><br>Drains around hard-standing areas will be shallow to minimise the disturbance to sub-soils.<br><br>Permanent roadside drainage will be installed as part of the construction stage. This will include the use of interceptor drains, swales, check dams and stilling ponds. These measures will buffer site run-off during periods of high rainfall by retaining the water until the storm hydrograph has receded.<br><br>Site drainage, including silt traps and stilling ponds, will be put in place in parallel with or ahead of construction, such that excavation for new infrastructure will have functional drainage system in place. The stilling ponds will remain in place during construction phase. The stilling ponds will drain diffusely overland, over existing vegetated areas, within the site boundary. The stilling ponds will be back-filled and the swales that were connected to them will be re-connected to the outfall once construction is completed.<br><br>Site access roads have been laid out to reduce the longitudinal slope of roadside drains and to follow natural flow paths. Where roadside drains are laid at slopes greater than 2%, check dams will be provided.<br><br>Where existing tracks will be used to access the site, roadside drains alongside these tracks will be cleared of obstructions only where strictly necessary (i.e. if flooding occurs).<br><br>Vegetation and other obstructions provide sediment arrest and flow attenuation functions and as such will not be interfered with unless absolutely necessary. | | |
| **16** | Wheel wash facilities | Wheel wash facilities will be located at the site entrance to reduce construction traffic fouling public roads.<br><br>The wheel wash will come with an additional water tank which will be filled regularly. These units will be self-contained and will filter the waste for ease of disposal.<br><br>Waste will be removed from each unit and from site by a permitted contractor to a licensed facility.<br><br>Measures will be in accordance with the invasive species management plan (ISMP) (Appendix 7) and Regulation 49 of the EC (Birds & Natural Habitats) Regulations (2011). | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. |
| **17** | Concrete | Major construction works including concrete pours onsite will be timed to occur outside periods where heavy rainfall would be expected.<br><br>A regular review of weather forecasts of heavy rainfall is required, and the site contingency plan will be updated in accordingly before and after such events. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. |

| No. | Mitigation Measure | How Measure Will Avoid/Reduce Adverse Effects | Implementation of Mitigation Measure and Level of Success | Monitoring scheme to prevent mitigation failure |
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| | | Concrete washout will be carried out in a dedicated area of the temporary compound. Only the washing of chutes will be permitted. Every concrete truck delivering concrete to the site must use the concrete washout facility prior to leaving the site. Chutes will be washed out at the designated area with a settlement lagoon provided to receive all run-off. During construction concrete will be kept out of all watercourses and drains. | | |
| **18** | Management of hydrocarbons | Any diesel, fuel or hydraulic oils stored at the temporary site compound will be bunded. The bund capacity will be sufficient to contain 110% of the tank's maximum capacity.<br><br>Fuels, lubricants and hydraulic fluids for equipment used on the site will be carefully handled to avoid spillage.<br><br>Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of;<br><br>Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling; and<br><br>Appropriate spill control equipment, such as oil soakage pads, will be kept within the refuelling areas and in each item of plant to deal with any accidental spillage. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. |
| **19** | Refueling | Refueling of plant and fuel bowsers during construction will be carried out at the primary refueling station which will be located at the main temporary site compound. The station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site.<br><br>In addition to the above, onsite refueling of machinery will be carried out 100m from watercourses using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refueling trailer will be re-filled off site or at the primary refueling station at the main site compound and will be towed by a 4x4 jeep to designated refueling areas near to where machinery is located but at distances of greater than 100m from watercourses.<br><br>Drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. |
| **20** | Spill control | Appropriate spill control equipment, such as oil soakage pads, will be kept within the construction area and in each item of plant to deal with any accidental spillage.<br><br>All staff will be trained in appropriate spill control measures. See Emergency spill plan within the CEMP. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. |
| **21** | Welfare utilities | Portaloos and / or containerised toilets and welfare units will be used to provide toilet facilities for site personnel.<br><br>Sanitary waste will be removed from site via a licensed waste disposal contractor. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. |
| **22** | Standing water | Standing water, which could arise during excavations, has the potential to contain a high concentration of suspended solids as a result of the disturbance to soils. This water will be pumped into the site drainage system (but not directly into settlement ponds – minimum setback 20m upstream of settlement pond), which will be constructed at site clearance stage, in advance of excavations for the turbine bases. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. |

| No. | Mitigation Measure | How Measure Will Avoid/Reduce Adverse Effects | Implementation of Mitigation Measure and Level of Success | Monitoring scheme to prevent mitigation failure |
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| | | In situations where space for drainage infrastructure or suitable treatment measures are not available (e.g. during grid cable installation) excess water from excavations will be required to be removed by tanker for disposal at licensed facility). | | |
| **23** | Excavated material | Excavated material will be re-used on-site where possible for berms etc. Surplus material will be removed from the site to an appropriately licensed or permitted facility.<br><br>Surplus soil or rock excavated during the course of the works taken to the spoil management area/borrow pit on site.<br><br>A setback distance of at least 100m from watercourses will be adhered to when storing temporary spoil. Temporary spoil heaps will be compacted and covered to minimise sediment-laden runoff. No spoil stockpiles will be left on site after construction.<br><br>Temporary stockpiles of sand/stone and other materials will be covered with sheeting when not in use to prevent washout of fines during rainfall.<br><br>All stockpile material will be bunded adequately and protected from heavy rainfall to reduce silt runoff, where necessary.<br><br>Adequate security will be provided to prevent spillage as a result of vandalism. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. |
| **24** | Grid Connection Route (GCR) | There will be a requirement for 3 no. riverine watercourse crossings along the GCR in total, outside the site. These are on an unnamed tributary of the Skeheens Stream, the Ballynaguilkee_lower and Colligan River.<br><br>The crossing of the unnamed tributary of the Skeheens Stream will be via horizontal directional drilling (HDD), Although no-instream works are proposed, the drilling works will only be completed during a dry period between July and September (as required by Inland Fisheries Ireland for in-stream works) to avoid the salmonid spawning season and sensitive life stage period. Mitigation measure 38 will be implemented.<br><br>A pre-construction confirmatory otter survey to reconfirm the findings of the FT surveys undertaken in 2021 will be undertaken to ensure than no breeding or resting areas are located within 150m of the drilling locations. Should an otter breeding (holt) or resting area (couch) be detected, a derogation licence will need to be obtained from the NPWS to facilitate drilling works, and measures will be implemented to ensure no significant effects on the otters.<br><br>Excavation of the grid route trench will require excavation of soils/subsoils which has the potential to impact the water quality and aquatic habitat of receiving watercourses. Excavated spoil emanating from the cut trenches, where appropriate (i.e. when trenching within private tracks or the public road verge) will be used to back-fill the trenches. Any excess will be disposed of off-site, at an appropriate licenced facility.<br><br>All excavated material emanating from trenches within the public road network will be disposed at an appropriate licenced facility. Mitigation measures to prevent the escapement of suspended solids to receiving watercourses (e.g. silt fences, interceptor drains, stilling ponds, drain blocking etc.) are outlined above. | Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the GCR.<br><br>All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager and/or EcoW will monitor the implementation of the mitigation measures in accordance with permitted license and in accordance with the relevant management plans detailed in the CEMP.<br><br>Regular reporting to client and contractor as per license requirement. |

| No. | Mitigation Measure | How Measure Will Avoid/Reduce Adverse Effects | Implementation of Mitigation Measure and Level of Success | Monitoring scheme to prevent mitigation failure |
|---|---|---|---|---|
| | | An Ecological Clerk of Works (ECoW) will monitor both turbidity and observe the riverbed during the drilling process to detect any leakage (frac-out) of drilling fluid. Should this leakage be observed, works will cease immediately.<br><br>The GCR crossing of the Ballynaguilkee_lower will be via an existing culverted road, and the Colligan River will be via a single span, pre-cast concrete bridge. This will avoid the requirement for instream works. Nevertheless, installation will only be completed during a dry period between July and September (as required by Inland Fisheries Ireland for in-stream works) to avoid the salmonid spawning season and sensitive life stage period. Potential releases of sediment-laden surface run-off as a result of bank clearance works to facilitate bridge installation/access will be mitigated against through the water quality mitigation measures applied elsewhere on site. | | |
| **25** | Horizontal Directional Drilling | An Environmental Engineer with a "stop work" authority will be engaged to monitor the construction phase of the development when the water crossing is being undertaken.<br><br>The working area around the stream will be fenced off prior to the commencement of works to avoid damage to bankside habitat.<br><br>Watercourses will be visually inspected during the HDD by the Environmental Engineer.<br><br>Should increase levels of siltation be recorded within the watercourses during the course of the construction phase, the environmental auditor will seek to halt construction works until the source of the pressure can be found and remediated.<br><br>Surplus material will be removed from the site to an appropriate facility. There will be no stockpiling of excavated material. A setback distance of at least 20 m from watercourses will be adhered to when storing temporary spoil.<br><br>Prior to any works taking place near water courses the Inland Fisheries Ireland will be consulted.<br><br>Construction works onsite will be timed to occur outside periods where heavy rainfall would be expected.<br><br>Appropriate signage will be placed along the proposed route outlining the spillage response procedure and a contingency plan to contain silt. A regular review of weather forecasts of heavy rainfall is required, and the contractor is required to prepare a contingency plan for before and after such events<br><br>Visual inspection will take place at all times along the bore path of the alignment.<br><br>Silt fences will be constructed around proposed work areas prior to commencement of works.<br><br>No refuelling will take place within 50m of the stream zone or any sensitive habitats.<br><br>During the drilling process, a mixture of a natural, inert and fully biodegradable drilling fluid will be used. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. |
| ***Operational Phase Mitigation Measures*** | | | | |

| No. | Mitigation Measure | How Measure Will Avoid/Reduce Adverse Effects | Implementation of Mitigation Measure and Level of Success | Monitoring scheme to prevent mitigation failure |
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| **26** | Inspections | Quarterly inspections of the erosion and sediment control measures on site (i.e. drains, swales, outfalls to field drains) will be undertaken for the first year following construction and annually thereafter to ensure operational efficiency. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the license and relevant management plans within the CEMP. |
| **27** | Management of hydrocarbons | Oil used in transformers (at the substation and within each turbine) and storage of oils in tanks at the substation could leak during the operational phase and impact on groundwater quality. The substation transformer and oil storage tanks will be in a concrete bunded capable of holding 110% of the oil in the transformer and storage tanks. Turbine transformers are located within the turbines, so any leaks will be contained.<br><br>Further management of hydrocarbons will be as detailed in mitigation measure no. 27 above. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the license and relevant management plans within the CEMP. |
| **28** | Settlement ponds | Settlement ponds will be left in place during the operational phase to be further utilised during the decommissioning phase. Ponds will be fenced to restrict access. | All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full.<br><br>High probability of success. | The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the license and relevant management plans within the CEMP. |
| ***Decommissioning Phase Mitigation Measures*** | | | | |
| **All prior to and construction phase mitigation will be implemented during the decommissioning phase.** | | | | |

## 4.5 Residual Effects on the Integrity of the Sites within the Potential Zone of Influence of the Proposed Development

Taking cognisance of measures incorporated into the project design and mitigation measures to avoid effects which are considered in the preceding section, the proposed project will not have any residual adverse effect on the integrity the Lower River Suir SAC, Blackwater River (Cork/Waterford) SAC, Dungarvan Harbour SPA and Mid-Waterford Coast SPA in light of the site's conservation objectives and status.

## 4.6 Conclusion

For the reasons set out in detail in this NIS, in the light of the best scientific knowledge in the field, all aspects of the Proposed Development which, by itself, or in combination with other plans or projects, which may affect the relevant European Sites have been considered.

The NIS contains information which the competent authority, may consider in making its own complete, precise and definitive findings and conclusions and upon which it is capable of determining that all reasonable scientific doubt has been removed as to the effects of the Proposed Development on the integrity of the relevant European sites.

In the light of the conclusions of the assessment which it shall conduct on the implications for the European sites concerned, the competent authority is enabled to ascertain that the Proposed Development , along or in combination with any other plan or project, will not adversely affect the integrity of any of the European sites concerned.

# 5 REFERENCES

CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

Department of the Environment, Heritage and Local Government, Dublin (2009) Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities (updated 2010). National Parks and Wildlife Service.

CIRIA (2001). Control of water pollution from construction sites - Guidance for consultants and contractors (C532). Construction Industry Research and Information Association, London.

CIRIA (2006). Control of Pollution from Linear Construction Project; Technical Guidance (C648). Construction Industry Research and Information Association, London.

CIRIA (2015b). Environmental Good Practice on Site (4th edition) (C741). Construction Industry Research and Information Association, London.

CIRIA (2019). Culvert, screen and outfall manual (C786). Construction Industry Research and Information Association, London.

DAFM (2018). Draft Plan for Forestry and Freshwater Pearl Mussel in Ireland. Department of Food, Agriculture, Food and Marine.

DAFM (2019). Standards for Felling and Reforestation. October 2019. Department of Food, Agriculture, Food and Marine.

Drewitt, A. L. and Langston, R. H. (2006). Assessing the impacts of wind farms on birds. Ibis, Vol. 148, pp. 29-42.

EPA (2021). Assessment of the catchments that need reductions in nitrogen concentrations to achieve water quality objectives. WFD River Basin Management Plan – 3rd Cycle. file:///C:/Users/jason.guile/Downloads/Catchment%20nitrogen%20reductions%20assessment%20-%20June%202021.pdf

European Commission (2000), Communication from the Commission on the Precautionary Principle, Office for Official Publications of the European Communities, Luxembourg.

European Commission (EC, 2002) Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC,

European Commission (2013) Interpretation Manual of European Union Habitats. Version EUR 28.

European Commission (2018) Managing Natura 2000 sites. The provisions of Article 6 of the Habitats Directive 92/43/EEC.. Brussels, 21.11.2018 C (2018) 7621 final.

European Commission (2020). Guidance document on wind energy developments and EU nature legislation. https://ec.europa.eu/environment/nature/natura2000/management/docs/wind_farms_en.pdf

European Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive).

Fossitt J.A. (2000). A Guide to Habitats in Ireland. Heritage Council, Kilkenny.

Government of Ireland. 2009. The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. [S.I. 296 of 2009]. Irish Statute Book.

Grunkorn, T. (2011). Proceedings: Conference on wind energy and wildlife impacts, 2-5 May 2011,Trondheim, Norway. Trondheim : NINA.

Hoetker, H., Thompson, K.H., Jeromin, H. (2006), Impacts on biodiversity of exploitation of renewable energy sources: the example of birds and bats- facts, gaps in knowledge, demands for further research, and ornithological guidelines for the development of renewable energy exploitation. Bergenhusen : Michael-Otto-Institut im NABU.

Holloway, S. (1997). Winter Distribution and Disturbance of Wildfowl and Waders on Findhorn Bay. BTO Research Report No. 179. British Trust for Ornithology

Holman, C., Barrowcliffe, R., Birkenshaw, D., Dalton, H., Gray, G., Harker, G., Laxen, D., Marner, B., Marsh, D., Prismall, F., Pullen, J., Stoaling, M., Storey, C., & Vining, L. (2014). IAQM Guidance on the assessment of dust from demolition and construction. Institute of Air Quality Management, London.

IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus Co. Dublin. IFI/2016/1-4298.

IFI (2019) Windfarm scoping document (draft). Inland Fisheries Ireland, Dublin.

IWEA (2012). Best Practice Guidelines for the Irish Wind Energy Industry. Guidance prepared by Fehily Timoney and Company for the Irish Wind Energy Association.

Johnson, W. P., P. M. Schmidt, and D. P. Taylor. (2014). Foraging flight distances of wintering ducks and geese: a review. Avian Conservation and Ecology 9(2): 2. http://dx.doi.org/10.5751/ACE-00683-090202

Krijgsveld, K.L., Akershoek, K., Schenk, F. Dijk, F., Dirkson, S. Ardea, (2009). Collision risk of birds with modern large wind turbines. Vol. 97.

Maarten, P & Henkensj, R. H. G (1997). Possible Impacts of Disturbance to Waterbirds: Individuals, Carrying Capacity and Populations. Wildfowl 48: 225-236

NATURA 2000 – Standard Data Form. Site IE0002170. Blackwater River (Cork/Waterford) SAC.

NATURA 2000 – Standard Data Form. Site IE0002137. Lower River Suir SAC

NATURA 2000 – Standard Data Form. Site IE0004117. Dungarvan Harbour SPA

NATURA 2000 – Standard Data Form. Mid-Waterford Coast SPA

NBDC (2021) Biodiversity Maps [online] available at: https://maps.biodiversityireland.ie/Map (accessed 26/07/2021)

NPWS (2019b). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report.

NPWS (2017) Conservation Objectives: Lower River Suir SAC 002137. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2012) Conservation Objectives: Blackwater River (Cork/Waterford) SAC 002170. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012) Conservation Objectives: Dungarvan Harbour SPA 004032. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2022) Conservation objectives for Mid-Waterford Coast SPA [004193]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

NRA. 2008. Guidelines for the treatment of otters prior to the construction of national road schemes. https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Otters-prior-to-the-Construction-of-National-Road-Schemes.pdf

NRA (2008). Guidelines for the Crossing of Watercourses during the construction of National Road Schemes. National Roads Authority.

Office of the Planning Regulator (March 2021) OPR Practice Note PN01 Appropriate Assessment Screening for Development Management

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

Popper, A. N., Hawkins, A. D., Fay, R. R., Mann, D. A., Bartol, S., Carlson, T. J., Coombs, S., Ellison, W. T., Gentry, R. L., Halvorsen, M. B., Løkkeborg, S., Rogers, P. H., Southall, B. L., Zeddies, D. G., & Tavolga, W. N. (2014). Sound Exposure Guidelines. In ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI (pp. 33–51). https://doi.org/10.1007/978-3-319-06659-2_7

Popper, A.N. and Hawkins, A.D. (2019) "An overview of fish bioacoustics and the impacts of anthropogenic sounds on fishes," Journal of Fish Biology. Blackwell Publishing Ltd, pp. 692–713. doi:10.1111/jfb.13948.

Ruddock, M. and Whitfield, P.D. (2007). A review of disturbance distances in selected bird species. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage.

Scarton, Francesco. (2018). Disturbance of Non-Breeding Waders by Pedestrians and Boats in a Mediterranean Lagoon. Ardeola. 65. 209-220. 10.13157/arla.65.2.2018.ra1.

Scottish Environment Protection Agency (2017) Land Use Planning System SEPA Guidance Note 31. Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and groundwater Dependent Terrestrial Ecosystems (Version 3).

Scottish Natural Heritage (2005). Survey methods for use in assessing the impacts of onshore windfarms on bird communities. Scottish Natural Heritage Guidance. November 2005.

Scottish Natural Heritage (2000). Windfarms and Birds: Calculating a Theoretical Collision Risk Assuming No Avoiding action. Scottish Natural Heritage.

Scottish Natural Heritage (2010). Survey methods for use in assessing the impacts of onshore windfarms on bird communities. Battleby: SNH.

Scottish Natural Heritage (2010). Avoidance Rate Information and Guidance Note. www.snh.gov.org. [Online] http://www.snh.gov.uk/docs/B721137.pdf

Scottish Natural Heritage (2012). Assessing the cumulative impact of onshore wind energy developments. Scottish Natural Heritage.

SHN, 2016. Assessing Connectivity with Special Protection Areas (SPAs). Version 3. Scottish Natural Heritage, UK.

Scottish Natural Heritage (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Version 2. Battleby: SNH.

Scottish Natural Heritage (2016). Assessing Connectivity with Special Protection Areas (SPAs). Version 3. Scottish Natural Heritage, UK.

Scottish Natural Heritage (2019b). Good Practice during Wind Farm Construction (4th edition). Scottish Natural Heritage.

UK Highways Agency. (2007). Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1 - HA207/07. http://www.highways.gov.uk

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