APPENDIX 5

Construction and Environmental Management Plan

Construction and Environmental Management Plan

Killoshulan Wind Farm

Appendix 4-3

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1. INTRODUCTION

This Construction and Environmental Management Plan (CEMP) has been developed by MKO on behalf of Killoshulan Renewable Energy Ltd. who intend to apply to An Coimisiún Pleanála for planning permission to construct a renewable energy development which will comprise of 10 no. wind turbines and associated infrastructure in the townland of Killoshulan and adjacent townlands, in Co. Kilkenny, including an 110 kV on-site substation, underground 110kV cabling to connect to the national grid at Ballyragget 110kV Substation, in the townland of Moatpark, Co. Kilkenny, and all associated works.

The CEMP has been prepared in conjunction with the Environmental Impact Assessment Report (EIAR) and the Natura Impact Statement ('NIS') which will accompany the planning application for the Proposed Project to be submitted to the competent authority. Should the Proposed Project secure planning permission, the CEMP will be updated, in line with all conditions and obligations which apply to any grant of permission. The CEMP should be read in conjunction with the EIAR, NIS and planning drawings. The CEMP will also require updating by the selected contractor in order to identify, assess and satisfy the contract performance criteria as set out by the various stakeholders. The CEMP due to its structure and nature will also require constant updating and revision throughout the construction period as set out below. Therefore, this is a working document and will be developed further prior to and during the construction phase of the Proposed Project.

Triggers for amendments to the CEMP will include:

- Response to any specific requirements arising from conditions attached to a grant of planning permission.
- When there is a perceived need to improve performance in an area of environmental impact;
- As a result of changes in environmental legislation applicable and relevant to the Proposed Project;
- Where the outcomes from auditing establish a need for change;
- Where Work Method Statements identify changes to a construction methodology to address high environmental risk; and
- As a result of an incident or complaint occurring that necessitates an amendment.

This CEMP identifies the key planning and environmental considerations that must be adhered to and delivered during site construction and operation. The Contractor, as appointed by the Project Developer, will be required to implement all of the requirements set out in this CEMP. The CEMP may be updated and revised throughout the construction phase of the Proposed Project, but all future iterations must meet or exceed the standards and requirements set out in this document and the Project Developer must be satisfied that all requirements set out in this document can and will be implemented in full by the appointed contractor.

The CEMP to be prepared by the appointed contractor will be a single, amalgamated document that can be used during the construction phase of the Proposed Project, as a single consolidated point of reference relating to all construction, environmental and drainage requirements for the Planning Authority, developer and contractors alike. The CEMP may evolve over further iterations as the construction works progress, but at all times must meet or exceed the standards and requirements set out in this document. It will be the contractor's current version of the CEMP, which at any point in time, will guide the construction activities on site and the implementation of which will be audited by an Environmental Clerk of Works (ECoW).

1.1 Scope of the Construction and Environmental Management Plan

This CEMP is presented as a guidance document for the construction of the proposed Killoshulan Wind Farm, which will comprise 10 no. wind turbines, and associated infrastructure in the townland of Killoshulan, and adjacent townlands, in Co. Kilkenny, including a 110kV on-site substation, underground 110kV electrical cabling to connect to the national grid at Ballyragget 110kV substation, in the townland of Moatpark, Co. Kilkenny, and all associated works.

For the purposes of this CEMP, the various project components are described and assessed using the following references: 'Proposed Project, 'the Site', 'Proposed Wind Farm' and 'Proposed Grid Connection'.

- Where the 'Proposed Project' is referred to this encompasses the entirety of the project for the purposes of this EIA in accordance with the EIA Directive. The Proposed Project is described in detail in Chapter 4 of this EIAR.
- Where the 'Proposed Wind Farm' is referred to, this refers to turbines (Proposed Turbines) and associated foundations and hardstanding areas, including entrances and access roads, underground cabling, permanent meteorological mast, temporary construction compounds, turbine delivery accommodation works, spoil management areas, borrow pit, tree felling, site drainage, operational stage signage, battery energy storage system (BESS), biodiversity enhancement areas and all ancillary works and apparatus. The Proposed Wind Farm is described in detail in Chapter 4 of this EIAR.
- Where the 'Proposed Grid Connection' is referred to, this refers to the on-site 110kV Substation, all ancillary works and underground 110kV grid connection cabling connecting to the existing Ballyragget 110kV Substation, Co. Kilkenny, and all ancillary works and apparatus. The Proposed Grid Connection is described in detail in Chapter 4 of this EIAR.
    - The 'Proposed 110kV Substation' refers to the new proposed onsite electricity infrastructure proposed within Frankford or Ballykeiran townland, Co. Kilkenny comprising 2 no. control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine and export that electricity from the onsite 110kV substation to the national grid.
    - The 'Proposed 110kV Underground Cabling' refers to new proposed 110kV underground electrical cabling connection from the 'Proposed 110kV Substation' to the existing 110kV Ballyragget substation, in the townland of Moatpark, approximately 1km north of Ballyragget, Co. Kilkenny. The underground electrical cabling route measures approximately 12.6km in length, the majority of which is located within the curtilage of the public road network.
- Where 'the Site' is referred to, this relates to the primary study area for the EIAR, as delineated by the EIAR Site Boundary in green as shown on Figure 2-1 and encompasses an area of approximately 796 hectares. Where the 'Proposed Wind Farm site' is referred to, this relates the EIAR Site Boundary without the corridor that encompasses the Proposed 110kV Underground Cabling route

A detailed description of the Proposed Project is provided in Chapter 4 of the EIAR.

The CEMP is divided into ten sections, as outlined below.

- **Section 1** provides a brief introduction as to the scope of the report.
- **Section 2** outlines the Site and Proposed Project details, detailing the targets and objectives of this plan along with providing an overview of construction methodologies that will be adopted throughout the Proposed Project.
- **Section 3** sets out details of the environmental controls to be implemented on site. Site drainage principles, traffic management, dust control, invasive species management and a waste management plan are also included in this section.
- **Section 4** sets out a fully detailed implementation plan for the environmental management of the Proposed Project outlining the roles and responsibilities of the project team.
- **Section 5** outlines the general Health and Safety measures that will be implemented on site during the construction phase of the Proposed Project.
- **Section 6** outlines the Emergency Response Procedure to be adopted in the event of an emergency in terms of site health and safety and environmental protection.
- **Section 7** consists of a summary table of all mitigation proposals to be adhered to during the Proposed Project, categorised into three separate headings, 1) pre-commencement measures; 2) construction-phase measures and 3) operational-phase measures.
- **Section 8** consists of a summary table of all monitoring requirements and proposals to be adhered to during the Proposed Project, categorised into three separate headings, 1) pre-commencement measures; 2) construction-phase measures and 3) operational-phase measures.
- **Section 9** sets out a programme for the timing of the works.
- **Section 10** outlines the proposals for reviewing compliance with the provisions of this report.

1.2 Targets and Objectives

The following key targets and objectives will inform the final detailed design should the Proposed Project secure planning permission and proceed to the construction phase. This includes consideration of the buildability of the designs that emerge:

- Ensure construction works and activities are completed in accordance with mitigation and best practice approach presented in the EIAR, NIS and associated planning documentation;
- Ensure construction works and activities have minimal impact/disturbance to local landowners and the local community;
- Ensure construction works and activities have minimal impact on the natural environment;
- Adopt a sustainable approach to construction and, ensure sustainable sources for materials supply where possible; 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. excavated stone and overburden;
- 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 construction to a minimum on the local environment, watercourses, and wildlife;
- Correct fuel storage and refuelling procedures to be followed;
- Good waste management and house-keeping 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. Construction Methods and designs will be altered where it is found there is an adverse effect on the environment;
- Comply with all relevant water quality legislation listed throughout this document; and,
- Ensure a properly designed, constructed and maintained drainage system appropriate to the requirements of the site is kept in place at all times.

2. SITE AND PROPOSED PROJECT DETAILS

2.1 Site Location

The Proposed Turbines are located approximately 4km west of the village of Freshford and 3.7km east of the village of Urlingford, both in Co. Kilkenny. It is proposed to access the Proposed Wind Farm site during both the construction and operational phase via an existing agricultural access point off the R693 Regional Road in the townland of Barna, Co. Kilkenny. This entrance will be upgraded in order to facilitate the delivery of turbine components and other abnormal loads. The Proposed Wind Farm is served by a number of existing forestry and agricultural roads and tracks. A site location context map and the EIAR Site Boundary is shown as Figure 2-1. The Site is shown overlain on OSI imagery in Figure 2-2 and Figure 2-3. For clarity, the red line planning application boundary is shown on Figure 2-4.

The Proposed Grid Connection includes for an underground 110kV grid connection cabling from the Proposed 110kV Substation, in the townland of Frankford or Ballykieran, Co. Kilkenny to the existing Ballyragget 110kV substation in the townland of Moatpark, Co. Kilkenny. The Proposed 110kV Underground Cabling route to Moatpark, Co. Kilkenny measuring approximately 12.6km in length, is primarily located within the curtilage of the public road network. Approximately 1.5km of the Proposed 110kV Underground Cabling is within the Proposed Wind Farm internal road network, approximately 9.6km is proposed within Local Roads, 770m of the Proposed 110kV Underground Cabling route is proposed within National Roads (N77), 653m proposed within private agricultural lands in Moatpark, Co. Kilkenny.

Minor temporary accommodation works will be required at various locations on the national and regional road network between the port of entry in Cork and the Proposed Wind Farm site. These will be limited to temporary measures including temporary local road widening, temporary access road through agricultural land, overruns of roundabout islands and temporary relocation of some signs and street furniture. The proposed accommodation works area locations are shown in Figure 2-2.

Current land-use on the Proposed Wind Farm comprises commercial forestry, agricultural pastural land, mixed forest and transitional woodland-shrub. Current land-use along the Proposed Grid Connection comprises of public road corridor, public open space, agriculture, commercial forestry, land principally used by agriculture with significant areas of natural vegetation, mineral extraction sites, mixed forest and discontinuous urban fabric. Land-use in the wider landscape of the Site comprises a mix of agriculture, quarrying, renewable energy, low density residential and commercial forestry. Land-use in the areas proposed for turbine delivery route accommodation comprises a mix of agriculture, transitional woodland-shrub, coniferous forest and public open space.

A full and detailed description of the Proposed Project (i.e. the Proposed Wind Farm and the Proposed Grid Connection) for the purposes of the planning application and the additional elements that form part of the overall project, assessed in the EIAR, is contained in Chapter 4 of the EIAR. The townlands in which the Proposed Project is located are listed in Table 2-1.

Table 2-1 Townlands within which the Proposed Project is located.

Development Works	Townlands in Co. Kilkenny
Proposed Wind Farm	
Wind Turbines, Access Roads, Temporary Construction Compounds, Permanent Meteorological Mast, Underground Cabling,	Barna, Killoshulan, Spahill, Frankford or Ballykieran, Foyle South, Clomantagh (Mt. Garret)

Development Works	Townlands in Co. Kilkenny
Battery Energy Storage System, Spoil Management Area, Borrow Pit, Biodiversity Enhancement Measures, site drainage, operational stage signage	
Accommodation works to facilitate the delivery of large turbine components and other abnormally sized loads.	Urlingford, Mountfinn, Balief Lower, Balief Upper, Barna
Proposed Grid Connection	
Proposed on-site 110kV Substation and BESS	Frankford or Ballykieran
Underground 110kV Cabling Route connecting to the existing Ballyragget 110kV Substation	Frankford or Ballykieran, Foyle South, Coolcashin, Garrydague, Ballygowney, Ballyring Upper, Lisdowney, Seskin Little, Seskin North, Seskin South, Ballyconra, Moatpark

**Townland located within EIAR boundary, but not within planning application boundary.*

2.2 Description of the Proposed Project

This section of the CEMP describes the Proposed Project and all its component parts. The planning application for the Proposed Project will be made to An Coimisiún Pleanála (ACP), and the development description which appears in the public notices as follows:

The development will consist of the provision of the following:

Planning Notice Proposed Project Description

i. *The construction of 10 no. wind turbines with an overall turbine tip height of 185 metres; a rotor blade diameter of 163 metres; and hub height of 103.5 metres, and a meteorological mast of 103.5m in height and subsequent decommissioning of the wind turbines and meteorological mast, following a thirty five-year operational life from the date of full commissioning of the wind turbines;*
ii. *Turbine and meteorological mast foundations, hard-standing and assembly areas;*
iii. *A 110kV substation compound (2 no. control buildings with welfare facilities, all associated electrical plant and equipment, security fencing, access gates, all associated underground cabling, wastewater holding tanks, rainwater holding tanks, site drainage and all ancillary works);*
iv. *Underground internal wind farm electrical cabling and communications cabling connecting the wind turbines to the proposed on-site 110kV electrical substation and associated ancillary works;*
v. *All works associated with the upgrade of the existing agricultural access off the R693 Regional Road (including the installation of fencing and steel gates) to serve as the main site entrance for the wind farm;*
vi. *The provision of 1 no. new access/egress point along the R693 Regional Road;*
vii. *The provision of 1 no temporary access/egress point along the L1805;*
viii. *Upgrade of existing tracks/roads and junctions and provision of new site access roads and junctions;*
ix. *2 no. temporary construction compounds with temporary offices and staff welfare facilities;*

x. *Accommodation works along the public road network in the townlands of Urlingford, Mountfinn, Balief Lower, Balief Upper, and Barna Co. Kilkenny to facilitate the delivery of turbine components and other abnormal loads;*
xi. *1 no. Borrow Pit;*
xii. *Spoil Management;*
xiii. *Site Drainage;*
xiv. *Tree Felling and hedgerow removal;*
xv. *Biodiversity Management and Enhancement Measures;*
xvi. *Operational stage site signage;*
xvii. *Battery Energy Storage System (BESS) and all associated electrical plant and equipment, security fencing, 2 no. static water storage tanks and a firewater retention tank, and all associated infrastructure and apparatus;*
xviii. *The provision of approximately 12km of underground electrical (110kV) and communications cabling from the proposed on-site 110kV electrical substation to the western boundary of the River Nore to facilitate a future connection to the national grid via the existing Ballyragget 110kV electrical substation;*
xix. *Provision of 17 no. joint bays, communication chambers and earth sheath links along the proposed underground electrical cabling route;*
xx. *Reinstatement of land, road and track surface above the proposed cabling trench; and*
xxi. *All related site works and ancillary development considered necessary to facilitate the proposed development, including landscaping and the reinstatement of land.*

The applicant is seeking a ten-year planning permission for development and 35-year operational life from the date of commissioning of the wind farm development.

Current and future wind turbine generator technology will ensure that the wind turbine model, chosen for the Proposed Wind Farm, will have an operational lifespan greater than the 35-year operational life that is being sought as part of the planning application.

Modern onshore wind turbine generators currently have a typical generating capacity in the 4 to 7 MW range, with the generating capacity continuing to evolve upwards as technology improvements are achieved by the turbine manufacturers. For the purposes of this EIAR it is assumed that the wind turbine model installed as part of the Proposed Wind Farm will have an output of 6.2MW. Therefore, on this basis, the proposed 10 no. wind turbines would have a combined generating capacity of 62MW. The actual turbine procured as part of a competitive tender process may have a power output that is marginally lower or greater than the 6.2MW turbine described in the EIAR. Irrespective of the power output of the actual turbine procured, the conclusions of the EIAR will not be materially affected.

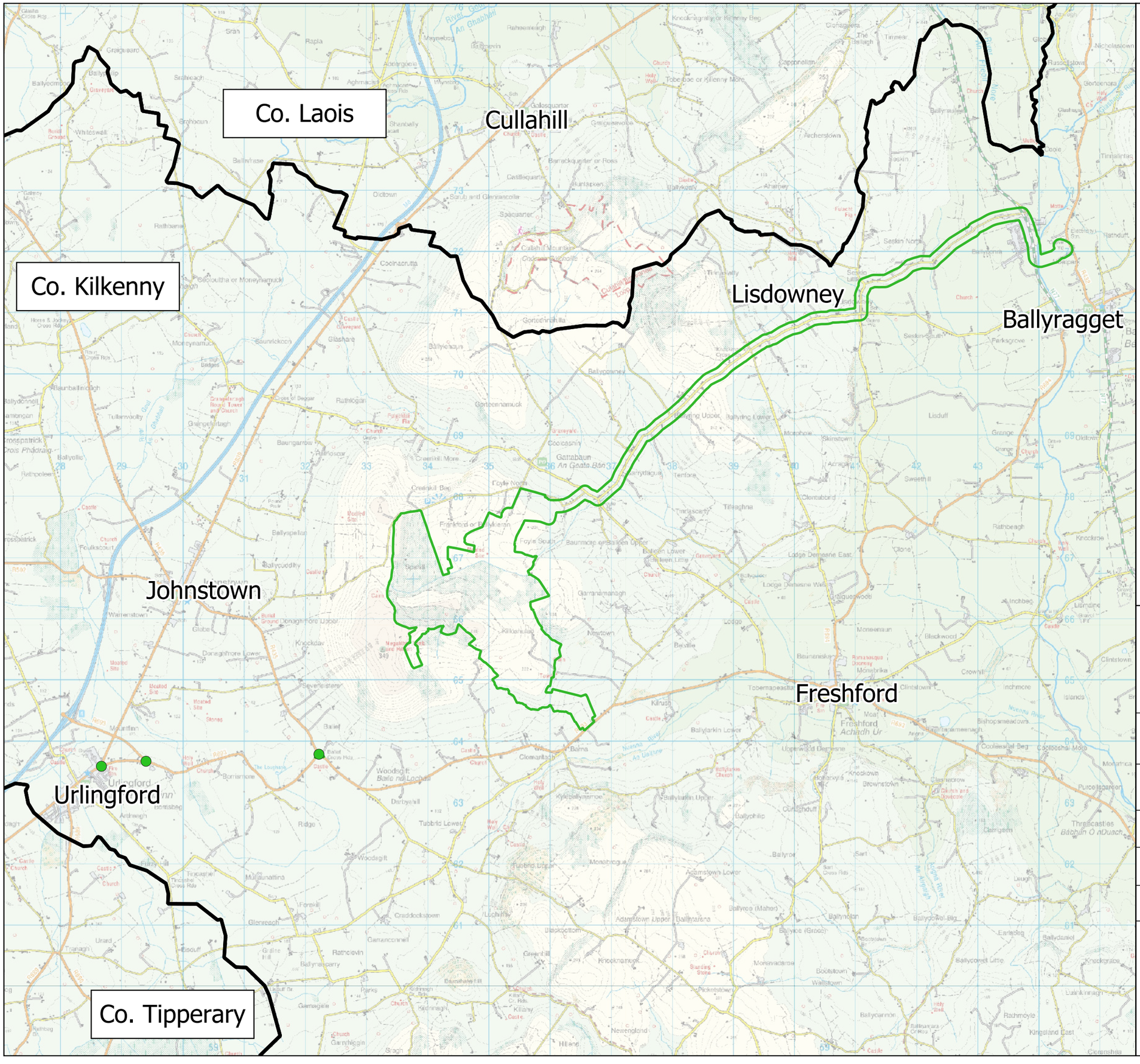
As detailed in Section 3.2.3 in Chapter 3 Site Selection and Reasonable Alternatives, the layout of the Proposed Project has been led by consideration of constraints and facilitators, thereby avoiding the environmentally sensitive parts of the Proposed Wind Farm site. The roads layout for the Proposed Project makes the use of the existing on-site access roads and tracks where possible, with approximately 4.5km of existing roadway/ tracks requiring upgrading and approximately 9.1km of new access road to be constructed. The Proposed Grid Connection underground cabling route is located predominately within the public road corridor.

There are no inhabitable, residential dwellings located closer than four times the maximum turbine tip height (i.e. within 740 metres) from any proposed turbine locations.

As part of the Proposed Project, tree felling will be required within and around the development footprint to allow for the construction of the turbine bases, access roads, underground cabling, and the other ancillary infrastructure. Further details on tree felling required within and around development footprint on the Proposed Project site is detailed in Chapter 6 of this EIAR. Nearly half (45%) of the Proposed Wind Farm site comprises commercial forestry. A total of 27.5 hectares of commercial forestry will be permanently felled as part of the Proposed Project along with existing treeline

boundaries as detailed in Chapter 6, Sections 6.5.2.2.4 and 6.5.3.2.1. Figure 4-11 of Chapter 4 shows the extent of the commercial forestry to be permanently felled as part of the Proposed Project. The commercial forestry felling activities required as part of the Proposed Project will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments. The policy requires that a copy of the planning permission for the Proposed Project be submitted with the felling licence application; therefore, the felling licence cannot be applied for until such time as planning permission is obtained for the Proposed Project.

Detailed site layout drawings of the Proposed Project are included in Appendix 4-1 to the EIAR.



Map Legend

- EIAR Site Boundary
- Location of Temporary Accomodation Works
- County Boundary

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Drawing Title

Site Location

Project Title

Killoshulan Wind Farm

Drawn By	Checked By
EC	JF
Project No.	**Drawing No.**
260172	Figure 2-1
Scale	**Date**
1:60,000	2026-09-15

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Freshford

Johnstown

Urlingford

Co. Kilkenny

Co. Tipperary

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10

Map Legend

- EIAR Site Boundary
- County Boundary
- Proposed Turbine
- Proposed Turbine Foundation
- Proposed Turbine Hardstanding
- Proposed New Roads
- Existing Roads to be Upgraded
- Proposed Borrow Pit
- Proposed Construction Compounds
- Proposed Spoil Management Area
- Proposed Met Mast Foundation
- Proposed Killoshulan Met Mast
- Proposed On-site 110kV Substation & BESS
- Proposed Grid Connection Route
- Ballyragget 110kV Substation
- Proposed Biodiversity Enhancement (Grassland)
- Proposed Hedgerow Bolstering
- Proposed New Hedgerows
- Proposed TDR Accom Areas

N

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Drawing Title

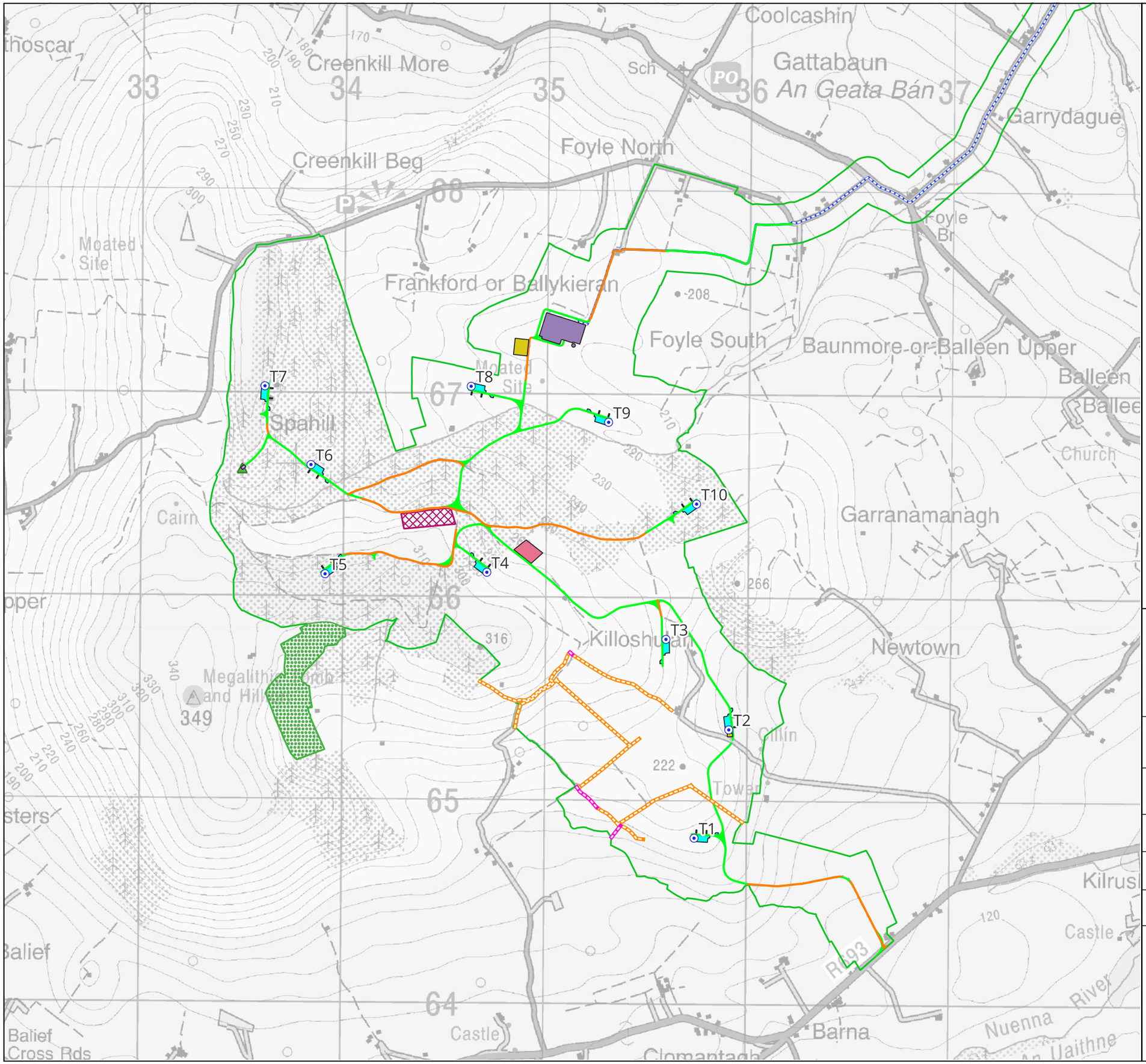
Proposed Project Layout (A)

Project Title

Killoshulan Wind Farm

Drawn By	Checked By
EC	JF
Project No. 260172	Drawing No. Figure 2-2
Scale 1:95,000	Date 2026-10-08

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Map Legend

- EIAR Site Boundary
- County Boundary
- Proposed Turbine
- Proposed Turbine Foundation
- Proposed Turbine Hardstanding
- Proposed New Roads
- Existing Roads to be Upgraded
- Proposed Borrow Pit
- Proposed Construction Compounds
- Proposed Spoil Management Area
- Proposed Met Mast Foundation
- Proposed Killoshulan Met Mast
- Proposed On-site 110kV Substation & BESS
- Proposed Grid Connection Route
- Proposed Biodiversity Enhancement (Grassland)
- Proposed Hedgerow Bolstering
- Proposed New Hedgerows

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Drawing Title

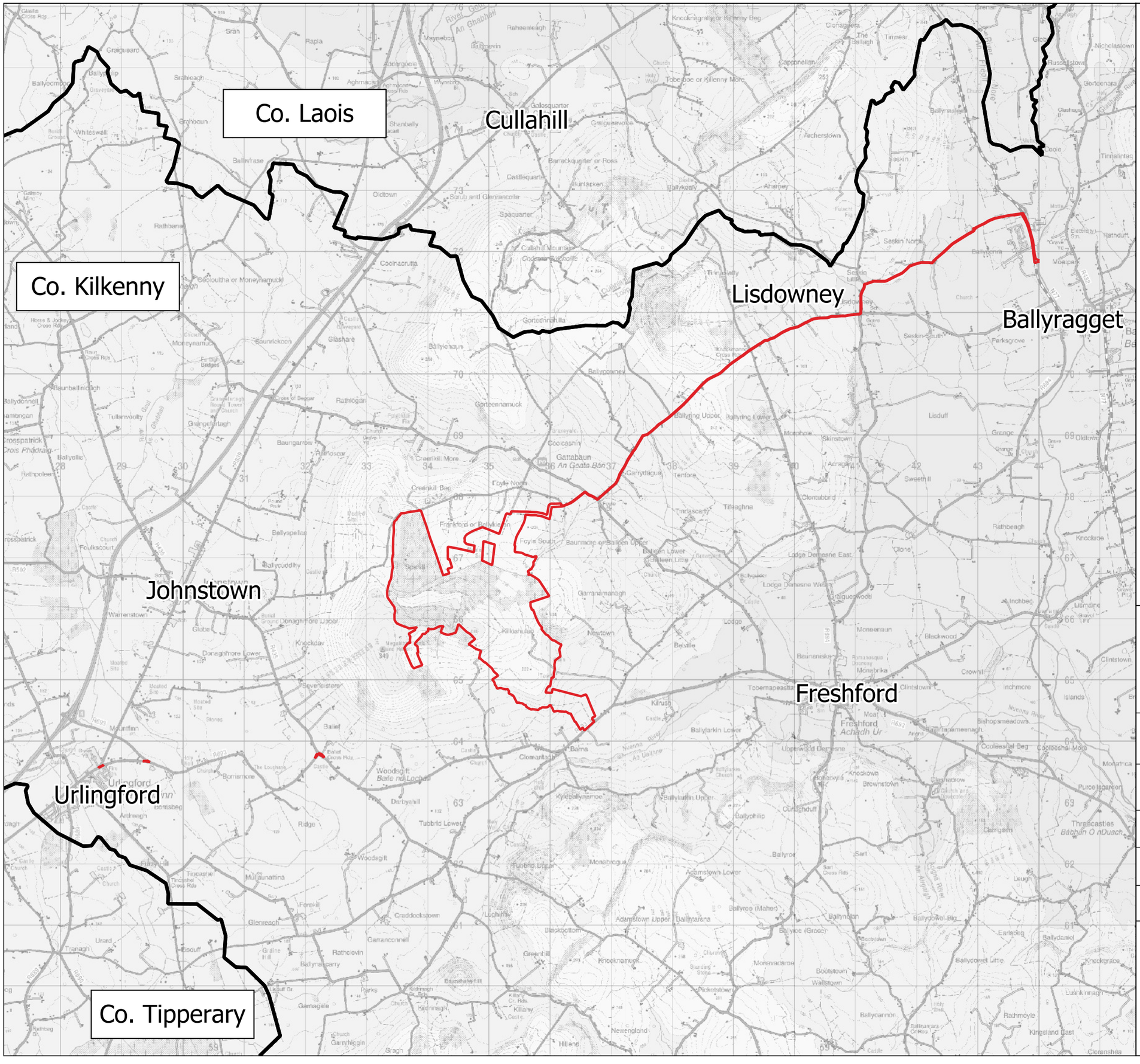
Proposed Project Layout (B)

Project Title

Killoshulan Wind Farm

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EC	JF
Project No.	**Drawing No.**
260172	Figure 2-3
Scale	**Date**
1:30,000	2026-10-08

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Map Legend

- Planning Application Boundary
- County Boundary

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Drawing Title

Planning Application Boundary

Project Title

Killoshulan Wind Farm

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Project No.	**Drawing No.**
260172	Figure 2-4
Scale	**Date**
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2.3 Construction Methodologies Overview

2.3.1 Introduction

An experienced main contractor will be appointed for the civil works for the construction phase of the Proposed Project. The appointed contractor for the works will be required to comply with this CEMP and any revisions made to this document in the preparation of method statements for the various elements of the construction phase of the Proposed Project. An overview of the proposed Construction Methodologies is provided below.

2.3.2 Overview of Proposed Construction Methodology

The EIAR includes construction methodologies for various elements of work to be undertaken as part of the Proposed Project. These construction methodologies are reproduced in the following sub-sections but will be superseded by an appointed contractor's construction method statements, which will form part of the CEMP. The contractor's construction method statements will be prepared to take account of the detailed engineering, geotechnical and detailed drainage design which will be prepared prior to commencement of construction and all requirements of this CEMP.

Proposed Wind Farm:

- Site Drainage System;
- Site Entrance Management;
- Access Roads (New and Upgrade to existing tracks);
- Proposed Wind Farm Underground Electrical (33kV) and Communication Cabling;
- Watercourse/Culvert Crossings;
- Borrow Pit;
- Spoil Management;
- Temporary Construction Compounds;
- Tree Felling and Hedgerow Removal;
- Biodiversity Enhancement and Management Measures;
- Meteorological Mast Foundations;
- Turbine Hardstanding Areas; and
- Turbine Foundations

Proposed Grid Connection

- On-site 110 kV Electricity Substation and Control Buildings;
- Battery Energy Storage System (BESS)
- Underground Electrical (110kV) and Communication Cabling;
- Existing Underground Services;
- Joint Bays; and
- Watercourse/Service Crossings on the Proposed Grid Connection Underground Cabling Route;

2.3.3 Proposed Wind Farm

2.3.3.1 Site Drainage System

The early establishment of the drainage system will manage the risk of impacts on watercourses on and adjacent to the Site during construction. In addition, construction operations will adopt best working practices and the development of the Site will be phased accordingly.

The EIAR (and appended drawings) includes a drainage design required for the purposes of assessing the potential effects of the Proposed Project. The drainage design will be developed further with a level of construction detail necessary to implement the measures on-site. The detailed (construction phase) drainage design will form part of the updated Main Contractor's CEMP, and the effective implementation of the detailed drainage design will be audited by the ECoW. Surface water management and drainage design principles are outlined in Section 3.2 below and Section 4.6 in Chapter 4 of the EIAR.

2.3.3.2 Site Entrance Management

Main Construction and Operational Site Entrance

During the construction phase, the Proposed Wind Farm site will be accessed via an existing agricultural access point off the R693 Regional road. The R693 runs along the southern boundary of the Proposed Wind Farm site in the townland of Barna, Co. Kilkenny. This entrance will be upgraded and used as the site entrance for HGVs and other abnormal loads during the construction and operation phases of the Proposed Wind Farm.

It is proposed to access the Proposed 110kV Substation, during both the construction and operational phases of the Proposed Wind Farm, via this proposed site entrance off the R693 Regional road in the townland of Barna, Co Kilkenny.

The Proposed Wind Farm Main Site Entrance is shown in Figure 4-28 of Chapter 4 and Appendix 4-1 of this EIAR.

Temporary Site Access

It is proposed to access the Proposed 110kV Underground Cabling route during the construction phase via an additional entrance on the L1805. The intended use of this access point will be to facilitate the installation of the Proposed 110kV Underground Cabling route from the Proposed 110kV Substation to the local road network only. This site assess point will be closed following the construction phase.

This access point may be used during any phase of the Proposed Project for emergency vehicle access.

Both the Main Site Entrance and Temporary Site Access points are shown in Figure 4-28 of Chapter 4 and Appendix 4-1 of this EIAR.

2.3.3.3 Access Roads

To facilitate travel within the Site and to connect the various project components together, existing onsite tracks will need to be upgraded, and new access roads will need to be constructed. The Site makes use of the existing track network insofar as possible. It is proposed to upgrade approximately 4.5km of existing site roads and tracks and to construct approximately 9.1km of new internal access roads.

The proposed site entrance was subject to a swept path analysis assessment to identify the turning area required, as described in Section 15.1 of the Traffic and Transport Assessment. Appropriate sightlines will be established for the safe access and egress of traffic during the operational phase, please see Section 15.1.2 of Chapter 15 for further information

The proposed access roads will be constructed using the methodology summarised below:

Upgrade of Existing Access Roads or Tracks

Approximately 4.5km of the existing roads will require upgrading which will comprise widening of the roadway to a total running width of approximately six metres, with wider sections at corners and the laying of a new surface dressing on the existing section of roadway where necessary. The road widening will be undertaken as follows. Cross section details of widening of existing roads is shown in Figure 4-5 of the EIAR.

The general construction methodology for upgrading of existing roads or tracks is summarised below.

- *If it is considered that the current road formation level is adequate to support required bearing, then no upgrade or widening works will be completed.*
- *Otherwise, where required, the subsoil in the existing road verge will be excavated down to a suitable formation layer.*
- *All spoil excavated will be managed on-site. It will be placed within the identified spoil management areas within the Site (which will be located outside identified watercourse 50m buffers). Some topsoil may be temporarily stockpiled locally for reuse for landscaping purposes.*
- *All drainage measures prescribed in the detailed drainage design for the Proposed Project will be implemented around the works area.*
- *Well-graded granular fill (imported or site-won) will be spread and compacted in layers up to 200mm to provide a homogeneous running surface. The thickness of layers and amount of compaction required will be decided by the Construction Manager based on the characteristics of the material and the compaction plant to be used.*
- *These layers of granular fill will be brought to the same level as the top of the existing road surface.*
- *Where required, a layer of geogrid will be installed directly onto the top of the granular fill layer and the existing road surface.*
- *A layer of finer well graded stone for the running surface will be laid on the geogrid and compacted.*
- *Upon completion the upgraded roads will be a single-track design with a width of 6m with localised widening at bends and changes in direction (depending on the location within the Site).*

Prior to any works commencing on the upgrade of existing roads, the requirement for additional roadside drainage will be considered by the Project Hydrologist in line with the proposals outlined in Section 3.2 below.

Construction of New Roads

The construction methodology for the proposed new access roads and turbine hardstands is outlined as follows:

- *Establish alignment of the new road from the construction drawings and mark out the centrelines with ranging rods or timber posts;*
- *All drainage measures prescribed in the detailed drainage design for the Proposed Project will be implemented around the works area;*

- *The road layout has been designed to avoid crossings of natural watercourses where possible;*
- *Where existing culverts are to be upgraded or extended, the works will be carried out to follow a method statement to be prepared in consultation with Inland Fisheries Ireland;*
- *The access tracks will be of single-track design with a width of 6m with localised widening at bends and changes in direction. (depending on the location within the Site)*
- *All spoil excavated will be managed on-site. It will be placed within the identified spoil management areas within the Site. Some topsoil may be temporarily stockpiled locally for reuse for landscaping purposes.*
- *The subsoil will be excavated down to a suitable formation layer of competent stratum;*
- *The road will be constructed using well-graded granular fill (imported or site-won), spread and compacted in layers typically of 200mm and a suitable capping layer to provide a homogeneous running surface. The thickness of layers and amount of compaction required will be subject to detailed design by Project Engineer in consultation with the Construction Manager based on the characteristics of the material and the compaction plant to be used;*
- *The new access roads will be constructed with a camber to aid drainage of surface water;*
- *Excavations side slopes shall not generally be greater than 1(V): 2 (H). Design slopes will be informed by the Geotechnical Engineer;*
- *At bends or steep inclines from the road, reflective snow poles will be erected to warn traffic on dark mornings and evenings that there is a turn in the road or a sharp incline beyond the road.*
- *Where underground services are to be traversed during the construction of new roads throughout the Proposed Wind Farm site, they will be traversed as per the methodology as outlined above.*

2.3.3.4 Proposed Wind Farm Underground Electrical (33kV) and Communication Cabling

The transformers in each turbine and the met mast are connected to the on-site Proposed 110kV Substation through a network of underground electrical and communication cabling. The ground is trenched using a mechanical excavator. The top layer of soil (or road surface) is removed and saved so that it is replaced on completion. The cables will be bedded with suitable material. The cables will be laid at a depth of approximately 1.2m below ground level; a suitable marking tape is installed between the cabling and the surface (see Plate 2-1 below illustrating an example of a single cable trench). On completion, the ground will be reinstated. The route of the underground electrical and communication cabling will follow the access tracks as illustrated on the Proposed Wind Farm layout drawings included as Appendix 4-1 of the EIAR. The cabling may be placed on either side of the road footprint, on both sides of the road and/or within the road. The exact configuration of the underground cabling will be set by the requirements of the electrical designers at detailed design stage.




Plate 2-1 Typical Cable Trench View

2.3.3.5 Watercourse/ Culvert Crossings

The northern portion of the Proposed Wind Farm site is that an extensive network of forestry agricultural drains already exist, and these will be integrated and enhanced as required and used within the Proposed Project drainage system. The integration of the existing drainage network and the Proposed Project network is relatively simple. The key elements being the upgrading and improvements to water treatment elements, such as in line controls and treatment systems, including silt traps, stilling ponds and buffered outfalls.

Clear-Span Watercourse Crossing

It is proposed to construct 3 no. new watercourse crossing (clear span bridge/culvert design) to facilitate the Proposed Wind Farm site infrastructure. The locations of these crossings are shown on the layout drawings included in Appendix 4-1. The clear-span watercourse crossing methodology presented below will ensure that no instream works are necessary. The standard construction methodology for the installation of a clear-span watercourse crossing is as follows:

- The access road on the approach either side of the watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of each watercourse crossing.
- All drainage measures along the proposed road will be installed in advance of the works.
- A foundation 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. The base will be excavated along the stream bank with no instream works required.
- Access to the opposite side of the watercourse for excavation and foundation installation will require the installation of a temporary pre-cast concrete or metal bridge across the watercourse to provide temporary access for the excavator. Plant and equipment will not be permitted to track across the watercourse.
- Once the foundation base has been completed, the pre-cast concrete clear-span structure will be installed using a crane which will be set up on the bank of the watercourse and will be lifted into place from the bank with no contact with the watercourse.

- Once the crossing is in position stone backfill will be placed and compacted against the structure up to the required level above the foundations.
- Underground cabling ducting will be contained within the road make-up of the proposed crossing.

A standard design drawing of a pre-cast concrete, clear span crossing is shown in Figure 4-35.

The watercourse crossing will be constructed to the specifications of the OPW bridge design guidelines 'Construction, Replacement or Alteration of Bridges and Culverts - A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945', and in consultation with Inland Fisheries Ireland. Abutments will be constructed from precast units combined with in-situ foundations, placed within an acceptable backfill material.

Confirmatory inspections of the proposed new watercourse crossing locations will be carried out by the Project Civil/Structural Engineer and the Project Hydrologist prior to the construction of the crossing.

Culvert Crossing

All new proposed culverts and proposed culvert upgrades will be suitably sized for the expected peak flows in the watercourse.

Some culverts may be installed to manage drainage waters from works areas of the Proposed Project, particularly where the waters have to be taken from one side of an existing roadway to the other for discharge. The size of culverts will be influenced by the depth of the track or road sub-base. In all cases, culverts will be oversized to allow mammals to pass through the culvert.

Culverts will be installed with a minimum internal gradient of 1% (1 in 100). Smaller culverts will have a smooth internal surface. Larger culverts may have corrugated surfaces which will trap silt and contribute to the stream ecosystem. Depending on the management of water on the downstream side of the culvert, large stone may be used to interrupt the flow of water. This will help dissipate its energy and help prevent problems of erosion. Smaller water crossings will simply consist of an appropriately sized pipe buried in the sub-base of the road at the necessary invert level to ensure ponding or pooling does not occur above or below the culvert and water can continue to flow as necessary.

All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance.

2.3.3.6 Borrow Pit

The estimated volume to be extracted from the borrow pit for the construction of the Proposed Wind Farm is up to 162,700m^3. This figure presented is the anticipated maximum volumes; however, the actual volumes to be removed from the borrow pit will be confirmed at the time of construction and following detailed pre-construction site investigation works.

The borrow pits will be excavated and backfilled as follows:

- The area to be used for the borrow pit will be marked out at the corners using ranging rods or timber posts. Drainage runs, and associated settlement ponds will be installed around the perimeter;
- The initial borrow pit excavation will involve removal of soil to the top of bedrock. These materials will be stored temporarily in the borrow pit or placed alongside access roads;
- All drainage measures prescribed in the detailed drainage design for the Proposed Project will be implemented around the works area;

- The bedrock material will be extracted by breaking and blasting (section 4.8.1.7.1 and 4.8.1.7.2 in Chapter 4) from the borrow pit and stockpiled or used as required;
- The use of material won from the borrow pit will be sequential with new road construction or turbine foundation formations;
- Temporary stockpiling of aggregates will be required to accommodate the cut and fill operations within the borrow pit, and the progression of access roads and turbine excavations;
- As the borrow pit excavation progresses and becomes deeper, surface water and groundwater ingress will be removed via pumping to settlement ponds, and re-distribution locally across natural vegetated areas. Where required, additional specialist water treatment measures will be employed to ensure no deterioration in downstream water quality occurs;
- When extraction ceases within the borrow pit, the borrow pit will be backfilled with excavated spoil and its associated drainage measures will be removed.
- The extraction area of the borrow pit will have to be permanently secured and a stock-proof fence will be erected around the borrow pit to prevent access to these areas as well as the installation of appropriate health and safety signage.

Two extraction methods have been assessed for breaking out the useful rock below: rock breaking and blasting.

2.3.3.6.1 *Rock Breaking*

Weathered or brittle rock can be extracted by means of a hydraulic excavator and a ripper attachment. This is a common extraction methodology where fragmented rock is encountered as it can be carefully excavated in layers. In areas where stronger rock is encountered and cannot be removed by means of excavating then a rock breaking methodology may be used. Rock breaking equipment comprises a large hydraulic 360-degree excavator with a rock breaker attachment. Given the power required to break out tight and compact stone at depth, the machines are generally large and in the 40-60 tonne size range. Even where rock might appear weathered or brittle at the surface, the extent of weathering can quickly diminish with depth resulting in strong rock requiring significant force to extract it at depths of only a few metres.

A large rock breaking excavator progressively breaks out the solid rock from the ground in the borrow pit area. A smaller rock breaker, in the 30-40 tonne size range, then breaks the rocks down to a size that can then be fed into a crusher.

The extracted, broken rock is loaded into a mobile crusher using a wheeled loading shovel and crushed down to the necessary size of graded stone required for the on-site civil works. The same wheeled loader takes the stone from the crusher conveyor stockpile and stockpiles it elsewhere within the borrow pit, away from the immediate area of the crusher, until it is required elsewhere within the Site.

2.3.3.6.2 *Rock Blasting*

Where blasting is used as an extraction method, a mobile drilling rig is used to drill vertical boreholes into the area of rock that is to be blasted. A drilling rig will drill the necessary number of boreholes required for a single blast in approximately 3 to 4 days. The locations, depth and number of boreholes are determined by the blast engineer. This is a specialist role fulfilled by the blasting contractor.

The blast engineer will arrange for the necessary quantity of explosive to be brought to site to undertake a single blast. The management of explosives on-site and the actual blasting operation will be agreed in advance with and supervised by An Gardaí Siochána. The blast engineer sets the explosives in place in the boreholes, sets the charges, and fires the blast.

A properly designed blast should generate rock of a size that can be loaded directly into a mobile crusher, using the same wheeled loader outlined above. The same method is used for processing the rock generated from a blast, as would be used to process rock generated by rock breaking. Generally, the drilling rig will recommence drilling blast holes for the next blast as soon as one blast is finished. The potential impacts and control measures associated with noise and vibration from this extraction method are assessed in Chapter 12 Noise and Vibration. Any blasting will be carried out in accordance with the *Guidance on the Safe Use of Explosives in Quarries* (Safety and Health Commission for the Mining and Other Extractive Industries, 2002)[1] and the British Standard BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Noise*[2].

2.3.3.7 Spoil Management Plan

It is proposed to manage overburden generated through construction activities for the Proposed Project locally within the Site, through backfilling of the proposed borrow pit void in the first instance, and following that within linear berms will be placed along access roads and turbine hardstand areas, where appropriate (avoiding environmentally constrained areas). Excess overburden will be placed in a spoil management area located approximately 173m northeast of T4, measuring approximately 8,062 square meters (m^2) in area.

The total estimated volume of spoil to be managed following excavations during the construction phase of the Proposed Project is approximately 133,000m^3. Some material arising from the construction of the Proposed 110kV Underground Cabling route will be sent to an appropriate licenced facility. The majority of soil and subsoil excavated during the works will be used to backfill the proposed borrow pit. Any additional soil and subsoil will be used for site landscaping or will be placed alongside site access roads (avoiding environmentally constrained areas). There is more than enough capacity to manage the total volume of spoil requiring management for both the Proposed Wind Farm and the Proposed Grid Connection as detailed in Table 4-2 in Chapter 4 of the EIAR.

2.3.3.8 Temporary Construction Compounds

Two temporary construction compounds will be located within the Proposed Wind Farm site. The primary construction compound will be located in the north of the Site, measuring approximately 5,410 square meters (m^2) in area, approximately 258m northwest of T8. The second construction compound will be located approximately 15m south of T2 measuring approximately 450 m^2.

The locations of the proposed temporary construction compounds are shown on the Proposed Project site layout drawing in Figure 4-2 of Chapter 4. The layouts of the temporary construction compounds are shown on Figure 4-8 and Figure 4-9 of Chapter 4.

- The area to be used as the compound will be marked out at the corners using ranging rods or timber posts. Drainage runs and associated settlement ponds will be installed around the perimeter;
- The compound platform will be established using a similar technique as the construction of the substation platform as discussed below in Section 4.8.2.1 in Chapter 4 of the EIAR;
- A layer of geo-grid will be installed where deemed necessary by the designer and compacted layers of well graded granular material will be spread and lightly compacted to provide a hard area for Site offices and storage containers;
- A limited amount of fuel will have to be stored in appropriately bunded containers and a designated area for oil storage will be constructed within the compound.

[1] https://www.hsa.ie/eng/Publications_and_Forms/Publications/Mines_and_Quarries/Guidance%20on%20the%20Safe%20Use%20of%20Explosives%20in%20Quarries.pdf
[2] https://www.thenbs.com/PublicationIndex/documents/details?Pub=BSI&DocID=305965

- Areas within the compound will be constructed as site roads and used as vehicle hardstandings during deliveries and for parking;
- A bunded containment area will be provided within the compound for the storage of lubricants, oils and site generators etc;
- A waste storage area will be provided within the compound;
- The compound will be fenced and secured with locked gates if necessary; and,
- Upon completion of the Proposed Project, the temporary construction compounds will be decommissioned and allowed to vegetate naturally.

2.3.3.9 Tree Felling and Replanting

As part of the Proposed Project, tree felling will be required within and around the development footprint to allow for the construction of the turbine bases, access roads underground cabling, and the other ancillary infrastructure.

Further details on tree felling required within and around development footprint on the Proposed Project site is detailed in Chapter 6 of this EIAR.

Nearly half (45%) of the Proposed Wind Farm site comprises commercial forestry. A total of 27.5 hectares of commercial forestry will be permanently felled as part of the Proposed Project along with existing treeline boundaries as detailed in Chapter 6, Sections 6.5.2.2.4 and 6.5.3.2.1. Figure 4-11 of Chapter 4 shows the extent of the commercial forestry to be permanently felled as part of the Proposed Project.

The commercial forestry felling activities required as part of the Proposed Project will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments. The policy requires that a copy of the planning permission for the Proposed Project be submitted with the felling licence application; therefore, the felling licence cannot be applied for until such time as planning permission is obtained for the Proposed Project.

2.3.3.9.1 *Forestry Replanting*

In line with the Forest Service's published policy on granting felling licences for wind farm developments, areas cleared of forestry for access roads, and any other wind farm-related uses will have to be replaced by replanting at an alternative site or sites. The Forest Service policy requires replacement or replanting on a hectare for hectare basis for the footprint of the infrastructure developments.

The estimated 27.5 hectares that will be permanently felled for the footprint of the Proposed Project infrastructure will be replaced or replanted on a hectare for hectare basis as a condition of any felling licence that will be issued in respect of the Proposed Project. Replanting is a requirement of the Forestry Act and is primarily a matter for the statutory licensing processes that are under the control of the Forest service.

The replacement of the 27.5 hectares of forestry can occur anywhere in the State subject to licence. The replacement of forestry, felled as part of the Proposed Project, may occur on any lands, within the state, benefitting from Forest Service Technical Approval[3] for afforestation, should the Proposed Project receive planning permission. Under the Forestry Regulations 2017, all applications for licences for afforestation require the prior written approval (technical approval) of the Minister for Agriculture, Food and the Marine. Before the Minister can grant approval, he/she must first determine if the project is likely to have significant effects on the environment (for EIA purposes) and assess if the development,

[3] *All proposed forestry developments where the area involved is greater than 0.1 hectare must receive the prior written approval of the Forest Service. The application for approval is known as Pre-Planting Approval – Form 1.*

individually or in combination with other plans or projects is likely to have a significant effect on a European site (for Habitats purposes). Further details in relation to forestry replanting are included in Chapter 2 and Chapter 4 of the EIAR.

2.3.3.10 Biodiversity Enhancement and Management Measures

A Biodiversity Enhancement and Management Plan (BEMP) has been prepared for the Proposed Project and is included as Appendix 6-4 of this EIAR. This plan has been developed to offset the loss of habitats identified within the Proposed Wind Farm site and further enhance the biodiversity of the site and its environs.

Areas within the Proposed Wind Farm site have been selected for biodiversity enhancement measures as part of the Proposed Project to offset any habitat losses and to enhance the Proposed Wind Farm site for species and habitats known to occur within the area. It is proposed that areas of Dry calcareous and neutral grassland (GS1) identified (approx. 11.7ha) in the western section of the Proposed Wind Farm site are managed to promote greater floral diversity and to target the establishment of the Annex I habitat: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites) (6210). This Annex I habitat is the single Qualifying Interest (QI) of the adjacent Spahill and Clomantagh Hill SAC (000849). Furthermore, the provision of the grassland measures are intended as enhancement only, as there will be no loss of diverse grasslands to facilitate the Proposed Project . Enhancement will include safeguarding existing species rich grassland habitat within the Proposed Wind Farm site during construction, in addition to implementing low-intensity management measures during the operation of the Proposed Wind Farm. It is proposed to manage and bolster existing hedgerow (approx. 3.4km) and plant new native hedgerows (approx. 225m) within the Proposed Wind Farm site. Newly planted species selected for both new and bolstered Hedgerows (WL1) will be indigenous to the local area. The ideal native hedge is made up of approx. 75% hawthorn and 25% of at least four other species. This measure will create additional habitat for commuting and foraging fauna, including bats, badger and other protected fauna, within the Proposed Wind Farm site. The proposed bolstering and planting of Hedgerow (WL1) habitat will mitigate the permanent loss of approximately 1.34km of linear features within the Proposed Wind Farm site by improving the foraging, commuting and breeding corridor network for protected fauna utilizing the Site.

Please see Figure 4-10 and Appendix 6-4 for Biodiversity Enhancement and Management Plan. These enhancement measures have also been considered in the landscape & visual assessment which is included at Chapter 13: Landscape & Visual, of this EIAR, with particular reference to Section 13.7.3.1.1. Similarly, the drainage design for the Proposed Project has been prepared by Hydro Environmental Services Ltd. (HES) and is included in Appendix 9-1 of this EIAR.

2.3.3.11 Meteorological Mast Foundation

One meteorological (met) mast is proposed as part of the Proposed Wind Farm site. The met mast will be equipped with wind monitoring equipment at various heights. The proposed met mast will be located at N633443, E666664 (ITM) as shown on the Proposed Project layout drawing in Figure 2-2 and Figure 2-3. The mast will be a free-standing slender lattice structure 103.5 metres in height. The mast will be constructed on a hard-standing area sufficiently large to accommodate the equipment that will be used to erect the mast. The proposed meteorological mast is shown in Figure 4-7 of Chapter 4.

The met mast foundation will be formed at a suitable level directed by the Geotechnical Engineer/Designer. The foundation area will be prepared as follows:

- *The extent of the excavation will be marked out and will include an allowance for trimming the sides of the excavation to provide a safe working area and slope batter;*
- *Where practical, the soil will be stripped over the area of the excavation and stored locally for reuse, the subsoil will be excavated and stored to one side for reuse during the landscaping around the finished met mast;*

- *No material will be removed from site with excavated spoil being transported and stored in the identified spoil management areas within the Site.*
- *All groundwater and surface water arising from met mase base excavation will be pumped to the dirty water system prior to discharge from the works area;*
- *Soil excavation shall be observed by a qualified archaeologist in accordance with a scheme of archaeological monitoring to identify any significant remains as they come to light;*
- *The foundations excavation will be raised to formation level by compacted layers of well graded granular material will be spread and compacted to provide a hard area for the met mast foundation.*

2.3.3.12 Turbine Hardstanding Areas

Hard standing areas consisting of levelled and compacted hardcore are required around each turbine base. These will facilitate access, turbine assembly and turbine erection. The hard standing areas are used to accommodate cranes used in the assembly and erection of the turbine. These areas also allow for the offloading and storage of turbine components, and generally provide a safe, level working area around each turbine position. The hard-standing areas are extended to cover the turbine foundations, once completed, by placing crushed stone over the foundation. The main body of the hard standing areas will measure 55m in length and 32m in width.

The precise sizes, arrangement and positioning of hard standing areas are dictated by turbine suppliers. All crane hardstand areas will be designed taking account of the loadings provided by the turbine manufacturer and will consist of a compacted stone structure. The crane hardstands will be constructed in a similar manner to the excavated site roads.

The proposed hard standing areas for each individual turbine are shown as part of the detailed layout drawings included in Appendix 4-1 and represent the maximum sizes required. However, the extent of the required areas at each turbine location may be optimised on-site within the parameters set out and assessed in this EIAR. This will depend on the turbine supplier's exact requirements.

These hard standing areas will be used as assembly areas for offloading turbine blades, tower sections and hub from trucks until such time as they are ready to be lifted into position by cranes and to assist the main crane during turbine assembly.

2.3.3.13 Turbine Foundations

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level. The size of the foundation will be dictated by the turbine manufacturer, and the final turbine selection will be the subject of a competitive tender process. Different turbine manufacturers use different shaped turbines foundations, ranging from circular to hexagonal and square, depending on the requirements of the final turbine supplier and a foundation area large enough to accommodate modern turbine models has been assessed in this EIAR. The turbine foundation transmits any load on the wind turbine into the ground. Gravity foundations have been assessed in this EIAR and are shown in Figure 4-4 of Chapter 4 of this EIAR. The maximum horizontal and vertical extent of the turbine foundation will be 25m and 3m respectively, which has been assessed in the EIAR.

After the foundation level of each turbine has been formed on competent strata (i.e. bedrock or subsoil of sufficient load bearing capacity) or using piling methods, the "Anchor Cage" (anchors the first section of the turbine tower to the foundation) is levelled and reinforcing steel is then built up around and through the anchor cage. The outside of the foundation is shuttered with demountable formwork to allow the pouring of concrete and is backfilled accordingly with appropriate granular fill to finished surface level (Plate 4-2 below.

It is anticipated that the formation level of the turbine foundations will be on the lower mineral subsoil or bedrock. They will be formed at a suitable level directed by the Geotechnical Engineer/Designer. The foundations will be constructed as follows:

1. *The extent of the excavation will be marked out and will include an allowance for trimming the sides of the excavation to provide a safe working area and slope batter;*
1. *Where practical, the soil will be stripped over the area of the excavation and stored locally for reuse, the subsoil will be excavated and stored to one side for reuse during the landscaping around the finished turbine;*
2. *No material will be removed from site with excavated spoil being transported to the identified spoil management areas within the Site.*
3. *All groundwater and surface water arising from turbine base excavation will be pumped to the dirty water system prior to discharge from the works area;*
4. *Soil excavation shall be observed by a qualified archaeologist in accordance with a scheme of archaeological monitoring to identify any significant remains as they come to light;*
5. *The foundations excavation will be raised to formation level by compacted layers of well graded granular material will be spread and compacted to provide a hard area for the turbine foundation.*

Standard excavated reinforced concrete bases will be completed as follows:

1. *A layer of lean-mix blinding will be laid approximately 75mm thick directly on top of the newly exposed formation, tamped and finished with a screed board to leave a flat level surface. The concrete should be protected from rainfall during curing and all surface water runoff from the curing concrete should be prevented from entering surface water drainage directly;*
2. *High tensile steel reinforcement will be fixed around the anchor cage in accordance with the designer's drawings & schedules. The foundation anchorage system will be installed, levelled and secured to the blinding using steel box section stools;*
3. *Ductwork will be installed as required, and formwork erected around the steel cage and propped from the backside as required;*
4. *The foundation anchorage system will be checked both for level and line prior to the concrete being installed in the base. These checks will be passed to turbine manufacturer for their approval;*
5. *Concrete will be placed using a concrete pump and compacted when in the forms using vibrating pokers to the levels and profile indicated on the drawings. Upon completion of the concreting works the foundation base will be covered and allowed to cure;*
6. *Steel shutters will be used to pour the circular chimney section;*
7. *Earth wires will be placed around the base;*
8. *The foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation or imported material and landscaped using the soil set aside during the excavation; and.*
9. *Any excess overburden excavated during construction shall be managed in line with the recommendations/ best practice guidelines outlined in Section 2.3.12 above.*

2.3.4 Proposed Grid Connection

2.3.4.1 On-site Electricity Substation and Control Buildings

A detailed drawing of the Proposed 110kV Substation is shown in Figure 4-14. The Proposed 110kV Substation will be constructed by the following methodology:

- The area of the on-site substation will be marked out using ranging rods or wooden posts and the soil and overburden stripped and temporarily stockpiled for later use in landscaping. Any excess material will be sent to the borrow pit void or within linear berms that will be placed along access roads and turbine hardstand areas, where appropriate within the Site.
- 2 no. control buildings will be built within the on-site substation compound.
- The foundations will be excavated down to the level indicated by the designer and appropriately shuttered reinforced concrete will be laid over it. An anti-bleeding admixture will be included in the concrete mix.
- The block work walls will be built up from the footings to DPC level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors.
- The block work will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the building for this operation.
- The roof slabs will be lifted into position using an adequately sized mobile crane.
- The timber roof trusses will then be lifted into position using a telescopic load all or mobile crane depending on-site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather.
- The transformer, electrical equipment and storage container plinths will be excavated down to the level indicated by the designer and appropriately shuttered reinforced concrete will be laid over it. An anti-bleeding admixture will be included in the concrete mix.
- Lightning poles will be erected at appropriate locations adjacent to the substation. All lightning poles will be appropriately earthed.
- The electrical equipment will be installed and commissioned.
- Perimeter fencing will be erected.
- The construction and components of the substation will be built to EirGrid specifications.

2.3.4.2 Battery Storage

A 50MWh battery-based energy storage system (BESS) will be located immediately adjacent the Proposed 110kV Substation. The BESS compound will have a footprint of approximately 4,000m^2. The BESS compound will include 10 no. Battery Storage modules and 10 no. transformers. Each battery storage module will measure 12.2m by 2.4m with a height of 2.6m.

Prior to installing the steel containers, clearance of the site area, levelling off the ground surface and creation of a hard stand will be undertaken. These containers and the adjacent infrastructure house the batteries, inverters, transformers, fire suppression equipment and associated electrical components. The containers will be mounted onto concrete plinth foundations. The containers shall be spaced to allow airflow around the containers, feeding their climate control systems.

In addition to the modular steel containers, other components of the development include:

- A grid transformer within the electrical compound;
- Above ground cable junction boxes/ cabling cabinets and cable racks/steel trunking facilitating the necessary electrical connections between containers;
- Underground ducting and cabling;
- A security fence around the perimeter of the compound;
- Communications equipment; and,
- Lightning protection poles,
- Fire suppression equipment,
- 2 no. Static Storage Tanks 250m^3,
- Underground Fire Water Retention Tank 500m^3.

The battery storage compound will operate continuously, linked to the on-site substation. A SCADA system will be provided that will allow for remote monitoring and operation of the site by operations staff. The system will raise all alarms to the control centre and will allow staff to remotely monitor system performance. A Battery Management System (BMS) will monitor and control the battery modules and the whole facility will be monitored and operated remotely by means of an Energy Management System with regular visits made by security and/or maintenance personnel.

The modular enclosures of the BESS includes a comprehensive fire protection system with isolated containment zones, integrated fire suppression, deflagration panels, environmental sensors, and active ventilation. These features are designed to prevent, detect, and contain thermal events, minimizing damage and downtime. The enclosures have an IP55 rating, which means it is protected against dust ingress and low-pressure water jets from any direction, contributing to overall safety and durability.

In the unlikely event of a fire within the BESS compound water is the preferred suppression agent due to its immediate cooling capacity, availability, and ease of onsite storage and transport. Firewater from a lithium-ion BESS fire will pick up toxic and corrosive by-products such as hydrofluoric acid, heavy metals, electrolytes, plastics, etc. The fire-water retention design for this BESS compound will capture, contain, and hold contaminated runoff from the worst-credible fire scenarios while keeping it away from drains, groundwater, and off-site receptors. 2 no. firewater storage tanks, with a combined capacity of at least 500,000 litres shall be provided in the compound to assist fire fighters in a fire event. The provision of firewater stored on site shall be subject to consultation with Kilkenny Fire Service. A firewater retention tank will also be provided above ground to provide the most effective and suitable measure for retaining firewater. The tank will be rendered impermeable by the use of an appropriate liner and integrity tested. All integrity testing of the tanks will be completed by a suitably qualified competent person and be in line with the Environmental Protection Agency's (EPA) guidance.

The fire water retention design for this BESS compound will capture, contain, and hold contaminated runoff from the worst credible fire scenarios while keeping it away from drains, groundwater, and off site receptors. After the fire, the retained water will be sampled, treated, or removed by licensed hazardous waste contractors.

The objectives of the fire water containment are to:

- Contain all firewater and contaminated rainfall from a worst-case BESS fire without uncontrolled release.
- Bund the compound so a single fire incident does not cause firewater to escape the boundary of the proposed BESS compound.
- Provide positive isolation of surface water drains (automatic/manual penstocks), defaulting to "closed on alarm."
- Be chemically compatible with expected contaminants (HF, metals, electrolytes, plastics by products) and allow safe sampling, treatment, and removal.

A Fire Risk Management and Emergency Response Plan has been prepared for the Proposed Project and is included as Appendix 4-4 of this EIAR. The BESS containers are shown in Figure 4-19 of Chapter 4 of this EIAR.

2.3.4.3 Underground Electrical (110kV) and Communication Cabling for Proposed Grid Connection

The underground cabling works will consist of the installation of ducts in an excavated trench to accommodate electrical and fibre communications cables to facilitate a connection between the Proposed 110kV Substation and the existing 110kV Ballyragget Substation.

The Proposed 110kV Underground Cabling will be laid beneath the surface of private roads (existing and proposed) and the public road using the following methodology:

- Before works commence, updated surveying will take place along the proposed cable route, with all existing culverts and services identified. All relevant bodies i.e., ESBN and Kilkenny County Council etc. will be contacted and all up to date information for all existing services sought.
- When the cable is located on public roads, a traffic management plan road opening licence will be prepared prior to any works commencing. A road opening licence will be obtained where required and all plant operators and general operatives will be inducted and informed as to the location of any services. Where applicable, works shall have regard to the Department of Transport's *Interim Guidance to Road Authorities regarding the proposed placement of Medium or High Voltage electricity assets, including ducts, cables and associated infrastructure under public roads (Version 2, effective from 1 March 2026)*, together with the *Guidelines for Managing Openings in Public Roads* and any applicable road-opening licence conditions
- A tracked 360-degree excavator will then proceed to dig out the proposed trench, typically to a depth of 1.2m, within which the ducts will be laid.
- The cable ducts will be concrete surrounded where they pass under the public road and under drains or culverts.
- Trench supports will be installed, or the trench sides will be benched or battered back where appropriate and any ingress of ground water will be removed from the trench using submersible pumps, fitted with appropriate silt filtration systems, to prevent contamination of any watercourse.
- Once the trench has been excavated, a base-layer will be laid and compacted, comprising Clause 804, or 15 Newton CBM4 concrete as required.
- The ducting will be installed as per specification, with couplers fitted and capped to prevent any dirt etc. entering the duct. In poor ground conditions, the ends of the ducts will be shimmed up from the bed of the trench, to prevent any possible ingress of water dirt. The shims will be removed again once the next length has been connected. Extreme care will be taken to ensure that all duct collars (both ends) are clean and in good condition prior to ducts being joined.
- As the works progress, the as-built location of the ducting will be recorded using a total station or GPS.
- As per the associated base-layer (Clause 804 material or 15 Newton CBM4 concrete) will be installed and compacted as per approved detail, with care not to displace the ducting.
- Spacers will be used to ensure that the correct cover is achieved at both sides of the ducting.
- The remainder of the trench will be backfilled in two compacted layers with approved engineer's specified material.
- Yellow marker warning tape will be installed across the width of the trench, at 300mm depth,
- The finished surface is to be reinstated, as per original specification. Off-road cabling may be finished with granular fill to facilitate access to the trench for any potential maintenance that is required during the operational phase of the Proposed Project.
- Marker posts will then be placed at regular intervals (generally at joint bays and any change in direction) to denote the location of the underground cabling.

2.3.4.4 Existing Underground Services

Any underground services encountered along the Proposed 110kV Underground Cabling route will be surveyed for level and the ducting will pass over the service provided adequate cover is available. A minimum clearance of 300 mm will be required between the bottom of the ducts and the service in question. If the clearance cannot be achieved the ducting will pass under the service and again 300 mm clearance between the top of the communications duct and bottom of the service will be achieved. In deeper excavations an additional layer of marker tape will be installed between the communications duct and top-level yellow marker tape. If the required separation distances cannot be achieved then a

number of alternative options are available such as using steel plates laid across the width of the trench and using 35N concrete surrounding the proposed ducting, with marker tape on the side of the trench. Back fill around any utility services will be with dead sand/pea shingle where appropriate.

2.3.4.5 Joint Bays

Joint bays are typically pre-cast concrete chambers where lengths of cable will be joined to form one continuous cable. They will be located at various points along the Proposed 110kV Underground Cabling route generally between 500 to 800 metres intervals or as otherwise required by ESB/EirGrid and electrical requirements. The Installed Joint Bays will be 2.5m x 6m x 1.75m pre-cast concrete structures installed below the finished ground level.

Where possible, joint bays will be located in areas where there is a natural widening/wide grass margin on the road in order to accommodate easier construction, cable installation and create less traffic congestion. 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. During construction the joint bay locations will be completely fenced off once they have been constructed, they will be backfilled until cables are being installed. Once the cabling is installed the joint bays will be permanently backfilled with the existing surface re-instated and there will be no discernible evidence of the joint bay on the ground.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between the Proposed 110kV Substation and the existing 110kV Ballyragget Substation. Earth Sheath Link Chambers are also required approximately every second joint bay along the cable route. Earth Sheath Links are used for earthing and bonding cable sheaths of underground power cables, installed in a flat formation, 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 precast concrete structures with an access cover at finished surface level. The locations of the joint bays and chambers are shown on the site layout drawings included in Appendix 4-1 of this EIAR. Standard joint bay and communication chamber details are shown in Figures 4-21 and 4-22 and Section 4.8.2.4 for joint bay construction methodology.

The precise siting of all Joint Bays, Earth Sheath Link Chambers and Communication Chambers within the underground cabling route corridor assessed is subject to approval by ESBN and EirGrid.

2.3.4.6 Watercourse Crossings on the Proposed Grid Connection Underground Cable Route

There are 6 no. watercourse crossings, all of which are referenced on EPA/OSI mapping, located along the Proposed 110kV Underground Cabling route. The construction methodology for the 6 no. watercourse crossings has been designed to eliminate the requirement for in-stream works at these locations. The various crossing methodologies to be employed along the Proposed 110kV Underground Cabling route include the following:

- Type A: Crossing using standard trefoil formation (Figure 4-23)
- Type B Flatbed formation under (Figure 4-24)
- Type C: Flatbed Formation over (Figure 4-25)
- Type D: Horizontal Directional Drilling (Figure 4-26)

A general description of the construction methods employed at watercourse crossings are described in Section 4.8.2.5 and 4.8.2.6 of Chapter 4 of this EIAR. An illustration of the proposed crossing methodology at the 6 no. watercourse crossing locations is included within the detailed site layout drawings in Appendix 4-1. A description of proposed methodologies for the crossing of services along the Proposed 110kV Underground Cabling route is included below.

2.3.4.6.1 Crossing Using Standard Trefoil Formation Over – Option A

Watercourses will not be directly impacted upon since no instream works or bridge/culvert alterations are proposed. Where adequate cover exists above a bridge/culvert or where a new bottomless box culvert or clear-span structure has been installed at a sufficient depth, the standard ESB approved trefoil arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course. The cable trench will pass over the culvert in a standard trench.

2.3.4.6.2 Flatbed Formation Under– Option B

Where cable ducts are to be installed under a watercourse or service where sufficient cover cannot be achieved by installing the ducts in a trefoil arrangement, the ducts will be laid in a much shallower trench the depth of which will be determined by the location of the top of the obstacle or the depth of excavatable material under a bridge. The ducts will be laid in this trench in a flatbed formation under the watercourse or service and will be encased in 6mm thick steel galvanized plate with a 35N concrete surround as per ESB Networks specification.

2.3.4.6.3 Flatbed Formation over – Option C

Where cable ducts are to be installed over a watercourse or service where sufficient cover cannot be achieved by installing the ducts in a trefoil arrangement, the ducts will be laid in a much shallower trench the depth of which will be determined by the location of the top of the obstacle or the depth of excavatable material over it. The ducts will be laid in this trench in a flatbed formation over the watercourse or service and will be encased in 6mm thick steel galvanized plate with a 35N concrete surround as per ESB Networks specification.

Where a bridge/culvert or service has insufficient cover depth to fully accommodate the required trench, the ducts can be laid in a flatbed formation partially within the existing road surface. Where this option is to be employed, the ducts will also be encased in steel with a concrete surround as per ESB Networks specifications. In order to achieve cover over these ducts and restore the carriageway of the road, it may be necessary to raise the pavement level locally to fully cover the ducts. The increased road level will be achieved by overlaying the existing pavement with a new wearing course as required. Any addition of a new pavement will be tied back into the existing road pavement at grade. After the crossing over the culvert has been achieved, the ducts will resume to the trefoil arrangement within a standard trench.

2.3.4.6.4 Horizontal Directional Drilling – Option D

The horizontal directional drilling method of duct installation is carried out using Vermeer D36 x 50 Directional Drill (approximately 22 tonnes), or similar plant. The launch and reception pits will be approximately 2.5mm wide, 2.5m long and 2.0m deep. The pits will be excavated with a suitably sized excavator. The drilling rig will be securely anchored to the ground by means of anchor pins which will be attached to the front of the machine. The drill head will then be secured to the first drill rod and the operator will commence to drill into the launch pit to a suitable angle which will enable him to obtain the depths and pitch required to the line and level of the required profile. Drilling of the pilot bore will continue with the addition of 3.0m long drill rods, mechanically loaded and connected into position.

During the drilling process, a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ and water is pumped through the centre of the drill rods to the reamer head and is forced in to void and enables the annulus which has been created to support the surrounding subsoil and thus prevent collapse of the reamed length. Depending on the prevalent ground conditions, it may be necessary to repeat the drilling process by incrementally increasing the size of the reamers. When the reamer enters the launch pit, it is removed from the drill rods which are then passed back up the bore to the reception pit and the next size reamer is attached to the drill rods and the process is repeated until the required bore with the allowable tolerance is achieved.

The use of a natural, inert and biodegradable drilling fluid such as Clear Bore™ is intended to negate any adverse impacts arising from the use of other, traditional polymer-based drilling fluids and will be used sparingly as part of the drilling operations. It will be appropriately stored prior to use and deployed in the required amounts to avoid surplus. Should any excess drilling fluid accumulate in the reception or drilling pits, it will be contained and removed from the site in the same manner as other subsoil materials associated with the drilling process to a licensed recovery facility.

Backfilling of launch & reception pits will be conducted in accordance with the normal specification for backfilling excavated trenches. Sufficient controls and monitoring, as listed below, will be put in place during drilling to prevent frack-out, such as the installation of casing at entry points where reduced cover and bearing pressure exits.

- The area around the Clear Bore™ batching, pumping and recycling plants shall be bunded using terram and sandbags in order to contain any spillages;
- One or more lines of silt fences shall be placed between the works area and adjacent rivers and streams on both banks;
- Accidental spillage of fluids shall be cleaned up immediately and transported off site for disposal at a licensed facility; and,
- Adequately sized skips will be used for temporary storage of drilling arisings during directional drilling works. This will ensure containment of drilling arisings and drilling flush.

3. ENVIRONMENTAL MANAGEMENT

3.1 Introduction

This CEMP includes all best practice measures required to construct the Proposed Project. The drainage proposals will be developed further prior to the commencement of construction however, any such improvements will be in line with the principles set out here and will also be in full compliance with the planning consent and mitigation measures as presented in the EIAR, Natura Impact Statement (NIS) and all other relevant planning documents. The following sections give an overview of the drainage design principles, dust and noise control measures and a waste management plan for the Site.

3.2 Protecting Water Quality

3.2.1 Good Environmental Management During Construction

Timing of works can strongly influence the potential for damaging the freshwater environment. Operations during wetter periods of the year pose a significantly greater risk of causing erosion and siltation, which can be particularly severe following major rainfall or snowmelt events. Traditionally, wind farm construction undertaken during the drier summer months would result in significantly less erosion and siltation. Construction activities in the hydrological buffer zones shall be avoided during or after prolonged rainfall or an intense rainfall event and work will cease entirely near watercourses when it is evident that water quality is being impacted.

3.2.2 Site Drainage Principles

The site drainage features have been outlined in Section 4.6 of Chapter 4 of the EIAR for the Proposed Project in addition to the drainage design and management for the Proposed Project. The protection of the watercourses within and surrounding the site, and downstream catchments that they feed is of utmost importance in considering the most appropriate drainage proposals for the site of the Proposed Project. No routes of any natural drainage features will be altered as part of the Proposed Project. Turbine locations and associated new roadways were originally selected to avoid natural watercourses, and existing roads are to be used wherever possible. The Proposed Project has where possible, been kept a minimum of 50 metres from natural watercourses. There will be no direct discharges to natural watercourses. All discharges from the proposed works areas or from interceptor drains will be made over vegetated ground at an appropriate distance from natural watercourse and lakes. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Project and are indicated on the drainage design drawings.

A detailed drainage design for the Proposed Project will be prepared prior to the commencement of construction to by the Project Hydrologist to incorporate these site drainage principles and carry forward into the construction phase of the Proposed Project.

Existing artificial drains in the vicinity of existing site roads will be maintained in their present location where possible. If it is expected that these artificial drains will receive drainage water from works areas, check dams will be added (as specified below) to control flows and sediment loads in these existing artificial drains. If road widening or improvement works are necessary along the existing roads, where possible, the works will take place on the opposite side of the road to the drain.

3.2.3 Legislation and Best Practice Guidance

The drainage design presented in the EIAR and planning application documents has been prepared based on experience of the project team of other renewable energy sites in similar environments, and the number of best practice guidance documents.

There is no one guidance document that deals with drainage management and water quality controls for wind farm and other renewable energy developments. However, a selection of good practice approaches have been adopted in preparation of this CEMP, and these are taken from the various best practice guidance documents listed below. These relate to infrastructure and operational works on sites, road design, water quality controls for linear projects, road drainage and management of geotechnical risks. To achieve best practice in terms of water protection through construction management, the detailed drainage design and all drainage management proposals shall be prepared in accordance with guidance contained in the following:

- Wind Energy Development Guidelines for Planning Authorities, 2006 (the Guidelines (DoEHLG, 2006) and the Draft Revised Wind Energy Development Guidelines (DoEHLG, 2019);
- Environmental Protection Agency (2022): Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- European Commission (2017): Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report;
- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh;
- Coillte (2009): Forest Operations & Water Protection Guidelines;
- Forest Services (Draft) Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures;
- Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford;
- COFORD (2004): Forest Road Manual – Guidelines for the Design, Construction and Management of Forest Roads;
- Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Watercourses;
- Good Practice During Wind Farm Construction (Scottish Natural Heritage, 2010);
- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006);
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, 2018);
- OPW (2009) The Planning System and Flood Risk Management;
- DOE/NIEA (2015): Wind Farms and Groundwater Impacts – A guide to EIA and Planning Considerations;
- Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU), (European Union, 2017);
- Land Types for Afforestation (Forest Service, 2016b);
- Forest Protection Guidelines (Forest Service, 2002);
- Forest Operations and Water Protection Guidelines (Coillte, 2013);
- Forestry and Water Quality Guidelines (Forest Service, 2000b); and,

- Forests and Water, Achieving Objectives under Ireland's River Basin Management Plan 2018-2021 (DAFM, 2018).

3.2.4 Battery Storage - Fire Water Contamination and Toxicity

Firewater from a lithium-ion BESS fire will pick up toxic and corrosive by-products such as hydrofluoric acid, heavy metals, electrolytes, plastics, etc. This contamination occurs quickly, even in early runoff. Contaminated water cannot be reused in firefighting streams for health and safety reasons with increased firefighter exposure risks and possible damage to pumps, hoses and nozzles. In addition, reapplying contaminated water to hot batteries containers may aerosolize toxic compounds, worsening inhalation hazards. The practice on this site will be to comply with industry best practice and to treat all firewater as hazardous waste requiring capture and disposal after a fire incident.

The fire-water retention design for this BESS compound will include capture, contain, and hold contaminated runoff from the worst-credible fire scenarios while keeping it away from drains, groundwater, and off-site receptors. After the fire, the retained water will be sampled, treated, or removed by licensed hazardous-waste contractors.

The objectives of the fire water containment are to:

- Contain all firewater and contaminated rainfall from a worst-case BESS fire without uncontrolled release.
- Bund the compound so a single incident doesn't flood the entire compound or escape the boundary with necessary bunding.
- Provide positive isolation of surface water drains (automatic/manual penstocks), defaulting to "closed on alarm."
- Be chemically compatible with expected contaminants (HF, metals, electrolytes, plastics byproducts) and allow safe sampling, treatment, and removal.

The sizing of the fire water retention capacity is calculated in Section 11.8 of Appendix 4-4 Fire Risk Management and Emergency Response Plan (Appendix F) of this EIAR, by the addition of the fire flow driven volume and the concurrent rainfall on the catchment. The highest 26-year period of rain fall over a 24-hour period for the area was sourced from Met Eireann's historical data. The hardstand/roof area for the BESS compound is calculated to be 3,700m^2 with a runoff coefficient of 1. A 15% freeboard to prevent the possibility of overtopping with the most adverse wind exposure case is not applied as the runoff water will be contained in a sealed tank(s).

For further details see Appendix 4-4 Fire Risk Management and Emergency Response Plan of this EIAR.

3.2.5 Refuelling, Fuel and Hazardous Materials Storage

Wherever possible, vehicles will be refuelled off-site, particularly for regular road-going vehicles. On-site refuelling of machinery will be carried out at designated refuelling areas at various locations throughout the site. Heavy plant and machinery will be refuelled on-site by a fuel truck that will come to the site as required on a scheduled and organised basis. All refuelling will be carried out outside designated watercourse buffer zones. Only designated trained and competent operatives will be authorised to refuel plant on-site. Mobile measures such as drip trays and fuel absorbent mats will used during refuelling operations as required. All plant and machinery will be equipped with fuel absorbent material and pads to deal with any event of accidental spillage.

The following mitigation measures are proposed to avoid release of hydrocarbons at the site:

- On site re-fuelling of machinery will be carried out using a dedicated fuel truck. The fuel truck will also carry fuel absorbent material and pads in the event of any accidental spillages;
- Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- On-site refuelling will be carried out by trained personnel only;
- A permit to fuel system will be put in place;
- Fuels stored on site will be minimised. Fuel storage areas if required will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor;
- The plant used during construction will be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages will be included in Section 6 below. Spill kits will be available to deal with and accidental spillage in and outside the re-fuelling area.

3.2.6 Cement Based Products Control Measures

Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills.

The following mitigation measures are proposed to avoid release of cement leachate from the Site:

- No batching of wet-concrete products will occur on the site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place;
- Where possible pre-cast elements for culverts and concrete works will be used;
- Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water practicable. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water will be undertaken at lined cement washout ponds located outside of Clomantagh/Killoshulan Group Water Scheme Zone of Contribution (ZoC);
- Weather forecasting will be used to plan dry days for pouring concrete; and,
- The pour site will be kept free of standing water and plastic covers will be ready in case of a sudden rainfall event.

The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area, or a Siltbuster-type concrete wash unit or equivalent. This type of Siltbuster unit catches the solid concrete and filters and holds wash liquid for pH adjustment and further solids separation. The residual liquids and solids will be removed off-site by an appropriately authorised waste collector for disposal at an authorised waste facility. Where temporary lined impermeable containment areas are used, such containment areas are typically built using straw bales and lined with an impermeable membrane. Two examples are shown below.



Plate 3-1 Typical concrete wash out areas

3.2.7 Tree Felling Drainage Measures

As discussed in Section 2.3.3.9 above, tree felling will be required within the Site to allow for the construction of the turbine bases, access roads underground cabling, and the other ancillary infrastructure. The commercial forestry felling activities required as part of the Proposed Project will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments.

Mitigation measures will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses. These measures are derived from best practice guidance documents as outlined below and in Chapter 9 Hydrology and Hydrogeology of the EIAR.

Tree felling to facilitate the Proposed Project will not be undertaken simultaneously with construction groundworks. Keyhole felling to facilitate construction works will take place prior to groundworks commencing. During tree felling there is a potential to generate silts and sediments in surface water runoff due to tracking of machinery and disturbance of the ground surface etc, however mitigation is provided in Chapter 9 Hydrology and Hydrogeology with regard surface water quality protection for this activity which is summarised below. Also, prior to the commencement of subsequent road construction the following key temporary drainage measures will be installed:

- All existing dry forestry drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using forestry check dams/silt traps;
- Clean water diversion drains will be installed upgradient of the works areas;
- Check dams/silt fence arrangements (silt traps) will be placed in all existing forestry drains that have surface water flows and also along existing forestry roadside drains; and,
- A double silt fence perimeter will be placed down-slope of works areas that are located inside the watercourse 50m buffer zone.

Before the commencement of any felling works, an Environmental Clerk of Works (ECoW) shall be appointed to oversee the keyhole and extraction works. The ECoW shall be experienced and competent, and shall have the following functions as proposed in the planning application:

- Attend the site for the setup period when drainage protection works are being installed and be present on Site during the remainder of the forestry keyhole felling works.
- Prior to the commencement of works, review and agree the positioning by the Operator of the required Aquatic Buffer Zones (ABZs), silt traps, silt fencing (see

below), water crossings and on-site storage facilities for fuel, oil and chemicals (see further below).

- Be responsible for preparing and delivering the Environmental Tool Box Talk (TBT) to all relevant parties involved in site operations, prior to the commencement of the works.
- Conduct daily and weekly inspections of all water protection measures and visually assess their integrity and effectiveness in accordance with the proposals outlined in Section 4.2 of this CEMP.
- Take representative photographs showing the progress of operation on-site, and the integrity and effectiveness of the water protection measures.
- Collect water samples for analysis by a 3rd party accredited laboratory, adhering to the following requirements:
- Surface water samples shall be collected upstream and downstream of the keyhole felling site at suitable sampling locations.
- Sampling shall be taken from the stream/river bank, with no in-stream access permitted.
- The following minimum analytical suite shall be used: pH, EC, TSS, BOD, Total P, Ortho-P, Total N, and Ammonia.
- Review of operator's records for plant inspections, evidence of contamination and leaks, and drainage checks made after extreme weather conditions.
- Prepare and maintain a contingency plan.
- Suspend work where potential risk to water from siltation and pollution is identified, or where operational methods and mitigation measures are not specified or agreed.

To protect watercourses, the following measures will be adhered to during all keyhole/tree felling activities:

- Machine combinations (i.e., handheld or mechanical) will be chosen which are most suitable for ground conditions and which will minimise soils disturbance;
- Checking and maintenance of roads and culverts will be on-going through any felling operation. No tracking of vehicle through watercourses will occur, as vehicles will use road infrastructure and existing watercourse crossing points. Where possible, existing drains will not be disturbed during felling works;
- Ditches which drain from the proposed area to be felled towards existing surface watercourses will be blocked, and temporary silt traps will be constructed. No direct discharge of such ditches to watercourses will occur. Drains and sediment traps will be installed during ground preparation. Collector drains will be excavated at an acute angle to the contour (approximately 0.3%-3% gradient), to minimise flow velocities. Main drains to take the discharge from collector drains will include water drops and rock armour, as required, where there are steep gradients, and will avoid being placed at right angles to the contour;
- Sediment traps will be sited in drains downstream of felling areas. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of in the peat disposal areas. Where possible, all new silt traps will be constructed on even ground and not on sloping ground;
- All drainage channels will taper out before entering the 50m buffer zone. This ensures that discharged water gently fans out over the buffer zone before entering the aquatic zone, with sediment filtered out from the flow by ground vegetation within the zone. On erodible soils, silt traps will be installed at the end of the drainage channels, to the outside of the buffer zone;
- Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Correct drain alignment, spacing and depth will ensure that erosion and sediment build-up are minimized and controlled;
- Brash mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface

water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall;
- Timber will be stacked in dry areas, and outside a local 50 metre watercourse buffer. Straw bales and check dams to be emplaced on the down gradient side of timber storage/processing sites;
- Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water run-off;
- Checking and maintenance of roads and culverts will be on-going through the felling operation;
- Refuelling or maintenance of machinery will not occur within 50m of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required;
- A permit to refuel system will be adopted;
- Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but care will be taken to avoid removing natural debris deflectors;
- Crossing of streams will not be permitted;
- Trees will be cut manually from along streams and using machinery to extract whole tree; and,
- Travel only perpendicular to and away from stream.

There is a requirement in the Forest Service Code of Practice and in the FSC Certification Standard for the installation of buffer zones adjacent to aquatic zones at planting stage. Minimum buffer zone widths recommended in the Forest Service (2000) guidance document *"Forestry and Water Quality Guidelines"* are shown in Table 3-1 below.

Table 3-1 Minimum Buffer Zone Widths (Forest Service, 2000)

Average slope leading to the aquatic zone		Buffer zone width on either side of the aquatic zone	Buffer zone width for highly erodible soils
Moderate	(0 – 15%)	10 m	15 m
Steep	(15 – 30%)	15 m	20 m
Very steep	(>30%)	20 m	25 m

3.3 Archaeological Management

This section of the CEMP provides an outline of the Archaeological, Architectural and Cultural Heritage mitigation measures for the construction phase of the Proposed Project.

There are no UNESCO World Heritage Sites or National Monuments located within or along the proposed footprint of the Proposed Project.

- The location of all recorded monuments located within the Site shall be shown on the site layout drawings in the CEMP.
- A 30m buffer/exclusion zone shall be established around the outer enclosing elements of Enclosure KK009-051— prior to the commencement of the construction stage of the Proposed Project. The buffer/exclusion zone shall comprise durable fencing and display 'Keep Out' signage. No tracking of machinery, storage of topsoil or other materials shall take place within the buffer/exclusion zone. The requirement for the buffer/exclusions zone shall be included in the CEMP. Recorded monument KK009-051— Enclosure is shown in Figure 3-1 of the CEMP below.
- Archaeological monitoring under licence from the National Monuments Service (NMS) of any geotechnical / engineering trial pits or investigations shall be carried out by a suitably qualified archaeologist. A report detailing the results of the monitoring shall be compiled on completion of the work and submitted to the NMS and Planning Authority/Body.
- Pre-development testing, under licence from the NMS, shall be carried out. Testing will only be undertaken in areas where ground disturbance will take place as part of the Proposed Project. The areas to be tested will be chosen by the appointed archaeologist and the number of test trenches agreed between the archaeologist and the NMS through the licensing system. A report on the testing will be compiled on completion of the work. Should archaeological finds, structures or deposits be uncovered as a result of the testing further mitigation measures such as preservation in situ or preservation by record (excavation) may be required and will be decided in consultation with the NMS. Such mitigation measures will be implemented, where relevant, following consultation with the NMS.
- Archaeological monitoring of ground works during the construction stage of the Proposed Project under licence from the NMS shall be carried out by a suitably qualified archaeologist. Should archaeological finds, structures or deposits be uncovered as a result of the monitoring further mitigation measures such as preservation in situ or preservation by record (excavation) may be required and will be decided in consultation with the NMS. Such mitigation measures will be implemented where relevant following consultation with the NMS. A report detailing the results of the monitoring and/or any further necessary mitigation as referred to above will be compiled on completion of the work and submitted to the NMS and Planning Authority/Body.
- A walk-over survey of any areas currently forested and where infrastructure is proposed shall be carried out post-clear-felling but prior to any other works.
- The location of any potential Cultural Heritage features therein will be recorded and a photographic record made of same. A report on the results of the walk-over survey shall be compiled on completion of same and will include any further required mitigation measures such as buffer zones, etc, deemed necessary.
- The location of all items of local cultural heritage merit located within the Site shall be shown on the site layout drawings in the CEMP.
- A methodology for clear-felling of forestry around CH5 and CH6 shall be devised prior to the commencement of this phase of the Proposed Project. The methodology shall ensure that trees are removed from around the structures while ensuring that direct effects to same do not occur.

- A post clear-felling walk-over survey of the area of CH5 and CH6 shall be undertaken. A full descriptive and photographic record of the surviving remains shall be carried out.
- A 10m buffer/exclusion zone shall be established around CH5 and CH6 post clear-felling and prior to the commencement of ground works. The buffer/exclusion zone shall comprise durable fencing with 'Keep Out' signage and be maintained for the duration of the construction stage of the Proposed Project.

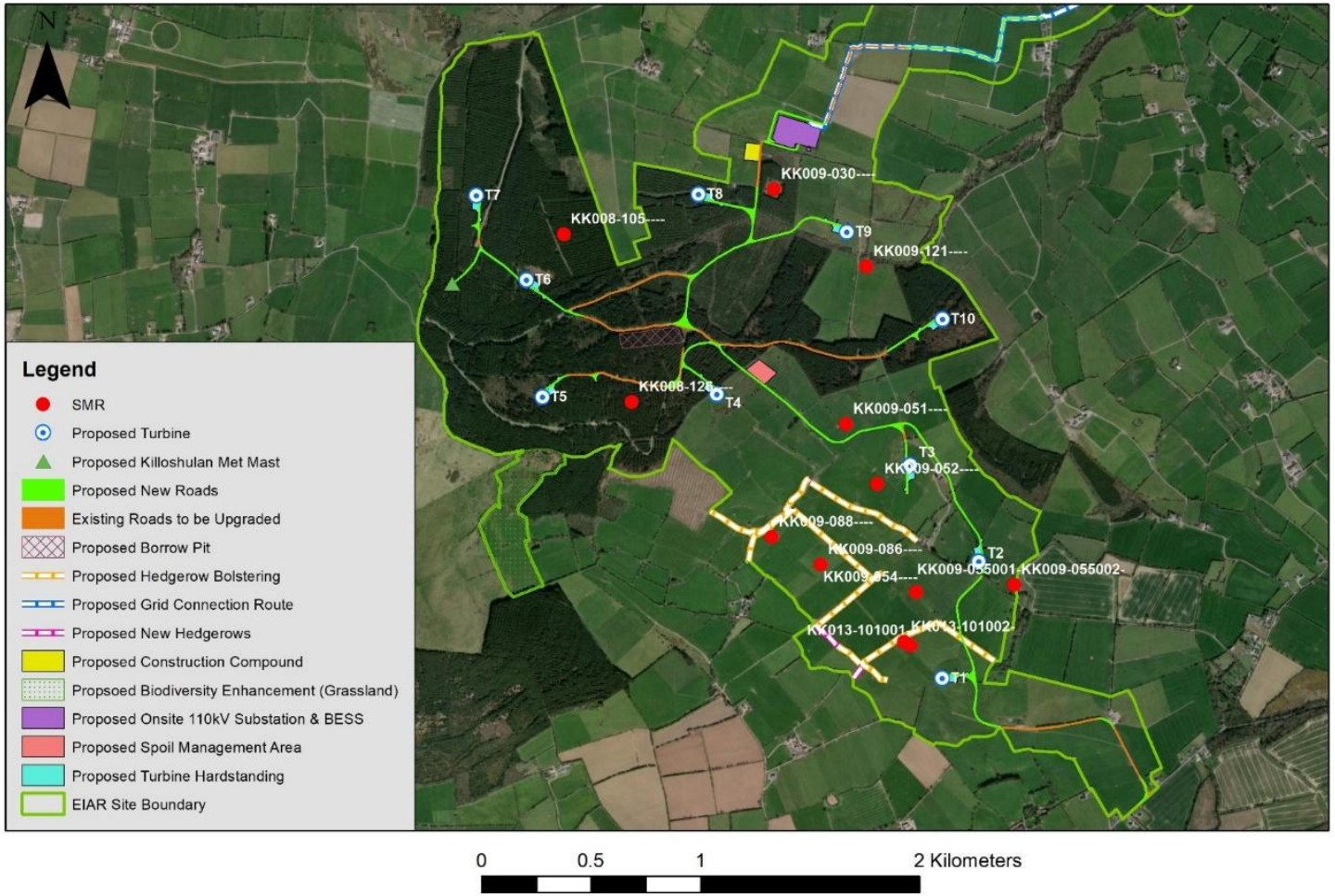


Figure 3-1 Recorded Monuments within the Site

3.4 Traffic Management

This section of the CEMP provides an outline of the traffic management proposals for the construction phase of the Proposed Project. In the event planning permission is granted the final Traffic Management Plan will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.

3.4.1 Turbine and Materials Transport Route

3.4.1.1 Proposed Wind Farm

It is envisaged that large wind turbine components will be delivered to the Proposed Wind Farm site, from the Port of Cork (Ringaskiddy) (other ports such as Galway Port, Shannon Foynes or Dublin Port could also be used), via the N28 and N40 national primary road, the M8 Motorway, R639 regional road, L1857 local road followed by the R693. The proposed turbine delivery route (TDR) from the M8 to the Proposed Wind Farm site is shown on Figure 15-1 of Appendix 15-3 of this EIAR.

From the Port of Cork (Ringaskiddy), the turbine delivery route is as follows;

- From the Port of Ringaskiddy the route travels west and then north for approximately 16 km via the N28 and N40 National Primary Roads before merging onto the M8 Motorway at Junction 19.
- The route then travels north on the M8 for approximately 92 km before exiting at Junction 7 north of the town of Cashel, Co Kilkenny.
- At Junction 7 (Cashel), the vehicles will exit the M8 and travel northeast for approximately 28.7km on the R639 Regional Road.
- In Urlingford, Co. Kilkenny, the turbine component delivery vehicles will travel east for approximately 80m through an area of green space/parkland adjacent to Mount Finn Drive, in order to transition onto the L1857 Local Road.
- The turbine component delivery vehicles will travel east for approximately 710m along the L1857 before joining the R693.
- The vehicles will turn south onto the R693 and travel for approximately 8.4km to the proposed site entrance, turning north into the Site in the townland of Barna, Co. Kilkenny

From the Port of Ringaskiddy to the Site access junction on the R693 the Turbine Delivery Route is approximately 145km.

A detailed swept path analysis was undertaken for all potential pinch points on the TDR from the turnoff from the M8 at Junction 7 onto the roundabout with the R639, to the proposed access junction off the R693. The locations included are shows in Figure 15-2 of Appendix 15-3 of this EIAR with the assessment discussed in Section 15.1.9.

It is also envisaged that general construction traffic (including materials and staff) will travel to the Site via the public road network to the south of the Site. Traffic movements generated by the Proposed Project are discussed in Section 15.1 of Chapter 15, Material Assets.

3.4.1.2 Proposed Grid Connection

It is proposed to construct a 110kV electricity substation within the Proposed Wind Farm site, as shown in Figure 4-1 and Figure 4-2 of Chapter 4. The Proposed 110kV Substation is located within agricultural land and will be accessed via the internal Proposed Wind Farm site road network.

The footprint of the Proposed 110kV Substation compound measures approximately 23,665 m^2 in area and will include 2 no. control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine and export that electricity from the Proposed 110kV Substation to the national grid. The layouts and elevations of the Proposed 110kV Substation are shown on Figure 4-14 to 4-17 of Chapter 4. The construction and exact layout of electrical equipment in the Proposed 110kV Substation will be to ESB Networks specifications.

Further details regarding the connection between the Proposed 110kV Substation and the national electricity grid are provided in Section 4.3.2 of Chapter 4.

The Proposed 110kV Substation compound will include steel palisade fencing (approximately 2.5 metre high or as otherwise required by ESB), and internal fences will also segregate different areas within the main substation. The Proposed 110kV Substation will remain in place as it will be under the ownership and control of the ESB Networks and/or EirGrid and will form a permanent part of the national electricity grid.

3.4.2 Traffic Mitigation Measures During the Construction Stage

The successful completion of the Proposed Project will require significant coordination, planning and a comprehensive set of mitigation measures will be put in place before and during the construction stage of the Proposed Project in order minimize the effects of the additional traffic generated.

A detailed **Traffic Management Plan (TMP)**, incorporating all the mitigation measures included as Appendix 15-2 of this EIAR, will be finalised and confirmatory detailed provisions in respect of traffic management agreed with the roads authority and An Garda Síochána prior to construction works commencing on Site. In addition, the traffic management measures proposed for the following construction traffic scenarios are set out for the Proposed Project in Appendix 15-2 of the EIAR:

- **Traffic Management Coordinator –** a competent Traffic Management Co-ordinator will be appointed for the duration of the construction of the Proposed Project and this person will be the main point of contact for all matters relating to traffic management.
- **Delivery Programme –** a programme of deliveries will be submitted to Kilkenny County Council and other relevant authorities in advance of deliveries of turbine components to the Proposed Project site. Liaison with the relevant local authorities including the roads sections of local authorities that the delivery routes traverse and An Garda Siochana, during the delivery phase of the large turbine vehicles, when an escort for all convoys will be required.
- **Information to locals** – Locals in the area will be informed of any upcoming traffic related matters e.g. delivery of turbine components at night, via letter drops and posters in public places. Information will include the contact details of the Contract Project Co-ordinator, who will be the main point of contact for all queries from the public or local authority during normal working hours. An "out of hours" emergency number will also be provided.
- **A Pre and Post Construction Condition Survey –** A pre-condition survey of roads associated with the Proposed Project will be carried out prior to construction commencement to record the condition of the road. A post construction survey will be carried out after works are completed. Where required the timing of these surveys will be agreed with the local authority.
- **Implementation of temporary alterations to road network at critical junctions** – At locations where required highlighted in Section 15.1.9 in Chapter 15 of the EIAR
- **Identification of delivery routes** – These routes will be agreed and adhered to by all contractors.
- **Travel plan for construction workers to Proposed Project site–** While the assessment above has assumed the worst case that construction workers will drive to the Site, the

construction company will be required to provide a travel plan for construction staff, which will include the identification of a routes to / from the site and identification of an area for parking.

- **Travel plan for construction workers to underground electric cabling route –** Due to the transient nature of the proposed underground grid connection construction site which will generally be on a section of the public road, construction workers will be transported to and from the site by the construction company at the beginning and end of each shift.
- **Drivers conduct** – All drivers will follow normal rules of the road and will receive toolbox talk regarding the delivery route and planned holding points prior to any deliveries.
- **Standard permitted axial loads** – Will not be exceeded.
- **Temporary traffic signs** – As part of the traffic management measures temporary traffic signs will be put in place at all key junctions, including the access junction on the R693 during the 18 month construction period. All measures will be in accordance with the "Traffic Signs Manual, Section 8 – Temporary Traffic Measures and Signs for Road Works" (DoT now DoTT&S) and "Guidance for the Control and Management of Traffic at Roadworks" (DoTT&S).
- **Delivery times of large turbine components** - The management plan will include the delivery of large wind turbine plant components at night in order to minimise disruption to general traffic during the construction stage.
- **Re-instatement works** - All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers. All works will be done in accordance with the Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads, DTToS, September 2015.
- **Additional measures** - Various additional measures will be put in place in order to minimise the effects of the development traffic on the surrounding road network including wheel washing facilities on Site and sweeping / cleaning of local roads as required.

It is confirmed that details for the Traffic Management Plan for the Proposed Project will be agreed with TII and the Road Section of Kilkenny County Council prior to construction and contact will be maintained with the Road and Traffic Section throughout the construction phase.

3.5 Dust Control

Construction dust can be generated from many on-site activities such as excavation and backfilling. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust, i.e., soil, sand, peat, etc. and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or periods of dry weather. Construction traffic movements also have the potential to generate dust as they travel along the haul route.

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/settlement ponds in the Wind Farm Site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and temporary construction compounds 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.

- Sporadic wetting of loose stone surface will be carried out during the construction phase to minimise movement of dust particles to the air. In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff.

- All plant and materials vehicles shall be stored in dedicated areas within the Site.
- Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction.
- Turbines and construction vehicles will be transported to the Site on specified haul routes only.
- Proposed Grid Connection infrastructure will be transported to the Site on specified haul routes only.
- Construction materials for the Proposed Grid Connection and a small volume for the Proposed Wind Farm will be sourced locally from licenced quarries.
- The agreed haul route roads adjacent to the Site will be regularly inspected for cleanliness and cleaned as necessary.
- The roads adjacent to the site entrances will be checked weekly or damage/potholes and repaired as necessary.
- The transport of construction materials around the site from the nearby quarry facilities will be covered by tarpaulin where necessary.
- Waste material will be transferred to a licensed /permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal. The MRF facility will be local to the Site to reduce the amount of emissions associated with vehicle movements.

When necessary, sections of the haul route will be swept using a truck mounted vacuum sweeper. It is not anticipated that vehicle or wheel washing facilities will be required as part of the construction phase of the Proposed Project because site roads will be formed before road-going trucks begin to make regular or frequent deliveries to the site (e.g. with steel or concrete). The site roads will be well finished with 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 requires cleaning due to construction traffic associated with the Proposed Project.

3.5.1 Site Drainage Design and Management

The proposed site drainage features for this Site are outlined in Section 4.6 of the EIAR. As this CEMP is a working document and is presented as an Appendix to the EIAR, the drainage measures are not included in this document. When the final CEMP report is prepared, and presented as a standalone document, all drainage measures will be included in that document. These drainage proposals will be developed further prior to the commencement of construction as part of the detailed drainage design. The following sections give an outline of drainage management arrangements in terms of pre-construction, construction, operational and decommissioning phases of the Proposed Project.

3.5.1.1 Pre-Construction Drainage

Prior to commencement of works in sub-catchments across the Site, main drain inspections will be competed to ensure ditches and streams are free from debris and blockages that may impede drainage. It is proposed to complete these inspections on a catchment-by-catchment basis as the construction works develop across the Site, as works in all areas will not commence simultaneously.

Drainage and associated pollution control measures will be implemented on-site before the main construction works commence. Where possible drainage controls will be installed during seasonally dry ground conditions. This will reduce the possibility of impact on surface waters by suspended sediment released during construction and entrained in surface run-off.

The routes of any natural drainage features will not be altered as part of the Proposed Project. Turbine locations have been selected to avoid natural watercourses. It is proposed that 3 no. new clear span watercourse crossings are required within the Proposed Wind Farm site.

There will be no direct discharges to natural watercourses. All discharges from the proposed works areas or from interceptor drains will be made over vegetated ground at an appropriate distance from natural watercourse and lakes. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Project and are indicated on the drainage design drawings.

Where artificial drains are currently in place in the vicinity of proposed works areas, these drains may have to be diverted around the proposed works areas to minimise the amount of water in the vicinity of works areas. Where it may not be possible to divert artificial drains around proposed work areas, the drains will be blocked to ensure sediment laden water from the works areas has no direct route to other watercourses. Where drains have to be blocked, the blocking will only take place after an alternative drainage system to handle the same water has been put in place.

Existing artificial drains in the vicinity of existing site roads will be maintained in their present location where possible. If it is expected that these artificial drains will receive drainage water from works areas, check dams will be added (as specified below) to control flows and sediment loads in these existing artificial drains. If road widening or improvement works are necessary along the existing roads, where possible, the works will take place on the opposite side of the road to the drain.

3.5.1.2 Construction Phase Drainage

The key principles of drainage design that will be implemented and adhered to as part of the Proposed Project are as follows:

- Keep clean water clean by intercepting it where possible, upgradient of works areas, and divert it around the works areas for discharge as diffuse overland flow or for rewetting of land.
- Collect potentially silt-laden runoff from works areas via downgradient collector drains and manage via series of avoidance, source, in-line, treatment and outfall controls prior to controlled diffuse release as overland flow or for rewetting of land.
- No direct hydraulic connectivity from construction areas to watercourses or drains connecting to watercourses.
- Where possible, maintain 50-metre watercourse buffer zones for the wind turbines.
- No alteration of natural watercourses.
- Maintain the existing hydrology of the Site.
- Blocking of existing manmade drainage as appropriate.
- Daily inspection and recording of surface water management system by on-site Environmental Clerk of Works and immediate remedial measures to be carried out as required and works temporarily ceased if a retained stormwater/sediment load is identified to have the potential to migrate from the Site.
- Use of siltbuster or equivalent system if required.

Runoff control and drainage management are key elements in terms of mitigation against effects on surface water bodies. Two distinct methods will be employed to manage drainage water within Site. The first method involves 'keeping clean water clean' by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations, construction areas and temporary storage areas. The second method involves collecting any drainage waters from works areas within the Site that might carry silt or sediment, and nutrients, to route them towards settlement ponds (or stilling ponds) prior to controlled diffuse release over vegetated surfaces. There will be no direct discharges to surface waters. During the construction phase all runoff from works areas (i.e. dirty water) will be attenuated and treated to a high quality prior to being released. The Proposed Drainage Design is included as Appendix 4-2 of the EIAR.

The Project Hydrologist will complete a detailed drainage design and maintenance plan before construction commences and will attend the Site to set out and assist with micro-siting of proposed drainage controls as outlined in Section 4.6 of the EIAR. The drainage system will be excavated and

constructed in conjunction with the road and hard standing construction. Drains will be excavated, and settlement ponds constructed to eliminate any suspended solids within surface water running off the site.

Drainage infrastructure within the Proposed Wind Farm site will include:

- Source controls:
  - Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sand bags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems.
  - Small working areas, covering or sealing stockpiles, weathering off stockpiles, cessation of works in certain areas.
- In-Line controls:
  - Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sand bags, oyster bags, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriate systems.
- Treatment systems:
  - Temporary sumps and ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems.

It should be noted for the northern portion of the Proposed Wind Farm site is that an extensive network of forestry agricultural drains already exist, and these will be integrated and enhanced as required and used within the Proposed Project drainage system. The integration of the existing drainage network and the Proposed Project network is relatively simple. The key elements being the upgrading and improvements to water treatment elements, such as in line controls and treatment systems, including silt traps, stilling ponds and buffered outfalls.

The main elements of interaction with existing drains will be as follows:

- Apart from interceptor drains, which will convey clean runoff water to the downstream drainage system, there will be no direct discharge (without treatment for sediment reduction, and attenuation for flow management) of runoff from the Proposed Wind Farm site drainage into the existing site drainage network. This will reduce the potential for any increased risk of downstream flooding or sediment transport/erosion;
- Silt traps will be placed in the existing drains upstream of any streams where construction works / tree felling is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area;
- Runoff from individual turbine hardstanding areas will be not discharged into the existing drain network but discharged locally at each turbine location through settlement ponds and buffered outfalls onto vegetated surfaces;
- Buffered outfalls which will be numerous over the Site will promote percolation of drainage waters across vegetation and close to the point at which the additional runoff is generated, rather than direct discharge to the existing drains of the Proposed Wind Farm site; and,
- Drains running parallel to the existing roads requiring widening will be upgraded, widening will be targeted to the opposite side of the road. Velocity and silt control measures such as check dams, sand bags, oyster bags, flow limiters, weirs, baffles, silt fences will be used during the upgrade construction works. Regular buffered outfalls will also be added to these drains to protect downstream surface waters.

Setbacks from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures to be properly installed and operate effectively. The proposed buffer zone will:

- Avoid physical damage to watercourses, and associated release of sediment;
- Avoid excavations within close proximity to surface watercourses;
- Avoid the entry of suspended sediment from earthworks into watercourses; and,
- Avoid the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone;

All of the Proposed Project works will be supervised by the Environmental Clerk of Works (ECoW) supported by the Project Hydrologist.

Best practice and practical experience on other similar projects suggest that in addition to the drainage plans that are included in the EIAR, there are additional site-based decisions and plans that can only be made in the field through interaction between the Site Construction Manager, the Project Hydrologist and the Project Geotechnical Engineers. The mechanisms for interaction between these roles are outlined within Section 4.1 of this CEMP.

In relation to decisions that are made on site it is important to stress that these will be implemented in line with the associated drainage controls and mitigation measures outlined in Section 7 of this CEMP, and to ensure protection of all watercourses.

The Project Hydrologist/Design Engineer will complete a site drainage and maintenance plan before construction commences and will attend the Site to set out and assist with micro-siting of proposed drainage controls as outlined in Chapter 4, Section 4.6 of the EIAR. The drainage system will be excavated and constructed in conjunction with the road and hard standing construction. Drains will be excavated, and stilling ponds constructed to eliminate any suspended solids within surface water running off the site.

3.5.1.3 Operational Phase Drainage

The Project Hydrologist will inspect and review the drainage system after construction has been completed to provide guidance on the requirements of an operational phase drainage system. This operational phase drainage system will have been installed during the construction phase in conjunction with the road and hardstanding construction work as described above and in Section 4.6 of the EIAR.

The drainage system will be monitored in the operational phase until such a time that all areas that have been reinstated become re-vegetated and the natural drainage regime has been restored.

The drainage system will not be altered upon decommissioning. Measures which will be implemented to ensure no impacts upon the drainage system during decommissioning will be outlined within the Decommissioning Plan (Appendix 4-6) and fully agreed with the local authority prior to any decommissioning works.

3.5.1.4 Preparative Site Drainage Management

The detailed drainage design will specify all materials and equipment necessary to implement the drainage measures effectively, which will be brought on site in advance of any works commencing.

An adequate quantity of straw bales, clean stone, terram, stakes, etc. will be kept on site at all times to implement the detailed drainage design measures as necessary. The detailed drainage measures will be installed prior to, or at the same time as the works they are intended to drain.

3.5.1.5 Pre-emptive Site Drainage Management

The works programme for the groundworks part of the construction phase of the Proposed Project will also take account of weather forecasts and predicted rainfall in particular. The site Construction Manager is responsible for making the decision to postpone or abandon works. Large excavations and movements of overburden or large-scale overburden or soil stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

3.5.1.6 Reactive Site Drainage Management

In line with the requirements of the EIAR, the final drainage design prepared for the Proposed Project prior to commencement of construction will provide for reactive management of drainage measures. The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the ECoW or supervising hydrologist on-site. The contractor is solely responsible for the implementation of the detailed drainage design on site. The ECoW is responsible for monitoring the effectiveness of the drainage design as it is implemented on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the Proposed Project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site. The drainage design may have to be modified on the ground as necessary, and the modifications will draw on the various features outlined above in whatever combinations are deemed to be most appropriate to situation on the ground as a particular time.

In the event that works are giving rise to siltation of watercourses, the ECoW or supervising hydrologist will stop all works in the immediate area around where the siltation is evident. The source of the siltation will be identified and additional drainage measures such as those outlined above will be installed in advance of works recommencing.

3.5.1.7 Cable Trench Drainage

Cable trenches are typically constructed in short, controlled sections, thereby minimising the amount of ground disturbed at any one time and minimising the potential for drainage runoff to pick up silt or suspended solids. Each short section of trench is excavated, ducting installed and bedded, and backfilled with the appropriate materials, before work on the next section commences.

To efficiently control drainage runoff from cable trench works areas, excavated material is stored on the up-gradient side of the trench. Should any rainfall cause runoff from the excavated material, the material is therefore collected and contained in the downgradient cable trench. Excess subsoil is removed from the cable trench works area immediately upon excavation, and in the case of the Proposed Project, would be transported to the borrow pit void, placed within linear berms along access roads and turbine hardstand areas or used for landscaping or reinstatement of other areas elsewhere within the site, where appropriate. Along sections of the Proposed 110kV Underground Cabling route that are further removed from the Proposed Wind Farm site it may be more practical to transport excess excavated material to a nearby licenced facility.

On steeper slopes, silt fences will be installed temporarily downgradient of the cable trench works area, or on the downhill slope below where excavated material is being temporarily stored to control run-off.

3.5.1.8 Rainfall Forecasting and Monitoring

Accurate forecasting and monitoring of rainfall is critical to the successful pre-emptive and reactive site drainage management as outlined in the subsections above.

Rainfall forecasts will be obtained for the nearest forecast reference point available via the www.yr.no weather forecasting website. The reference location will be that of Killoshulan, Co. Kilkenny.

https://www.yr.no/en/forecast/daily-table/2-3307820/Ireland/Leinster/County%20Kilkenny/Killoshulan

Construction personnel will be required to check the forecasted rainfall for the days ahead and plan for or suspend planned works accordingly. The forecasted rainfall should be recorded for reference and comparison with the rainfall levels to be recorded on-site.

Actual rainfall will be monitored on site, ideally via an automated rain gauge with regular recording intervals recommended by the Project Hydrologist and a means of alerting the construction personnel of rainfall trigger levels. Any recorded rainfall data should be available on site at all times for review by the ECoW, Project Hydrologist or any regulatory authorities. The appointed contractor will be required to outline their proposed means of recording rainfall on site to the satisfaction of the ECoW and the Project Hydrologist prior to commencement of works.

3.6 Noise Control

The operation of plant and machinery, including construction vehicles, is a source of potential impact that will require mitigation at all locations within the Site.

The following proposed measures to control noise will be implemented in full include:

- limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- establishing channels of communication between the contractor/developer, Local Authority and residents;
- appointing a site representative responsible for matters relating to noise and vibration;
- monitoring typical levels of noise and vibration during critical periods and at sensitive locations;
- keeping site access roads even to mitigate the potential for vibration from lorries.

Section 8 of BS5228-1:2009+A1:2014 as outlined in Chapter 12 of the EIAR Noise and Vibration, further recommends a number of simple control measures as summarised below that will be employed on-site:

- Keep local residents informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and be subject to programmed maintenance;
- Select inherently quiet plant where appropriate - all major compressors will be 'sound reduced' models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use;
- All ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers;
- Machines will be shut down between work periods (or when not in use) or throttled down to a minimum;
- Regularly maintain all equipment used onsite, including maintenance related to noise emissions;
- Vehicles will be loaded carefully to ensure minimal drop heights so as to minimise noise during this operation; and
- All ancillary plant such as generators and pumps will be positioned so as to cause minimum noise disturbance and if necessary, temporary acoustic screens or enclosures will be provided.

- At any location within 50m of a residential receptor where jointing bay activities are required for the Proposed 110kV Underground Cabling, the installation of temporary boarding or 'acoustic blanket panels' hanging from Heras fencing (or similar) may be considered.

Where the BS5228 threshold levels are anticipated to be exceeded due to directional drilling activities along the underground electrical cabling route, the following are examples of measures that will be considered, where necessary, to mitigate noise emissions from these activities are as follows:

- Temporary boarding alongside the drilling rig or use of 'acoustic blanket panels' to hang from heras fencing or similar. Installation will be as close to the drilling rig as is practicable and fitted so as to interrupt any direct line of sight between the drilling rig and the closest residential receptors.
- Examples of appropriate products include Echo Noise Defender and Soundex DeciBloc. It is anticipated that this will be required should directional drilling be used for the water crossings along the proposed underground grid connection cable route.

Where rock breaking is employed in relation to the Proposed Project, the following are examples of measures that will be employed, where necessary, to mitigate noise emissions from these activities:

- Fit suitably designed muffler or sound reduction equipment to the rock breaking tool to reduce noise without impairing machine efficiency;
- Ensure all leaks in air lines are sealed;
- Erect acoustic screen between compressor or generator and noise sensitive area;
- When possible, line of sight between top of machine and reception point needs to be obscured;
- Enclose breaker or rock drill in portable or fixed acoustic enclosure with suitable ventilation;
- Air overpressure from a blast is difficult to control because of its variability, however, much can be done to reduce the effect. A reduction in the amount of primer cord used, together with the adequate burial of any that is above the ground, can give dramatic reduction to air overpressure intensities especially in the audible frequency range. Most complaints are likely to be received from an area downwind of the blast site, and therefore, if air blast complaints are a continual problem, it would be advisable to postpone blasting during unfavourable weather conditions if possible. As air blast intensity is a function of total charge weight, then a reduction in the total amount of explosives used can also reduce the air overpressure value;
- Further guidance will be obtained from the recommendations contained within BS 5228: Part 1 and the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations 1988 in relation to blasting operations.

If blasting is undertaken as part of the Proposed Project, a detailed assessment will be undertaken by a specialist blast design engineer to determine the blast design parameters. All mitigation measures specified to keep construction/operational noise within the criteria in Section 12.7, Chapter 12 of the EIAR will be implemented.

Air overpressure from a blast is difficult to control, however, because of its variability much can be done to reduce the effect. A reduction in the amount of primer cord used, together with the adequate burial of any that is above the ground, can give dramatic reduction to air overpressure intensities especially in the audible frequency range. Should complaints arise, they are likely to be received from an area downwind of the blast site, and therefore, blasting will be postponed during unfavourable weather conditions. Furthermore, as air blast intensity is a function of total charge weight, then a reduction in the total amount of explosives used can also reduce the air overpressure value.

Further guidance will be obtained from the recommendations contained within BS 5228: Part 1 and the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations 1988 in relation to blasting operations.

The methods used to minimise complaints could consist of some or all of the following:

- Restriction of hours within which blasting can be conducted (e.g. 09:00 – 18:00hrs).
- Notification to nearby residents before blasting starts (e.g. 24-hour written notification).
- The firing of blasts at similar times to reduce the 'startle' effect.
- On-going circulars informing people of the progress of the works.
- The implementation of an on-site documented complaints procedure.
- The use of independent monitoring by external bodies for verification of results.
- Trial blasts in less sensitive areas to assist in blast designs and identify potential zones of influence.

3.7 Invasive Species Management

A baseline invasive species survey was carried out at the Site to identify the presence and location of any invasive species (listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) by a suitably qualified ecologist. As outlined in Chapter 6 of the EIAR, no Third Schedule Alien Invasive species were recorded within the footprint of the Proposed Wind Farm or Proposed Grid Connection during the survey conducted. In the event that the presence of such species is found at or adjacent to the development footprint during pre-commencement surveys, particularly in areas where its excavation may be required, an invasive species management plan will be prepared for the site to prevent the introduction or spread of any invasive species within the footprint of the works. An invasive species management plan, if required, will set out best practice control methods as summarised in the following sections.

3.8 Waste Management

This section of the CEMP provides a waste management plan (WMP) which outlines the best practice procedures during the excavation and construction phases of the project. The WMP will outline the methods of waste prevention and minimisation by recycling, recovery, and reuse at each stage of construction of the Proposed Project. Disposal of waste will be seen as a last resort.

3.8.1 Legislation

The Waste Management Act 1996 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and EU legislation.

The Act requires that any waste related activity has to have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the site of the development to ensure that all contractors hired to remove waste from the site have valid Waste Collection Permits. It will then be necessary to ensure that the waste is delivered to a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits and authorisations.

The Department of the Environment provides a document entitled, *'Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects'* (2006). It is important to emphasise that no demolition will take place at this site, however, this document was referred to throughout the process of completing this WMP.

3.8.2 Waste Management Hierarchy

The waste management hierarchy sets out the most efficient way of managing in the following order:

Prevention and Minimisation:

The primary aim of the WMP will be to prevent and thereby reduce the amount of waste generated at each stage of the project.

Reuse of Waste:

Reusing as much of the waste generated on site as possible will reduce the quantities of waste that will have to be transported off site to recovery facilities or landfill.

Recycling of Waste:

There are a number of established markets available for the beneficial use of Construction waste such as using waste concrete as fill for new roads.

At all times during the implementation of the WMP, disposal of waste to landfill will be considered only as a last resort.

3.8.3 Construction Phase Waste Management

3.8.3.1 Description of the Works

The construction of the Proposed Project will involve the construction of:

- Proposed Wind Farm: this refers to turbines and associated foundations and hardstanding areas, including access roads, underground cabling, permanent meteorological mast, temporary construction compounds, junction accommodation works, spoil management, borrow pit, tree felling, site drainage, operational stage signage, battery energy storage system, 110kV on-site substation, and all ancillary works and apparatus. The Proposed Wind Farm is described in detail in Chapter 4 of this EIAR.
- Proposed Grid Connection route: this refers to underground Proposed 110kV Underground Cabling connecting to the existing Ballyragget 110kV Substation Co. Kilkenny, and all ancillary works and apparatus. The Proposed Grid Connection route is described in detail in Chapter 4 of this EIAR.

The turbines and meteorological mast will be manufactured off-site and delivered to the Site where on site erection will occur.

The turbine and meteorological mast foundations will consist of stone from the on-site borrow pit and a concrete base which will contain reinforcing steel. These concrete foundations will be shuttered with steel formwork specifically designed for the works and re-usable off site on similar projects.

The new site roads and existing roads for upgrade will be constructed with rock sourced predominantly from the on-site borrow pit, with some material sourced from local quarries.

The on-site electrical substation and control buildings will be constructed on a concrete foundation with the buildings constructed with concrete masonry blocks with a timber roof structure and roof tile or slate covering. The roof structure will be made up of prefabricated roof trusses manufactured off site to

minimise timber cutting on site. The construction of the underground electrical cabling (Grid Connection & Wind Farm) will consist of excavating sections of a trench, laying the ducting and cabling and backfilling.

The waste types arising from the construction phase of the Proposed Project are outlined in Table 3-2 below.

Table 3-2 Expected waste types arising during the Construction Phase

Material Type	Example	EWC Code
Cables	Electrical wiring	17 04 11
Cardboard	Boxes, cartons	15 01 01
Composite packaging	Containers	15 01 05
Metals	Copper, aluminium, lead, iron and steel	17 04 07
Inert materials	Sand, stones, plaster, rock, blocks	17 01 07
Mixed municipal waste	Daily canteen waste from construction workers, miscellaneous	20 03 01
Plastic	PVC frames, electrical fittings	17 02 03
Plastic packaging	Packaging with new materials	15 01 02
Tiles and ceramics	Slates and tiles	17 01 03
Wooden packaging	Boxes, pallets	15 01 03
Tarmac/Bitumen	Road surfacing along Grid Connection underground connection cabling route	17 03 02

Hazardous wastes that may occur on site during the construction phase of the development may include oil, diesel fuel, chemicals, paints, preservatives etc. All hazardous wastes will be stored in bunded containers/areas before being collected by an authorised waste contractor and brought to an EPA licensed waste facility. As mentioned above, hazardous wastes will be kept separate from non-hazardous wastes so that contamination does not occur.

3.8.3.2 Waste Arising and Proposals for Minimisation, Refuse and Recycling of Construction Waste

Construction waste will arise on the project mainly from excavation and unavoidable construction waste including material surpluses and damaged materials and packaging waste.

Appropriate measures will be taken to ensure excess waste is not generated during construction, including:

- Ordering of materials will be on an 'as needed' basis to prevent over supply to site. Co-ordination is required with suppliers enabling them to take/buy back surplus stock;
- Purchase of materials pre-cut to length to avoid excess scrap waste generated on site;
- Request that suppliers use least amount of packaging possible on materials delivered to the site;

- Ensuring correct storage and handling of goods to avoid unnecessary damage that would result in their disposal;
- Ensuring correct sequencing of operations;
- Use reclaimed materials in the construction works.

Hazardous waste will be kept separate from all other construction waste to prevent contamination and removed appropriately.

3.8.3.3 Waste Arising from Construction Activities

All waste generated on site will be contained in waste skips at a waste storage area on site. This waste storage area will be kept tidy with skips clearly labelled to indicate the allowable material to be disposed of therein.

The expected waste volumes generated on site are unlikely to be large enough to warrant source segregation at the wind farm site. Therefore, all wastes streams generated on site will be deposited into a single waste skip. This waste material will be transferred to a Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal.

The waste generated from the turbine erection will be limited to the associated protective covers which are generally reusable. Considering the specialist nature of this packaging material the majority will be taken back by suppliers for their own reuse. Any other packaging waste generated from the turbine supply will be deposited into the on-site skips and subsequently transferred to the MRF.

It is not envisaged that there will be any waste material arising from the materials used to construct the site roads as only the quantity of stone necessary will be sourced from the on-site borrow pit and local quarries and brought on site on an 'as needed' basis.

Site personnel will be instructed at induction that under no circumstances can waste be brought to site for disposal in the on-site waste skip. It will also be made clear that the burning of waste material on site is forbidden.

3.8.3.4 Waste Arising from Decommissioning

The design life of the proposed renewable energy development is 35 years after which time a decision will be made to determine whether or not the turbines will be replaced by new turbines or if decommissioning will occur. The lengthy time frame between the completion of the construction phase and decommissioning will result in the only materials remaining on site at that time will be infrastructural material such as the turbine foundations, turbines and the granular material used to construct roads. When the Site is decommissioned, cranes will disassemble each turbine tower and all equipment. The associated components will be removed from site for re-use, recycling or waste disposal. Any structural elements that are not suitable for recycling will be disposed of in an appropriate manner. All lubrication fluids will be drained down and put aside for appropriate collection, storage, transport and disposal. Any materials which cannot be re-used or recycled will be disposed of by an appropriately licenced contractor.

The waste types arising from the decommissioning of the development are outlined in Table 3-3 below.

Table 3-3 Expected Waste types arising during the Decommissioning Phase

Material Type	Example	EWC Code
Cables	Electrical wiring	17 04 11
Metals	Copper, aluminium, lead, iron and rebar	17 04 07

Inert materials	Crushed stone, concrete	17 01 07
Lubricating Oils/Fluids	Oils used within wind turbines	13 02 04
Plastic	PVC frames, electrical fittings	17 02 03

3.8.3.5 Reuse

Many construction materials can be reused a number of times before they have to be disposed of:

- Concrete can be reused as aggregate for roads cable trench backfilling material.
- Plastic packaging etc. can be used to cover materials on site or reused for the delivery of other materials.

3.8.3.6 Recycling

If a certain type of construction material cannot be reused on-site, then recycling is the most suitable option. The opportunity for recycling on site will be restricted to the associated packaging from the wind turbines.

All waste that is produced during the construction phase including dry recyclables will be deposited in the on-site skip initially and sent for subsequent segregation at a remote facility. The anticipated volume of all waste material to be generated at the development is low which provides the justification for adopting this method of waste management.

3.8.3.7 Implementation

3.8.3.7.1 *Roles and Responsibilities for Waste Management*

Prior to the commencement of the development a Construction Waste Manager will be appointed by the Contractor. The Construction Waste Manager will be in charge of the implementation of the objectives of the plan, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to. The person nominated must have sufficient authority so that they can ensure everyone working on the development adheres to the management plan.

3.8.3.7.2 *Training*

It is important for the Construction Waste Manager to communicate effectively with colleagues in relation to the aims and objectives of the waste management plan. All employees working on site during the construction phase of the project will be trained in materials management and thereby, should be able to:

- Distinguish reusable materials from those suitable for recycling;
- Ensure maximum segregation at source;
- Co-operate with site manager on the best locations for stockpiling reusable materials;
- Separate materials for recovery; and
- Identify and liaise with waste contractors and waste facility operators.

3.8.3.7.3 *Record Keeping*

The WMP will provide systems that will enable all arisings, movements and treatments of construction waste to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated. It will highlight the areas from which most waste occurs and allows the

measurement of arisings against performance targets. The WMP can then be adapted with changes that are seen through record keeping.

The fully licensed waste contractor employed to remove waste from the site will be required to provide documented records for all waste dispatches leaving the Site. Each record will contain the following:

- Consignment Reference Number Material Type(s) and EWC Code(s)
- Company Name and Address of Site of Origin
- Trade Name and Collection Permit Ref. of Waste Carrier
- Trade Name and Licence Ref. of Destination Facility
- Date and Time of Waste Dispatch
- Registration no. of Waste Carrier vehicle
- Weight of Material
- Signature of Confirmation of Dispatch detail
- Date and Time of Waste Arrival at Destination
- Site Address of Destination Facility

3.8.3.8 Waste Management Plan Conclusion

The WMP will be properly adhered to by all staff involved in the Proposed Project which will be outlined within the induction process for all site personnel. The waste hierarchy will always be employed when designing the plan to ensure that the least possible amount of waste is produced during the construction phase. Reuse of certain types of construction wastes will cut down on the cost and requirement of raw materials therefore further minimising waste levels.

This preliminary WMP has been prepared to outline the main objectives that are to be adhered to for the preparation of a more detailed WMP to be completed after the planning phase of the Proposed Project.

4. ENVIRONMENTAL MANAGEMENT IMPLEMENTATION

4.1 Roles and Responsibilities

The Project Developer will appoint a design team to prepare the detailed design for the Proposed Project prior to the commencement of construction and ensure all planning and environmental obligations are met. The developer will appoint a Project Contractor who will be responsible for the construction of the Proposed Project in accordance with this CEMP which will be updated by the contractor as required during the construction phase of the Proposed Project. Any updated CEMP must meet or exceed the standards and requirements set out in this document.

The Environmental Clerk of Works (ECoW) will be nominated by the Project Developer to oversee the Project Contractor's effective implementation of the Proposed Project 's environmental requirements and obligations, as captured in the CEMP. The ECoW will be responsible for monitoring the works of the Project Contractor from an environmental perspective on behalf of the Project Developer. For the sake of expediency, the ECoW will report their ongoing audit findings, monitoring results and site observations to both the Project Developer and the Project Contractor, having been nominated by the developer to fulfil the role.

The ECoW will have the power to halt the works, should the need arise and will be supported by the developer to ensure the contractor adheres to such an instruction.

The ECoW will also have to call upon the Project Ecologist, Project Hydrologist, or other members of the Project Developer's design team, as required, to oversee the contractor's works on-site.

An organogram structure for the construction stage roles is as outlined below.

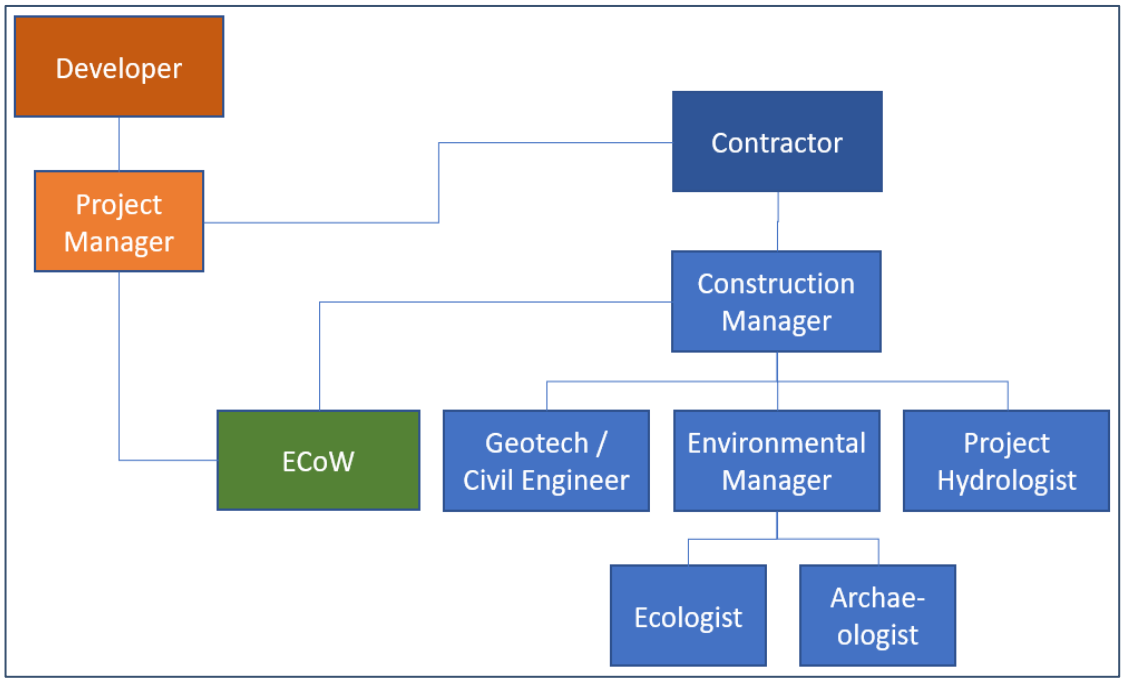


Figure 4-1 Proposed Project Organogram

Any requirement of the granted permission, for the works to be supervised by an engineer with professional indemnity insurance, who upon completion of the works, shall certify the said works, will

be adhered to. Such an engineer will be appointed to oversee and supervise the construction phase of the Proposed Project.

4.1.1 Construction Manager

The Project Contractor will be required to nominate a Construction Manager who will have responsibility for the organisation and execution of environmental requirements outlined in this CEMP or any further versions thereof. The Construction Manager will have an assigned deputy who will fulfil the role of Environmental Manager. To implement the CEMP, the Construction Manager with the assistance of the Environmental Manager will be required to:

- Implement all Proposed Project design requirements to minimise environmental risk;
- Implement all CEMP requirements and measures to minimise environmental risk;
- Ensure any site personnel responsible for directing works on site are familiar with all requirements of the CEMP;
- Propose revisions to the Proposed Project's CEMP for approval of the Project Developer, project design team and ECoW, only where any such revisions meet or exceed the standards and requirements set out in this document;
- Ensure that all environmental standards are achieved during the construction phase of the Proposed Project;
- Promptly implement any remedial action required to rectify and close-out any non-compliant items identified by the ECoW;
- Ensure immediate notification of environmental incidents are issued to the ECoW, the Project Developer and the relevant authorities, initially by phone and as soon as is practicable by e-mail;
- Identify environmental training requirements and arrange relevant training for all levels of site-based staff/workers.
- Ensure that all construction activities are planned and performed such that minimal risk to the environment is introduced.

4.1.2 Site Environmental Clerk of Works

The Project Developer will be required to engage a qualified Environmental Engineer, Environmental Scientist, or equivalent, with experience in wind farm construction to fulfil the role of Environmental Clerk of Works (ECoW) to oversee the construction works and audit the implementation of the CEMP. The ECoW will report to the Project Developer and Project Contractor but will liaise closely with the Construction Manager in relation to the Project Contractor's day-to-day implementation of the CEMP on site. The responsibilities and duties of the ECoW will include the following:

- Review/approval of the CEMP and supporting environmental documentation and review/approval of contractor method statements;
- Undertake environmental monitoring, inspections and reviews to ensure the works are carried out in compliance with the CEMP by the Project Contractor;
- Manage the water quality monitoring programme and turbidity monitors;
- Maintain a live Actions List and accompanying map outlining any corrective actions across the site requiring attention or action by the contractor;
- Confirm for the Project Contractor that pre-commencement requirements have been met to allow construction activities to commence;
- Highlight for the contractor, any abandonment triggers that are occurring and inform the contractor that works are to cease;
- Generate environmental reports as required to show environmental data trends and ensure environmental records are maintained throughout the construction period;
- Advise site management/contractor/sub-contractors on:
    - Prevention of environmental pollution and improvement to existing working methods;

- Changes in legislation and legal requirements affecting the environment;
- Suitability and use of plant, equipment and materials to prevent pollution;
- Environmentally sound methods of working and systems to identify environmental hazards;

- Assist the contractor in coordinating the required inputs and site visits from the Project Ecologist or Project Hydrologist to support the ECoW role;
- Ensure immediate notification of any environmental incidents are issued to the Construction Manager and Project Developer;
- Support the investigation of incidents of significant, potential or actual environmental damage and ensure corrective actions are carried out, recommend means to prevent recurrence and communicate incident findings to relevant parties.
- Liaise with the Project Design Team and attend meetings to report on audit findings
- Support the contractor who will be responsible for providing toolbox talks and site induction content to ensure the requirements of the CEMP are delivered on site.
- The geotechnical design requirements of the Proposed Project are not within the remit of the ECoW.

The level, detail and frequency of reporting expected from the ECoW for the Construction Manager, Developer's Project Manager, and any Authorities or other Agencies, will be agreed by all parties prior to commencement of construction, and may be further adjusted as required during the course of the Proposed Project.

4.1.3 Project Ecologies/Ornithologist

The Project Ecologist will be available to support the ECoW on matters relating to the protection of sensitive habitats and species encountered prior to or during the construction phase of the Proposed Project. The Project Ecologist will not be full time on site but will undertake pre-commencement surveys and visit the site as required. The responsibilities and duties of the Project Ecologist/Ornithologist will include the following:

- Undertake a pre-construction transect/walkover bird survey to ensure that significant effects on breeding birds will be avoided.
- Inform and educate on-site personnel of the ornithological and ecological sensitivities within the site.
- Oversee management of ornithological and ecological issues during the construction period and advise on ornithological issues as they arise.
- Provide guidance to contractors to ensure legal compliance with respect to protected species on-site.
- Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress.

4.1.4 Project Hydrologist

The Project Hydrologist is part of the design team that will prepare the detailed drainage design for the construction phase of the Proposed Project, but will also support the ECoW in monitoring, overseeing and auditing the effective implementation of the detailed drainage design by the Project Contractor. The Project Hydrologist will not be full time on site but will be required to visit as necessary to oversee the implementation of their drainage design.

The responsibilities and duties of the Project Hydrologist will include the following:

- Preparation of detailed drainage design before construction commences;
- Input to the CEMP in respect of drainage design and water quality management;
- Attend site to support ECoW and oversee and audit the effective implementation of the detailed drainage design;

- Complete ongoing inspection and monitoring of the development, particularly in areas of drainage control in support of the ECoW in monitoring the effectiveness of the drainage design as it is implemented on-site.

4.1.5 Project Archaeologist

The Project Archaeologist will report to the Environmental Manager/ECoW and is responsible for archaeological monitoring of the Site during the construction phase. This will include monitoring of site investigations and excavation works as well as the monitoring and metal detection of spoil during construction.

If new archaeological material is detected during the pre-construction re-inspection, testing or monitoring, the project archaeologist will be responsible for ensuring they are preserved by record (archaeologically excavated) and therefore permanently removed with a full record made.

4.1.6 Project Geotechnical Engineer/Civil Engineer

The Geotechnical Engineer will report to the Construction Manager and is responsible for inspection and review of geotechnical aspects associated with construction of the Proposed Project. The Geotechnical Engineer will not be full time on site but will visit the site at least once a month during the construction phase civil works and on a weekly basis during site preparation/groundworks.

The responsibilities and duties of the Geotechnical Engineer will include the following:

- Visit the site regularly, or at least once a month during the construction phase, to complete geotechnical audits and reviews and report any issues to the Construction Manager;
- Ensuring that identified hazards are listed in the Geotechnical Risk Register and that these are subject to ongoing monitoring; and,
- Ongoing inspection and monitoring of the Proposed Project, particularly in temporary stockpile areas, through all phases of construction (including pre, during and post construction) and ensure construction is carried out as specified in the EIAR, NIS and in relevant planning conditions.

4.2 Water Quality and Monitoring

4.2.1 Pre-Construction Baseline Monitoring

Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of felling and construction at the Site.

Baseline sampling will be completed on at least two occasions, and these should ideally coincide with low flow and high flow stream conditions. The high flow sampling event will be undertaken after a period of sustained rainfall, and the low flow event will be undertaken after a dry spell.

4.2.2 Construction Phase Monitoring

4.2.2.1 Daily Visual Inspections

An inspection and maintenance plan for the on-site drainage system will be prepared in advance of commencement of any works. Daily visual inspections of drains and outfalls will also be performed during the construction period to ensure suspended solids are not entering streams and rivers on site, to identify any obstructions to channels and to allow appropriate maintenance of the drainage regime.

Should the suspended solids levels measured during construction be higher than the existing levels, the source will be identified, and additional mitigation measures implemented. Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs should be undertaken for each primary watercourse along the Proposed 110kV Underground Cabling route and specifically following heavy rainfall events (i.e. weekly, monthly and event based).

Inspection sheets and photographic records will be kept on site. Inspection points will include the in-situ field monitoring point locations and the laboratory analysis sampling points. Inspection points will depend on works being completed within the catchment upstream of the identified monitoring locations. Visual inspections will also be completed after major rainfall events, i.e. after events of >25mm rainfall in any 24-hour period and data including photographs will be collected by visual inspections and independently assessed by the Project Hydrologist who will monitor and advise on the records being received.

The following periodic inspection regime will be implemented:

- Daily general visual inspections of site operations and inspections of all drainage infrastructure within the site and in the surrounding area by the ECoW or a suitably qualified and competent person as delegated by the ECoW;
- Inspections to include all elements of drainage infrastructure to ensure the system is operating correctly and to identify and maintenance that is required. Any changes, such as discolouration, odour, oily sheen or litter will be noted and corrective action will be implemented. High risk locations such as settlement ponds will be inspected daily. Daily inspections checks will be completed on plant and equipment, and whether materials such as straw bales or oil absorbent materials need replacement;
- Event based inspections by the ECoW as follows:
- >10 mm/hr (i.e. high intensity localised rainfall event);
- >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
- Rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week).
- Monthly site inspections by the Project Hydrologist/ ECoW during construction phase;
- Quarterly site inspections by the Project Hydrologist/ ECoW after construction for a period of one year following the construction phase; and,
- A written record will be maintained or available on-site within this Construction Environmental Management Plan (CEMP) which will be maintained on-site during the construction phase.

4.2.2.2 Continuous Turbidity Monitoring

Turbidity monitors or sondes can be installed where required at locations surrounding the Site. The sondes will provide continuous readings for turbidity levels in the watercourse. This equipment will be supplemented by daily visual monitoring at their locations as outlined in the sections below.

4.2.2.3 Laboratory Analysis

Baseline laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken as per water monitoring programme for the Proposed Project. This will not be restricted to just these locations around the proposed renewable energy development site with further sampling points added as deemed necessary by the ECoW in consultation with the Project Hydrologist and Site Manager.

4.2.2.4 Field Monitoring

Field chemistry measurements of unstable parameters, (pH, conductivity, temperature) will be taken at the surface water monitoring locations, as per water monitoring programme for the Proposed Project and each primary watercourse along the Proposed Grid Connection Route. These analyses will be carried out by either the ECoW or the Project Hydrologist. In-situ field monitoring will also be completed after major rainfall events, i.e. after events of >25mm rainfall in any 24-hour period. The Project Hydrologist will monitor and advise on the readings collected by in-situ field monitoring.

4.2.2.5 Monitoring Parameters

The analytical determinants of the monitoring programme (including limits of detection and frequency of analysis) will be as per S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations and European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The likely suite of determinants will include:

- pH (field measured)
- Electrical Conductivity (field measured)
- Temperature (field measured)
- Dissolved Oxygen (field measured)
- Total Phosphorus
- Chloride
- Nitrate
- Nitrite
- Total Nitrogen
- Ortho-Phosphate
- Ammonia N
- Biochemical Oxygen Demand
- Total Suspended Solids

4.2.3 Construction Phase Drainage Inspections & Maintenance

Drainage performance will form part of the civil works contract requirements. During the construction phase, the Project Contractor will be responsible for the effectiveness of drainage measures. This responsibility extends to drainage maintenance, to ensure that the installed drainage measures continue to perform as intended by the detailed drainage design. Silt fences, check dams, level spreaders and other drainage measures likely to form part of the detailed drainage design, require regular maintenance to ensure they continue to function effectively, and the Project Contractor is entirely responsible for this maintenance.

Regular inspections of all existing and installed drainage measures should be undertaken by the Project Contractor, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water within the system. The contractor will devise a system of recording the findings of these inspections. Any excess build-up of silt levels at check dams, the settlement ponds, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. For this reason, the drainage measures installed on-site should be inspected at least weekly by the contractor and maintained as required during the construction phase of the Proposed Project to ensure good performance.

The ECoW will monitor the effectiveness of the on-site drainage during changing weather, ground or drainage conditions encountered on site, through their regular visual inspections of on-site watercourses and water monitoring programme. Where it appears that additional drainage measures will be required to ensure the drainage system remains effective, the ECoW will notify the contractor, the developer and

project design team including the Project Hydrologist. The ECoW's role in this regard does not replace the need for the weekly (at least) inspections of the drainage system's measures by the Project Contractor.

4.2.4 Surface Water Monitoring Reporting

Visual inspection and laboratory analysis results of water quality monitoring shall assist in determining requirements for any necessary improvements in drainage controls and pollution prevention measures implemented on site.

It will be the responsibility of the ECoW to present the ongoing results of water quality and weather monitoring at or in advance of regular site meetings.

Reports on water quality will consider all field monitoring and visual inspections, and results of laboratory analysis completed for that period. Reports will describe how the results compare with baseline data as well as previous reports on water quality. The reports will also describe whether any deterioration or improvement in water quality has been observed, whether any effects are attributable to construction activities and what remedial measures, or corrective actions have been implemented. Any proposed alteration to sampling frequency will be agreed with the Planning Authority in advance.

4.3 Environmental Awareness and Training

4.3.1 Environmental Induction

The Environmental Induction will be integrated into the general site induction on a case-by-case basis for each member of staff employed on-site depending on their assigned roles and responsibilities on site.

Where necessary, the Environmental Induction will as a minimum include:

- A copy of the Environmental Management Site Plans and discussion of the key environmental risks and constraints;
- An outline of the CEMP structure;
- A discussion of the applicable Works Method Statement;
- The roles and responsibilities of staff, including contractors, in relation to environmental management; and,
- An outline of the environmental Incident Management Procedure.

4.3.2 Toolbox Talks

Toolbox talks would be held by the ECoW or Construction Manager at the commencement of each day, or at the commencement of new activities. The aims of the toolbox talks are to identify the specific work activities that are scheduled for that day or phase of work. In addition, the necessary work method statements and sub plans would be identified and discussed prior to the commencement of the day's activities. The toolbox talks will include training and awareness on topics including:

- On-site Ecological Sensitivities;
- Buffers to be upheld – watercourses, archaeology, ecology;
- Sediment and Erosion Control;
- Good site practice;
- On-site Traffic Routes and Rules;
- Keeping to tracks – vehicle rules;
- Strictly adhering to the development footprint;
- Fuel Storage and;

- Materials and waste procedures

Site meetings would be held on a regular basis involving all site personnel. The objectives of site meetings are to discuss the coming weeks activities and identify the relevant work method statements and sub plans that will be relevant to that week's activities. Additionally, any non-compliance identified during the previous week would also be discussed with the aim to reduce the potential of the same noncompliance reoccurring.

During construction of the Proposed Project, all staff will be made aware of and adhere to the Health & Safety Authority's *'Guidelines on the Procurement, Design and Management requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013'*. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan.

5. HEALTH AND SAFETY

Construction of the Proposed Project will necessitate the presence of a construction site and travel on the local public road network to and from the Site. Construction sites and the machinery used on them pose a potential health and safety hazard to construction workers if site rules are not properly implemented. The Proposed Project will be constructed in accordance with all relevant Health and Safety Legislation, including:

- Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005);
- Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2016 (S.I. No. 36 of 2016);
- S.I. No. 528/2021 - Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021 and
- Safety, Health and Welfare at Work (Work at Height) Regulations 2006 (S.I. No. 318 of 2006).

The following measures below are also detailed in Chapter 18 Schedule of Monitoring and Mitigation Measures.

- A Health and Safety Plan covering all aspects of the construction process will address the Health and Safety requirements in detail. This will be prepared on a preliminary basis at the procurement stage and developed further at construction stage.
- All hazards will be identified, and risks assessed. Where elimination of the risk is not feasible, appropriate mitigation and/or control measures will be established. The contractor will be obliged under the construction contract and current health and safety legislation to adequately provide for all hazards and risks associated with the construction phase of the project. Safepass registration cards are required for all construction, delivery and security staff. Construction operatives will hold a valid Construction Skills Certificate Scheme card where required. The developer is required to ensure a competent contractor is appointed to carry out the construction works. The contractor will be responsible for the implementation of procedures outlined in the Safety and Health Plan. Public safety will be addressed by restricting site access during construction. Fencing will be erected in areas of the site where uncontrolled access is not permitted.
- Goal posts will be established, where necessary, under overhead electricity lines for the entirety of the construction phase of the Proposed Wind Farm.
- The suitability of machinery and equipment for use near power lines will be risk assessed.
- All staff will be trained on operating voltages of overhead electricity lines running the site. All staff will be trained to be aware of the risks associated with overhead lines. All contractors that may visit the site are made aware of the location of lines before they come on to site.
- Barriers will run parallel to the overhead line at a minimum horizontal distance of 6 metres on plan from the nearest overhead line conductor wire.
- When activities must be carried out beneath overhead lines, e.g., component delivery or substation construction, a site-specific risk assessment will be undertaken prior to any works. The risk assessment must take into account the maximum potential height that can be reached by the plant or equipment that will be used prior to any works. Overhead line proximity detection equipment will be fitted to machinery when such works are required.
- Information on safe clearances will be provided to all staff and visitors.
- Signage indicating locations and health and safety measures regarding overhead lines will be erected in canteens and on site.

- The construction of the Proposed Grid Connection Route will be carried out in phases. Prior to commencing grid connection works in the agricultural fields in the townlands of Frankford or Ballykieran and Foyle South, goal posts will be established under the overhead lines and remain in place for the duration of the works in this area. The goal posts will not exceed a height of 4.2 metres, unless specifically agreed with ESB Networks.
- All staff will be made aware of and adhere to the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021'. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan.

The scale and scope of the project necessitates that a Project Supervisor Design Process (PSDP) and Project Supervisor Construction Stage (PSCS) are required to be appointed in accordance with the provisions of the Health & Safety Authority's *'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013'*. The PSDP appointed for the construction stage shall be required to perform his/her duties as prescribed in the Safety, Health and Welfare at Work (Construction) Regulations. These duties include (but are not limited to):

- Identify hazards arising from the design or from the technical, organisational, planning or time related aspects of the project;
- Where possible, eliminate the hazards or reduce the risks;
- Communicate necessary control measures, design assumptions or remaining risks to the PSCS so they can be dealt with in the Safety and Health Plan;
- Ensure that the work of designers is coordinated to ensure safety;
- Organise co-operation between designers;
- Prepare a written Safety and Health Plan;
- Prepare a safety file for the completed structure and give it to the client; and
- Notify the Authority and the client of non-compliance with any written directions issued.

The PSCS appointed for the construction stage shall be required to perform his/her duties as prescribed in the Safety, Health and Welfare at Work (Construction) Regulations. These duties include (but are not limited to):

- Development of the Safety and Health Plan for the construction stage with updating where required as work progresses;
- Compile and develop safety file information.
- Reporting of accidents / incidents;
- Weekly site meeting with PSCS;
- Coordinate arrangements for checking the implementation of safe working procedures. Ensure that the following are being carried out:
- Induction of all Site staff including any new staff enlisted for the project from time to time;
- Toolbox talks as necessary;
- Maintenance of a file which lists personnel on site, their name, nationality, current Safe Pass number, current Construction Skills Certification Scheme (CSCS) card (where relevant) and induction date;
- Report on Site activities to include but not limited to information on accidents and incidents, disciplinary action taken and PPE compliance;
- Monitor the compliance of contractors and others and take corrective action where necessary; and
- Notify the Authority and the client of non-compliance with any written directions issued.

6. EMERGENCY RESPONSE PLAN

6.1 Overview

The Emergency Response Plan (ERP) is presented in this section of the CEMP. It provides details of procedures to be adopted in the event of an emergency. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. The ERP will require updating and submissions from the contractor/PSCS and suppliers as the project progresses. Where sub-contractors that are contracted on site are governed by their own emergency response procedure a bridging arrangement will be adopted to allow for inclusion of the sub-contractor's ERP within this within this document.

This is a working document that requires updating throughout the various stages of the project.

6.1.1 Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The site Supervisor/Construction Manager will lead the emergency response which makes him responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response are presented in Figure 6-1. In a situation where the site Supervisor/ Construction Manager is unavailable or incapable of coordinating the emergency response, the responsibility will be transferred to the next person in the chain of command outlined in Figure 6-1. This will be updated throughout the various stages of the Proposed Project.

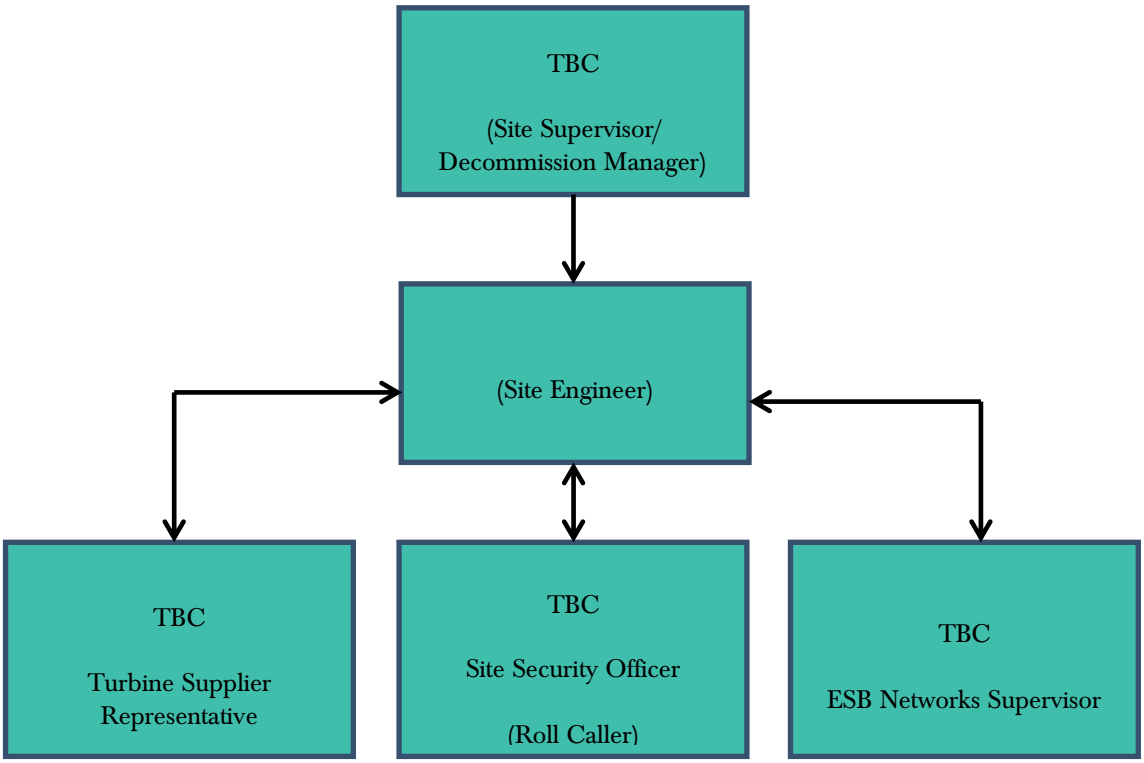


Figure 6-1 Emergency Response Procedure Chain of Command

6.1.2 Hazard Identification

In order to establish the type and scale of potential emergencies that may occur, the following hazards have been identified as being potential situations that may require an emergency response in the event of an occurrence.

Table 6-1 Hazards associated with potential emergency situations

Hazard	Emergency Situation
Construction Vehicles: Dump trucks, tractors, excavators, cranes etc.	Collision or overturn which has resulted in operator or third-party injury.
Abrasive wheels/Portable Tools	Entanglement, amputation or electrical shock associated with portable tools.
Contact with services	Electrical shock or gas leak associated with an accidental breach of underground services.
Fire	Injury to operative through exposure to fire.
Falls from heights including falls from scaffold towers, scissor lifts, ladders, roofs and turbines.	Injury to operative after a fall from a height.
Sickness	Illness unrelated to site activities of an operative e.g., heart attack, loss of consciousness, seizure.
Turbine Specific Incident	This will be included when the upon agreement and section of the final turbine type.
Siltation of watercourses, Fuel Management and Spill Control	Run-off to watercourses casing pollution.

In the event of an emergency situation associated with, but not restricted to, the hazards outlined in Table 6-1 the Site Supervisor/Construction Manager will carry out the following:

- Establish the scale of the emergency situation and identify the number of personnel, if any, have been injured or are at risk of injury.
- Where necessary, sound the emergency siren/foghorn that activates an emergency evacuation on the site. The site Supervisor/Construction Manager must proceed to the assembly point if the emergency poses any significant threat to their welfare and if there are no injured personnel at the scene that require assistance. The site Supervisor/Construction Manager will be required to use their own discretion at that point. In the case of fire, the emergency evacuation of the site should proceed, without exception. The site evacuation procedure is outlined in Section 6.1.3.
- Make safe the area if possible and ensure that there is no identifiable risk exists with regard to dealing with the situation e.g., if a machine has turned over, ensure that it is in a safe position so as not to endanger others before assisting the injured.
- Contact the required emergency services or delegate the task to someone. If delegating the task, ensure that the procedures for contacting the emergency services as set out in Section 6.3 is followed.
- Take any further steps that are deemed necessary to make safe or contain the emergency incident e.g., cordon off an area where an incident associated with electrical issues has occurred.

- Contact any regulatory body or service provider as required e.g., ESB Networks the numbers for which as provided in Section 6.3.
- Contact the next of kin of any injured personnel where appropriate.

6.1.3 Site Evacuation/Fire Drill

A site evacuation/fire drill procedure will provide basis for carrying out the immediate evacuation of all site personnel in the event of an emergency. The following steps will be taken:

- Notification of the emergency situation. Provision of a siren or foghorn to notify all personnel of an emergency situation.
- An assembly point will be designated in the construction compound area and will be marked with a sign. All site personnel will assemble at this point.
- A roll call will be carried out by the Site Security Officer to account for all personnel on site.
- The Site Security Officer will inform the Site Supervisor/Construction Manager when all personnel have been accounted for. The Site Supervisor/Construction Manager will decide the next course of action, which be determined by the situation that exists at that time and will advise all personnel accordingly.

All personnel will be made aware of the evacuation procedure during site induction. The Fire Services Acts of 1981 and 2003 require the holding of fire safety evacuation drills at specified intervals and the keeping of records of such drills.

6.1.4 Spill Control Measures

Every effort will be made to prevent an environmental incident during the construction and operational phase of the Proposed Project. Oil/fuel spillages are one of the main environmental risks that will exist on the site which will require an emergency response procedure. The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. The following steps provide the procedure to be followed in the event of such an incident:

- Stop the source of the spill and raise the alarm to alert people working in the vicinity of any potential dangers.
- If applicable, eliminate any sources of ignition in the immediate vicinity of the incident.
- Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
- If possible, cover or bund off any vulnerable areas where appropriate such as drains, watercourses or sensitive habitats.
- If possible, clean up as much as possible using the spill control materials.
- Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.
- Notify the ECoW immediately giving information on the location, type and extent of the spill so that they can take appropriate action.
- The ECoW will inspect the site and will assist by providing any advice possible to ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring.
- The Construction Manager will notify the appropriate regulatory body such as Kilkenny County Council, Inland Fisheries Ireland (IFI), National Parks and Wildlife Service (NPWS), etc. if deemed necessary.

The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident must be investigated in accordance with the following steps.

- The ECoW must be immediately notified.
- If necessary, the Construction Manager will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.
- The details of the incident will be recorded on an Environmental Incident Form which will provide information such as the cause, extent, actions and remedial measures used following the incident. The form will also include any recommendations made to avoid reoccurrence of the incident.
- If the incident has impacted on an ecologically sensitive receptor, such as a sensitive habitat, protected species or designated conservation site (pSPA or cSAC), the ECoW will liaise with the Project Ecologist.
- If the incident has impacted on a sensitive receptor such as an archaeological feature the ECoW will liaise with the Project Archaeologist.

A record of all environmental incidents will be kept on file by the ECoW and the Project Contractor. These records will be made available to the relevant authorities such as Kilkenny County Council, IFI, NPWS, etc. if required. The ECoW will be responsible for any corrective actions required as a result of the incident e.g. an investigative report, formulation of alternative construction methods or environmental sampling, and will advise the Main Contractor as appropriate.

6.2 Contacting the Emergency Services

6.2.1 Emergency Communications Procedure

In the event of requiring the assistance of the emergency services the following steps will be taken:

Stay calm. It is important to take a deep breath and not get excited. Any situation that requires 999/112 is, by definition, an emergency. The dispatcher or call-taker knows that and will try to move things along quickly, but under control.

Know the location of the emergency and the number you are calling from. This may be asked and answered a couple of times but do not get frustrated. Even though many emergency call centres have enhanced capabilities meaning they are able to see your location on the computer screen they are still required to confirm the information. If for some reason you are disconnected, at least emergency crews will know where to go and how to call you back.

Wait for the call-taker to ask questions, then answer clearly and calmly. If you are in danger of assault, the dispatcher or call-taker will still need you to answer quietly, mostly "yes" and "no" questions.

If you reach a recording, listen to what it says. If the recording says your call cannot be completed, hang up and try again. If the recording says all call takers are busy, WAIT. When the next call-taker or dispatcher is available to take the call, it will transfer you.

Let the call-taker guide the conversation. He or she is typing the information into a computer and may seem to be taking forever. There is a good chance, however, that emergency services are already being sent while you are still on the line.

Follow all directions. In some cases, the call-taker will give you directions. Listen carefully, follow each step exactly, and ask for clarification if you do not understand.

Keep your eyes open. You may be asked to describe victims, suspects, vehicles, or other parts of the scene.

Do not hang up the call until directed to do so by the call taker.

Due to the remoteness of the site it may be necessary to liaise with the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.

6.3 Contact Details

A list of emergency contacts is presented in Table 6-2. A copy of these contacts will be included in the Site Safety Manual and in the site offices and the various site welfare facilities.

Table 6-2 Emergency Contacts

Contact	Telephone no.
Emergency Services – Ambulance, Fire, Gardaí	999/112
Doctor – Freshford Health Centre	056 883 2261
Hospital – St. Luke's General Hospital - Kilkenny	056 778 5000
ESB Emergency Services	1850 372 999
Gardaí – Freshford Garda Station	056 883 2122
Health and Safety Co-ordinator - Health & Safety Services	TBC
Health and Safety Authority	1890 289 389
Inland Fisheries Ireland (IFI)	1890 347 424
Project Supervisor Construction Stage (PSCS): TBC	TBC
Project Supervisor Design Stage (PSDS): TBC	TBC
Client: Killoshulan Renewable Energy Ltd.	TBC

6.4 Procedure for Personnel Tracking

All operatives on site without any exception will have to undergo a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.

In the event of a site operative becoming in an emergency situation where serious injury has occurred and hospitalisation has taken place, it will be the responsibility of the Site Manager or next in command if unavailable to contact the next of kin to inform them of the situation that exists.

6.5 Induction Checklist

Table 6-3 provides a list of items highlighted in this ERP which must be included or obtained during the mandatory site induction of all personnel that will work on the site. This will be updated throughout the various stages of the Proposed Project.

Table 6-3 Emergency Response Plan Items Applicable to the Site Induction Process

ERP Items to be included in Site Induction	Status
All personnel will be made aware of the evacuation procedure during site induction	
It may be necessary to liaise with and assist the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.	
All operatives on site without any exception will have undergo a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.	

7. MITIGATION PROPOSALS

All mitigation measures relating to the pre-commencement, construction and operational phases of the Proposed Project are set out in the various sections of the Environmental Impact Assessment Report (EIAR), NIS prepared as part of the planning application to An Coimisiún Pleanála (ACP).

This section of the CEMP groups together all of the mitigation measures presented in the above documents. The Mitigation Measures are presented in the following pages and are also outlined within Chapter 18: Schedule of Mitigation and Monitoring Measures. Decommissioning Phase mitigation measures are not included in the table below, however, can be viewed in Appendix 4-6 (Decommissioning Plan) of this EIAR.

By presenting the mitigation proposals in the below format, it is intended to provide an easy to audit list that can be reviewed and reported on during the future phases of the Proposed Project. The tabular format in which the below information is presented, can be further expanded upon during the course of future project phases to provide a reporting template for site compliance audits.

Table 7-1 Proposed Mitigation Measures

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Ch. 4: Description of the Proposed Project – Description of the Proposed Project					
Pre-Construction Phase					
MM1	Environmental Management	Ch. 4: Description of the Proposed Project	› All proposed activities on the site of the Proposed Project will be provided for in an environmental management plan. › The CEMP includes details sets out details of the environmental controls to be implemented on site, site drainage measures and a waste management plan. The CEMP also outlines the Emergency Response Procedure to be adopted in the event of an emergency in terms of site health and safety and environmental protection. In the event planning permission is granted for the Proposed Project, the CEMP will be updated prior to the commencement of the development, to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned and will be submitted to the Planning Authority for written approval		
MM2	Cement Based Deliveries	Ch. 4: Description of the Proposed Project Appendix 4-5: Surface Water Management Plan	› The arrangements for concrete deliveries to the Site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout of trucks and discussing emergency procedures; › Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place. Where possible pre-cast elements for culverts and concrete works will be used.		
MM3	Pre-Constructi	Appendix 4-5: Surface Water Management Plan	› Prior to commencement of works in sub-catchments across the Site, main drain inspections will be completed to ensure ditches and streams are free from debris and blockages that may impede drainage. It is proposed to complete these inspections on		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	on Drainage	CEMP Section 3	a catchment-by-catchment basis as the construction works develop across the site, as works in all areas will not commence simultaneously. › Drainage and associated pollution control measures will be implemented on-site before the main construction works commence. Where possible drainage controls will be installed during seasonally dry ground conditions. This will reduce the possibility of impact on surface waters by suspended sediment released during construction and entrained in surface run-off › The routes of any natural drainage features will not be altered as part of the Proposed Project. Turbine locations have been selected to avoid natural watercourses. 3 no. new watercourse crossing are proposed within the Proposed Wind Farm site. Culvert upgrades at forestry drain crossings are also proposed. › There will be no direct discharges to natural watercourses. All discharges from the proposed works areas or from interceptor drains will be made over vegetated ground at an appropriate distance from natural watercourse and lakes. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Project and are indicated on the drainage design drawings. › Where artificial drains are currently in place in the vicinity of proposed works areas, these drains may have to be diverted around the proposed works areas to minimise the amount of water in the vicinity of works areas. Where it may not be possible to divert artificial drains around proposed work areas, the drains will be blocked to ensure sediment laden water from the works areas has no direct route to other watercourses. Where drains have to be blocked, the blocking will only take place after an alternative drainage system to handle the same water has been put in place. › Existing artificial drains in the vicinity of existing site roads will be maintained in their present location where possible. If it is expected that these artificial drains will receive drainage water from works areas, check dams will be added (as specified below) to control flows and sediment loads in these existing artificial drains. If road widening or improvement works are necessary along the existing roads, where possible, the works will take place on the opposite side of the road to the drain. › Along the Proposed 110kV Underground Cabling route there are 6 no. watercourse crossings, which includes natural stream/rivers and drains. No in-stream works are		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			proposed at any of the 6 no. crossings where works are required to accommodate the Proposed 110kV Underground Cable.		
MM4	Watercourse Inspection	Ch. 4: Description of the Proposed Project CEMP Section 2	› Confirmatory inspections of the proposed new no. 3 watercourse crossing locations will be carried out by the Project Civil/Structural Engineer and the Project Hydrologist prior to the construction of the crossing.		
MM5	Drainage Maintenance	Ch. 9: Water Appendix 4-5: Surface Water Management Plan	› Any excess build-up of silt levels at check dams, the settlement ponds, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.		
MM6	Earthworks	Appendix 4-5: Surface Water Management Plan CEMP Section 3	› Drainage and associated pollution control measures will be implemented on-site before the main construction works commence. Where possible drainage controls will be installed during seasonally dry ground conditions. This will reduce the possibility of impact on surface waters by suspended sediment released during construction and entrained in surface run-off.		
MM7	Forestry Felling Drainage Measures	Ch. 4: Description of the Proposed Project Ch. 9: Water CEMP Section 3	› Before the commencement of any felling works, an Environmental Clerk of Works (ECoW) will be appointed to oversee the felling and extraction works. The ECoW will have the following functions: › Attend the site for the setup period when drainage protection works are being installed and be present on site during the remainder of the forestry felling works. › Prior to the commencement of works, review and agree the positioning by the Operator of the required Aquatic Buffer Zones (ABZs), silt traps, silt fencing (see below), water crossings and on-site storage facilities for fuel, oil and chemicals (see further below). › Be responsible for preparing and delivering the Environmental Tool Box Talk (TBT) to all relevant parties involved in site operations, prior to the commencement of the works.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Conduct daily and weekly inspections of all water protection measures and visually assess their integrity and effectiveness. › Take representative photographs showing the progress of operation on-site, and the integrity and effectiveness of the water protection measures. › Collect water samples for analysis by a 3rd party accredited laboratory, adhering to the following requirements: › Surface water samples shall be collected upstream and downstream of the keyhole felling site at suitable sampling locations. › Sampling shall be taken from the stream / river bank, with no in-stream access permitted. › The following minimum analytical suite shall be used: pH, Electrical Conductivity, Total Suspended Solids, Biochemical Oxygen Demand, Total Phosphorus, Ortho-Phosphate, Total Nitrogen, and Ammonia. › Review of operator's records for plant inspections, evidence of contamination and leaks, and drainage checks made after extreme weather conditions. › Prepare and maintain a contingency plan. › Suspend work where potential risk to water from siltation and pollution is identified, or where operational methods and mitigation measures are not specified or agreed. › Prepare and maintain a Water Protection Measure Register. This document is to be updated weekly by the ECoW. › All relevant measures set out in the most recent versions of the Forestry & Water Quality Guidelines, Forest Harvesting & the Environment Guidelines and the Forest Protection Guidelines will apply. In particular, to protect watercourses, the following measures will be adhered to during all /tree felling activities. › Works will be overseen by an ECoW as described above. › The extent of all necessary tree felling will be identified and demarcated with markings on the ground in advance of any felling commencing. › All roads and culverts will be inspected prior to any machinery being brought on site to commence the felling operation. No tracking of vehicles through watercourses will occur. Vehicles will only use existing road infrastructure and established watercourse crossings.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Existing drains that drain an area to be felled towards surface watercourses will be blocked, and temporary silt traps will be constructed to ensure collection of all silt within felling areas. These temporary silt traps will be cleaned out and backfilled once felling works are complete. This ensures there is no residual collected silt remaining in blocked drains after felling works are completed. No direct discharge of such drains to watercourses will occur from within felling areas. › New collector drains and sediment traps will be installed during ground preparation to intercept water upgradient of felling areas and divert it away. Collector drains will be excavated at an acute angle to the contour (0.3%-3% gradient), to minimise flow velocities. › All silt traps will be sited outside of buffer zones and have no direct outflow into the aquatic zone. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of away from all aquatic zones. › Where felling is required inside the buffers, silt fences will be installed around existing watercourses. Silt fences will be installed as single, double or a series of triple silt fences, depending on the space available and the anticipated sediment loading. › All new collector drains will taper out before entering the aquatic buffer zone to ensure the discharging water gently fans out over the buffer zone before entering the aquatic zone. › Machine combinations, such as mechanical harvesters or chainsaw felling, will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance; › Mechanised operations will be suspended during and immediately after heavy rainfall. › Where brash is required to form brash mats, it will be laid out at harvesting stage to prevent soil disturbance by machine movement. › Brash which has not been pushed into the soil will be moved within the Site to facilitate the creation of mats in more demanding locations. › Felling of trees will be pointed directionally away from watercourses. › Felling will be planned to minimise the number of machine passes in any one area. › Extraction routes, and hence brash mats, will be aligned parallel to the ground contours where possible.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Harvested timber will be stacked in dry areas, and outside any 50-metre watercourse buffer zone. Straw bales and check dams will be emplaced on the down gradient side of timber storage sites. › Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but removing of natural debris deflectors will be avoided.		
MM8	Felling License	Ch. 4: Description of the Proposed Project CEMP Section 2	› The commercial forestry felling activities required as part of the Proposed Project will be the subject of a Felling Licence application to the Forest Service, in accordance with the Forestry Act 2014, the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments. The policy requires that a copy of the planning permission for the wind farm be submitted with the felling licence applications; therefore, the felling licenses cannot be applied for until such time as planning permission is obtained for the Proposed Project.		
MM9	Traffic Management	Ch. 4: Description of the Proposed Project Ch. 15: Material Assets CEMP Section 3	› In the event planning permission is granted for the Proposed Project, the Traffic Management Plan will address the requirements of any relevant planning conditions, including any additional mitigation measures, should they be conditioned. Traffic management measures included the following: › Identification of a delivery schedule › Details of the alterations required to the infrastructure and any other minor alteration identified; › A dry run of the route using vehicles with similar dimensions. › The deliveries of turbine components to the site will be made in convoys of five vehicles at a time, and at night when roads are quietest. › Convoys will be accompanied by escorts at the front and rear operating a "stop and go" system. Although the turbine delivery vehicles are large, they will not prevent other road users or emergency vehicles passing, should the need arise. › The delivery escort vehicles will ensure the turbine transport is carried out in a safe and efficient manner with minimal delay or inconvenience for other road users. › It is not anticipated that any section of the public road network will be closed during transport of turbines, although there will be some delays to local traffic at pinch points.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			During these periods it may be necessary to operate local diversions for through traffic. All deliveries comprising abnormally large loads where required will be made outside the normal peak traffic periods, at night, to avoid disruption to work and school-related traffic. › A full dry run of the transport operation along the proposed route will be completed using vehicles with attachments to simulate the dimensions of the wind turbine transportation vehicles. This dry run will inform the Traffic Management Plan submitted for agreement with Kilkenny County Council. › All turbine deliveries will be provided for in the Transport Management Plan which will be finalised in advance of the construction stage, when the exact transport arrangements are known, delivery dates confirmed and escort proposals in place. The finalised Transport Management Plan will be submitted to the Planning Authority for agreement in advance of any abnormal loads using the local roads, and 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.		
MM10	Waste Management	Ch. 4: Description of the Proposed Project CEMP Section 3.8	› Prior to the commencement of the development a Construction Waste Manager will be appointed by the Contractor. The Construction Waste Manager will be in charge of the implementation of the objectives of the plan, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to. The person nominated must have sufficient authority so that they can ensure everyone working on the development adheres to the management plan		
Construction Phase					
MM11	Refuelling	Ch. 4: Description of the Proposed Project Ch.9: Water	› Wherever possible, vehicles will be refuelled off-site, particularly for regular road-going vehicles. On-site refuelling of machinery will be carried out at designated refuelling areas at the temporary construction compounds. › Heavy plant and machinery will be refuelled on-site by a fuel truck that will come to the Site as required on a scheduled and organised basis. › Only designated trained and competent operatives will be authorised to refuel plant on-site.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 3 Appendix 4-5: Surface Water Management Plan	› Mobile measures such as drip trays and fuel absorbent mats will used during refuelling operations as required. All plant and machinery will be equipped with fuel absorbent material and pads to deal with any event of accidental spillage. The following mitigation measures are proposed to avoid release of hydrocarbons at the site: › All plant will be inspected and certified to ensure that they are leak free and in good working order prior to use at the site. › Fuels stored on site will be minimised. › On-site refuelling will be carried out by trained personnel only; › All refuelling will be carried out outside of the designated hydrological buffer zones; › Mobile measures such as dip trays and fuel absorbent mats will be used during refuelling operations as required; › All plant and machinery will be equipped with fuel absorbent material and pads to deal with any accidental spillage; › The electrical substation compound will be bunded appropriately to 110% of the volume of oils that will be stored, and to prevent leakage of any associated chemicals to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor; › Spill kits will be available to deal with any accidental spillage in and outside the re-fuelling area. › An emergency plan for the construction phase to deal with accidental spillages will be developed (refer to Section 6 of this CEMP); › All hazardous wastes will be stored in bunded containers/areas before being collected by an authorised waste contractor and brought to an EPA licensed waste facility; › Hazardous wastes will be kept separate from non-hazardous wastes so that contamination does not occur.		
MM12	Cement Based Products Deliveries and	Ch. 4: Description of the Proposed Project	› Only ready-mixed concrete will be used during the construction phase, with all concrete being delivered from local batching plants in sealed concrete delivery trucks. › The use of ready-mixed concrete deliveries will eliminate any potential environmental risks of on-site batching. › When concrete is delivered to site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the site.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	Management		› Chute cleaning water will be isolated in temporary lined wash-out pits located near the Proposed Wind Farm site entrance. These temporary lined wash-out pits will be removed from the Proposed Wind Farm site at the end of the construction phase. Concrete trucks will be washed out fully at the batching plant, where facilities are already in place. The risks of pollution arising from concrete deliveries will be further reduced by the following: › When concrete is delivered to the Site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the Site. › Concrete trucks will not be washed out on the site but will be directed back to their batching plant for washout. › Site roads will be constructed to a high standard to allow transport of the turbine components around the Site, and hence, concrete delivery trucks will be able to access all areas where the concrete will be needed. No concrete will be transported around the Site in open trailers or dumpers so as to avoid spillage while in transport. All concrete used in the construction of turbine bases will be pumped directly into the shuttered formwork from the delivery truck. If this is not practical, the concrete will be pumped from the delivery truck into a hydraulic concrete pump or into the bucket of an excavator, which will transfer the concrete to the location where it is needed. › The arrangements for concrete deliveries to the Site will be discussed with suppliers before work starts, confirming routes, prohibiting on-site washout and discussing emergency procedures. › Clearly visible signage will be placed in prominent locations close to concrete pour areas specifically stating washout of concrete lorries is not permitted on the Site.		
MM13	Concrete Pouring	Ch. 4: Description of the Proposed Project	› Using weather forecasting to assist in planning large concrete pours and avoiding large pours where prolonged periods of heavy rain is forecast. › Restricting concrete pumps and machine buckets from slewing over watercourses while placing concrete. › Ensuring that excavations are sufficiently dewatered before concreting begins and that dewatering continues while concrete sets.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		Appendix 4-5: Surface Water Management Plan	› Ensuring that covers are available for freshly placed concrete to avoid the surface washing away in heavy rain. › The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area, or a Siltbuster-type concrete wash unit (https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/) or equivalent › Disposing of surplus concrete after completion of a pour in suitable off-site locations away from any watercourse or sensitive habitats.		
MM14	Road Cleanliness	Ch. 4: Description of the Proposed Project CEMP Section 3	› It is not anticipated that vehicle or wheel washing will be required as part of the construction phase of the Proposed Project because site roads will be already formed using on-site materials before other road-going trucks begin to make regular or frequent deliveries to the site (e.g. with steel or concrete). A road sweeper will be available if any section of the public roads were to be dirtied by trucks associated with the Proposed Project.		
MM15	Existing Drainage Features	Ch. 4: Description of the Proposed Project Appendix 4-5: Surface Water Management Plan CEMP Section 3	› There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows. All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses. The distance will vary between 5-20m depending on local slope, the nature of local soil deposits and also the type of vegetation present. Buffer zones around the existing natural drainage features have been used to inform the layout of the Proposed Project. › Minimum buffer zones of 50m around the existing natural drainage features have informed the layout of the Proposed Wind Farm. › Where artificial drains are currently in place in the vicinity of proposed works areas, these drains may have to be diverted around the proposed works areas to minimise the amount of water in the vicinity of works areas. › Where it may not be possible to divert artificial drains around proposed work areas, the drains will be blocked to ensure sediment laden water from the works areas has no direct route to other watercourses. › Where drains have to be blocked, the blocking will only take place after an alternative drainage system to handle the same water has been put in place. Existing artificial		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			drains in the vicinity of existing site roads will be maintained in their present location where possible. › If it is expected that these artificial drains will receive drainage water from works areas, check dams will be added (as specified below) to control flows and sediment loads in these existing artificial drains. › If road widening or improvement works are necessary along the existing roads, where possible, the works will take place on the opposite side of the road to the drain.		
MM16	Surface Water Drainage Measures	Appendix 4-5: Surface Water Management Plan	<u>Interceptor Drains</u> › Interceptor drains will be installed upgradient of any works areas to collect surface flow runoff and prevent it reaching excavations and construction areas of the Site where it might otherwise have come into contact with exposed surfaces and picked up silt and sediment. The drains will be used to divert upslope runoff around the works area to a location where it can be redistributed over the ground surface as sheet flow. This will minimise the volume of potentially silty runoff to be managed within the construction area. <u>Drainage Swales</u> › Drainage swales (or collector drains) are shallow drains that will be used to intercept and collect run off from construction areas of the Site during the construction phase. › Drainage swales will remain in place to collect runoff from roads and hardstanding areas of the Proposed Project during the operational phase and channel it to infiltration area for sediment settling. › Drainage swales will be installed downgradient of any works areas to collect surface flow runoff where it might have come into contact with exposed surfaces and picked up silt and sediment. Swales will intercept the potentially silt-laden water from the excavations and construction areas of the Site and prevent it reaching natural watercourses. › The velocity of flow in the interceptor drains and drainage swales, particularly on sloped sections of the channel, will be controlled by check dams, which will be installed at regular intervals along the drains to ensure flow in the swale is non-erosive.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Check dams will also be installed in some existing artificial drainage channels that will receive waters from works areas of the Site. Level Spreaders › A level spreader will be constructed at the end of each interceptor drain to convert concentrated flows in the drain, into diffuse sheet flow on areas of vegetated ground. The levels spreaders will be located downgradient of any proposed works areas in locations where they will not contribute further to water ingress to construction areas of the Site. › The water carried in interceptor drains will not have come in contact with works areas of the Site and therefore should be free of silt and sediment. The level spreaders will distribute clean drainage water onto vegetated areas where the water will not be reconcentrated into a flow channel immediately below the point of discharge. The discharge point will be on level or only very gently sloping ground rather than on a steep slope so as to prevent erosion. › Clean four-inch stone can be placed on the outside of the spreader lip and pressed into the ground mechanically to further dissipate the flow leaving the level spreader over a larger area. Vegetation Filters › Vegetation filters are the existing vegetated areas of land that will be used to accept surface water runoff from upgradient areas. The selection of suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions. › Vegetation filters will carry outflow from the level spreaders as overland sheet flow, removing any suspended solids and discharging to the groundwater system by diffuse infiltration. › Vegetation filters will not be used in isolation for waters that are likely to have higher silt loadings. In such cases, silt-bearing water will already have passed through stilling ponds prior to diffuse discharge to the vegetation filters via a level spreader. Stilling and Settlement Ponds		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Stilling or settlement ponds will be used to attenuate runoff from works areas of the site of the Proposed Project during the construction phase and will remain in place to handle runoff from roads and hardstanding areas of the Proposed Project during the operational phase › The embankment that forms the sloped sides of the stilling ponds will be stabilised with vegetated turves, which will have been removed during the excavation of the stilling ponds area. › Stilling ponds will be located towards the end of swales, close to where the water will be reconverted to diffuse sheet flow. Upon exiting the stilling pond system, water will be immediately reconverted to diffuse flow via a fan-shaped rock apron if there is adequate space and ground conditions allow. Siltbusters › A “siltbuster” or similar equivalent piece of equipment will be available to filter any water pumped out of excavation areas, if necessary, prior to its discharge to stilling ponds or swales. Dewatering Silt bags › Dewatering silt bags are an additional drainage measure that can be used downgradient of the stilling ponds at the end of the drainage swale channels and will be located, wherever it is deemed appropriate, throughout the Site. › The water will flow, via a pipe, from the stilling ponds into the silt bag. The silt bag will allow the water to flow through the geotextile fabric and will trap any of the finer silt and sediment remaining in the water after it has gone through the previous drainage measures. The dewatering silt bags will ensure that there will be no loss of silt into the stream. Culverts › All new proposed culverts and proposed culvert upgrades will be suitably sized for the expected peak flows in the watercourse.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Some culverts will be installed to manage drainage waters from works areas of the Proposed Project, particularly where the waters have to be taken from one side of an existing roadway to the other for discharge. The size of culverts will be influenced by the depth of the track or road sub-base. In some cases, two or more smaller diameter culverts may be used where this depth is limited, though this will be avoided as they will have a higher associated risk of blockage than a single, larger pipe. In all cases, culverts will be oversized to allow mammals to pass through the culvert. › Culverts will be installed with a minimum internal gradient of 1% (1 in 100). Smaller culverts will have a smooth internal surface. Larger culverts may have corrugated surfaces which will trap silt and contribute to the stream ecosystem. Depending on the management of water on the downstream side of the culvert, large stone may be used to interrupt the flow of water. This will help dissipate its energy and help prevent problems of erosion. Smaller water crossings will simply consist of 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 culvert and water can continue to flow as necessary. <u>Silt Fences</u> › Silt fences will be installed as an additional water protection measure around existing watercourses in certain locations, particularly where works are proposed within the 50-metre buffer zone of a natural watercourse, which is inevitable where existing roads in proximity to watercourses are to be upgraded as part of the Proposed Wind Farm. These areas include around existing culverts, around the headwaters of watercourses. › Silt fences will be installed as single, double or a series of triple silt fences, depending on the space available and the anticipated sediment loading. The silt fence designs follow the technical guidance document 'Control of Water Pollution from Linear Construction Projects' published by CIRIA (Ciria, No. C648, 1996). Up to three silt fences may be deployed in series. <u>Sediment Entrapment Mats</u>		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Sediment entrapment mats, consisting of coir or jute matting, will be placed at the outlet of the silt bag to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure Check Dams › The velocity of flow in the interceptor drains and drainage swales, particularly on sloped sections of the channel, will be controlled by check dams, which will be installed at regular intervals along the drains to ensure flow in the swale is non-erosive. Check dams will also be installed in some existing artificial drainage channels that will receive waters from works areas of the Site. › Check dams will restrict flow velocity, minimise channel erosion and promote sedimentation behind the dam. The check dams will be installed as the interceptor drains are being excavated. › Check dams will be used along sections of access road drains to attenuate flows and intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock. › Check dams will be used along sections of access road drains to intercept silts at source › Check dams will not be used in any natural watercourses, only artificial drainage channels and interceptor drains. The check dams will be left in place at the end of the construction phase to limit erosive linear flow in the drainage swales during extreme rainfall events.		
MM17	Wastewater Management	Ch. 4: Description of the Proposed Project	› Temporary port-a-loo toilets located within a staff portacabin will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. The nearest licenced primary wastewater treatment plant is located in Clintstown, Co. Kilkenny approximately 5km east of the Site. › There will also be a water supply on-site for hygiene purposes, by way of a temporary storage tank. The construction compound will also include a bunded refuelling and		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			containment area for the storage of oil, lubricants and site generators etc, and full retention oil interceptor.		
MM18	Clear-Span Watercourse Crossing	Ch. 4: Description of the Proposed Project Ch. 9: Water CEMP Section 2	It is proposed to construct a new clear-span watercourse crossing at one location within the Site and upgrade one existing crossing. The clear-span watercourse crossing methodology presented below will ensure that no instream works are necessary. The standard construction methodology for the installation of a clear-span watercourse crossing is as follows: › The access road on the approach either side of the watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of each watercourse crossing. › All drainage measures along the proposed road will be installed in advance of the works. › A foundation 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. The base will be excavated along the stream bank with no instream works required. › Access to the opposite side of the watercourse for excavation and foundation installation will require the installation of a temporary pre-cast concrete or metal bridge across the watercourse to provide temporary access for the excavator. Plant and equipment will not be permitted to track across the watercourse. › Once the foundation base has been completed, the pre-cast concrete box culvert will be installed using a crane which will be set up on the bank of the watercourse and will be lifted into place from the bank with no contact with the watercourse. › Where the box culvert is installed in sections, the joints will be sealed to prevent granular material entering the watercourse, › Once the crossing is in position stone backfill will be placed and compacted against the structure up to the required level above the foundations. › Underground cabling ducting will be contained within the road make-up of the proposed crossing. The watercourse crossings will be constructed to the specifications of the OPW bridge design guidelines 'Construction, Replacement or Alteration of Bridges and Culverts - A Guide to		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Applying for Consent under Section 50 of the Arterial Drainage Act, 1945', and in consultation with Inland Fisheries Ireland. Abutments will be constructed from precast units combined with in-situ foundations, placed within an acceptable backfill material. Confirmatory inspections of the proposed new watercourse crossing locations will be carried out by the Project Civil/Structural Engineer and the Project Hydrologist prior to the construction of the crossing.		
MM19	Proposed Grid Connection – existing underground services, marker posts, joint bays and major watercourse crossings	Ch. 4: Description of the Proposed Project	<u>Existing Underground Services</u> › Any underground services encountered along the grid cable routes will be surveyed for level and the ducting will pass over the service provided adequate cover is available. › A minimum clearance of 300 mm will be required between the bottom of the ducts and the service in question. If the clearance cannot be achieved the ducting will pass under the service and again 300 mm clearance between the top of the communications duct and bottom of the service will be achieved. › In deeper excavations an additional layer of marker tape will be installed between the communications duct and top level yellow marker tape. If the required separation distances cannot be achieved then a number of alternative options are available such as using steel plates laid across the width of the trench and using 35N concrete surrounding the ESB ducts where adjacent services are within 600mm, with marker tape on the side of the trench. Back fill around any utility services will be with dead sand/pea shingle. <u>Marker Posts</u> › In deeper excavations an additional layer of marker tape will be installed between the communications duct and top level yellow marker tape. If the required separation › Surface cable markers will be placed along the route where cable depth is unavoidably shallow, due to constraints such as existing services, to indicate the precise location of the UGC. These markers will be metallic plates in accordance with ESBN and EirGrid standards.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› 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 700mm base, and with centred lightning symbol, on engineering grade fluorescent yellow background shall be installed in adequately sized concrete foundations. Marker post shall also be placed in the event that burial depth is not to standard. Siting of marker posts to be dictated by ESBN as part of the detailed design process. Joint Bays › Joints Bays are to be installed approximately every 650m - 850m along the UGC route to facilitate the jointing of 2 No. lengths of 110kV UGC. Joint Bays are 6m x 2.5m x 2.05m 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. Please refer to Section 4.8.2.4 of Chapter 4 for further details on joint bay construction and cable installation. › Where possible, joint bays will be located in areas where there is a natural widening/wide grass margin on the road in order to accommodate easier construction, cable installation and create less traffic congestion. During construction the joint bay locations will be completely fenced off, and once they have been constructed, they will be backfilled until cables are being installed. › In association with joint bays, Communication Chambers will be installed at every joint slab location to facilitate communication links. Earth Sheath Link Chambers are also be installed at every joint bay 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. Major Watercourse Crossings		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			The cable route will involve 6-no. crossings, of which 1 no. will be horizontal directional drilling (HDD) crossings and will not interact with an existing bridge structure. Drawings of the bridge crossings and further details on culvert crossing methodology are included in Appendix 4-1 of this EIAR. The Proposed 110kV Underground Cabling route will encounter 5 no. water culverts along the route. Existing culverts will be crossed using open trenching with either an undercrossing or overcrossing. A confirmatory site survey of all culverts has been completed as part of this phase of the project prior to planning to confirm the crossing methods. › 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 (Eastern Regional Fisheries Board, 2004)", and these guidelines will be adhered to during the construction of the Proposed Project.		
MM20	Turbine Bases, Hardstanding and Infrastructure Foundations	Ch. 4: Description of the Proposed Project CEMP Section 2	› An embankment approximately 600 mm high will be constructed around the perimeter of each turbine foundation base and a fence will be erected to prevent construction traffic from driving into the excavated hole and to demarcate the working area. All necessary health and safety signage will be erected to warn of deep excavations etc. Access to and from excavated bases will be formed by excavating a pedestrian walkway to 1:12 grade. › There will be a minimum of 100 mm of binding concrete laid on the formation material positioned using concrete skip and 360o excavator to protect ground formation and to give a safe working platform.		
MM21	Temporary Construction Compound	Ch. 4: Description of the Proposed Project CEMP Section 2	The construction compounds will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors. Construction materials and turbine components will be brought directly to the proposed turbine locations following their delivery to the site. The 2 no. temporary construction compounds will be constructed as follows:		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› The area to be used for each compound will be marked out at the corners using ranging rods or timber posts. Drainage runs and associated settlement ponds will be installed around the perimeter; › The compound platform will be established using a similar technique as the construction of the substation platform; › A layer of geo-grid will be installed where deemed necessary by the designer and compacted layers of well graded granular material will be spread and lightly compacted to provide a hard area for Site offices and storage containers; › A limited amount of fuel will have to be stored on the Proposed Project site and for the Proposed Grid Connection in appropriately bunded containers and a bunded area for oil storage will be constructed within the compound. › Areas within the compound will be constructed as site roads and used as vehicle hardstanding during deliveries and for parking; › A bunded containment area will be provided within the compound for the storage of lubricants, oils and site generators etc; › A waste storage area will be provided within the compounds; › The compounds will be fenced and secured with locked gates if necessary; and, › Upon completion of the Proposed Project the temporary construction compounds will be decommissioned, granular material will be removed and the area will be allowed to vegetate naturally.		
Operational Phase					
MM22	Wastewater Management	Ch. 4: Description of the Proposed Project	› The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. › The wastewater storage tank alarm will be part of a continuous stream of data from the site's turbines, wind measurement devices and electrical substation that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007(as amended), will be employed to transport wastewater away from the site.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM23	Electrical Substation and BESS	Ch. 4: Description of the Proposed Project CEMP Section 2	› The area of the Proposed 110kV Substation will be marked out using ranging rods or wooden posts and the soil and overburden stripped and will be either temporarily stockpiled locally at the substation location, or transported immediately on excavation to one of the designated spoil management areas; › Perimeter fencing will be erected › The construction and components of the substation have been designed to EirGrid specifications. › The electrical substation and BESS compound will be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;		
			Decommissioning Phase		
MM24	Decommissioning	Ch. 4: Description of the Proposed Project Appendix 4-6: Decommissioning Plan	› Prior to the end of the operational period the Decommissioning Plan will be updated in line with decommissioning methodologies that exist at the time and will agree with the competent authority at that time.		
MM25	Decommissioning	Ch. 4: Description of the Proposed Project Appendix 4-6: Decommissioning Plan	› The wind turbines proposed as part of the Proposed Project are expected to have a lifespan of 35 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Project will be decommissioned fully. The Proposed 110kV Substation and Proposed 110kV Underground Cabling will remain in place as it will be under the ownership of the ESB and will form a permanent part of the national electricity grid.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Upon decommissioning of the Proposed Project, the wind turbines will be disassembled in reverse order to how they were erected. All above ground turbine components will be separated and removed off-site for recycling. › Turbine hardstands and foundations will remain in place underground and will be left to revegetate naturally. Leaving the turbine hardstands and foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in significant environment nuisances such as noise, dust and/or vibration. › Site roadways will be left in situ, as appropriate to facilitate on-going forestry operations. Underground cables, including grid connection, will be removed and the ducting left in place. › A decommissioning plan will be agreed with the local authorities three months prior to decommissioning the Proposed Project.		
MM26	Surface Water Drainage Measures	Appendix 4-5: Surface Water Management Plan	<u>Interceptor Drains</u> › On completion of the construction phase works, it is envisaged that the majority of the interceptor drains could be removed. At that stage, there will be no open excavations or large areas of exposed ground that are likely to give rise to large volumes of potentially silt-laden run off. › Any areas in which works were carried out to construct roads, turbine bases or hardstands, will have been built up with large grade hardcore, which even when compacted in place, will retain sufficient void space to allow water to infiltrate the subsurface of these constructed areas. › It is not anticipated that roadways or other installed site infrastructure will intercept ground-conveyed surface water runoff to any significant extent that would result in scouring or over-topping or spill over. › Where the drains are to be removed, they will be backfilled with the material from the diversion dike. Interceptor drains will be retained in certain locations, for example where roadways are to be installed on slopes, to prevent the roadways acting of conduits for water that might infiltrate the roadway sub-base. In these cases, interceptor drains will be maintained in localised areas along the roadway with		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			culverts under the roadway, which will allow the intercepted water to be discharged to vegetation filters downgradient of the roadway. › Similarly, in localised hollows where water is likely to be funnelled at greater concentrations than on broader slopes, interceptor drains, and culverts may be left in situ following construction.		
Ch. 5: Population and Human Health: Population and Human Health					
Pre-construction Phase					
MM27	Human Health	Ch. 5: Population and Human Health	At the outset of the Proposed Project, during the constraints mapping process detailed in Ch. 3: Site Selection & Reasonable Alternatives of this EIAR, all sensitive receptors within c. 1.63km of the area suitable for siting wind turbines within the EIAR Site Boundary were identified and mapped. › This included all occupied and unoccupied dwellings, businesses, stud farms and schools. In addition, a planning history search to identify properties that may have been granted planning permission, but not yet been constructed, was carried out. Any property with a valid planning permission for a dwelling house was also added to the sensitive receptors' dataset. All inhabitable dwellings (existing, proposed and permitted) and other sensitive receptors (inclusive of schools, businesses and stud farms) within 1.63km of the proposed turbines have been considered as part of the following shadow flicker assessment. There are 110 no. sensitive receptors located within 1.63km of proposed turbine locations.		
MM28	Property Values	Ch. 5: Population and Human Health	› The Proposed Wind Farm has been designed in accordance with the parameters set out in the Guidelines and with cognisance of the draft Guidelines, adhering to the required setback distances from sensitive receptors set out in those documents.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM29	Traffic and Transport	Ch. 5: Population and Human Health Ch. 15 Material Assets	› A pre-condition survey of roads associated with the Proposed Project will be carried out prior to construction commencement to record the condition of the road. A post construction survey will be carried out after works are completed. Where required the timing of these surveys will be agreed with the local authority. › A competent Traffic Management Coordinator will be appointed for the duration of the construction of the Proposed Project, and this person will be the main point of contact for all matters relating to traffic management. › Locals in the area will be informed of any upcoming traffic related matters e.g. delivery of turbine components at night, via letter drops and posters in public places. Information will include the contact details of the Contract Project Coordinator, who will be the main point of contact for all queries from the public or local authority during normal working hours. An "out of hours" emergency number will also be provided. › Liaison with the relevant local authorities including the roads sections of local authorities that the delivery routes traverse, and An Garda Siochana, during the delivery phase of the large turbine vehicles, when an escort for all convoys will be required.		
Construction Phase					
MM30	Human Health	Ch. 5: Population and Human Health CEMP Section 5	The Proposed Project will be constructed, operated and decommissioned in accordance with all relevant Health and Safety Legislation, including: › Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005); › Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2016 (S.I. No. 36 of 2016); › S.I. No. 291/2013 - Safety, Health and Welfare at Work (Construction) Regulations 2013 and › Safety, Health and Welfare at Work (Work at Height) Regulations 2006 (S.I. No. 318 of 2006). The following measures will be taken:		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› A Health and Safety Plan covering all aspects of the construction process will address the Health and Safety requirements in detail. This will be prepared on a preliminary basis at the procurement stage and developed further at construction stage. › All hazards will be identified, and risks assessed. Where elimination of the risk is not feasible, appropriate mitigation and/or control measures will be established. The contractor will be obliged under the construction contract and current health and safety legislation to adequately provide for all hazards and risks associated with the construction phase of the project. Safepass registration cards are required for all construction, delivery and security staff. Construction operatives will hold a valid Construction Skills Certificate Scheme card where required. The developer is required to ensure a competent contractor is appointed to carry out the construction works. The contractor will be responsible for the implementation of procedures outlined in the Safety and Health Plan. Public safety will be addressed by restricting Site access during construction. Fencing will be erected in areas of the Site where uncontrolled access is not permitted. › The suitability of machinery and equipment for use near power lines will be risk assessed. › All staff will be trained on operating voltages of overhead electricity lines running the Site. All staff will be trained to be aware of the risks associated with underground cables. All contractors that may visit the Site are made aware of the location of lines before they come on to Site. › When activities must be carried out beneath overhead lines, e.g., component delivery or substation construction, a site-specific risk assessment will be undertaken prior to any works. The risk assessment must take into account the maximum potential height that can be reached by the plant or equipment that will be used prior to any works. › Information on safe clearances will be provided to all staff and visitors. › Signage indicating locations and health and safety measures regarding electrical cables will be erected in canteens and on Site. › All staff will be made aware of and adhere to the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021'.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			This will encompass the use of all necessary Personal Protective Equipment and adherence to the Site Health and Safety Plan. › The suitability of machinery and equipment for use near power lines will be risk assessed. › All staff will be trained on operating voltages of electricity cables running the Site. All staff will be trained to be aware of the risks associated with overhead lines. All contractors that may visit the Site are made aware of the location of lines before they come on to Site. › When activities must be carried out beneath overhead lines, e.g., component delivery or substation construction, a site-specific risk assessment will be undertaken prior to any works. The risk assessment must take into account the maximum potential height that can be reached by the plant or equipment that will be used prior to any works. › Information on safe clearances will be provided to all staff and visitors. › Signage indicating locations and health and safety measures regarding electrical cables will be erected in canteens and on Site. › All staff will be made aware of and adhere to the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021'. This will encompass the use of all necessary Personal Protective Equipment and adherence to the Site Health and Safety Plan. › The suitability of machinery and equipment for use near power lines will be risk assessed. › All staff will be trained on operating voltages of electricity cables running the Site. All staff will be trained to be aware of the risks associated with overhead lines. All contractors that may visit the Site are made aware of the location of lines before they come on to Site. › When activities must be carried out beneath overhead lines, e.g., component delivery, a site-specific risk assessment will be undertaken prior to any works. The risk assessment must take into account the maximum potential height that can be reached by the plant or equipment that will be used prior to any works.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Overhead line proximity detection equipment will be fitted to machinery when such works are required. The scale and scope of the project requires that a Project Supervisor Design Process (PSDP) and Project Supervisor Construction Stage (PSCS) are required to be appointed in accordance with the provisions of the Health & Safety Authority's '*Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013*'. The PSDP appointed for the construction stage shall be required to perform his/her duties as prescribed in the Safety, Health and Welfare at Work (Construction) Regulations. These duties include (but are not limited to): › When activities must be carried out beneath overhead lines, e.g., component delivery, a site-specific risk assessment will be undertaken prior to any works. The risk assessment must take into account the maximum potential height that can be reached by the plant or equipment that will be used prior to any works. › Overhead line proximity detection equipment will be fitted to machinery when such works are required. › Identify hazards arising from the design or from the technical, organisational, planning or time related aspects of the project; › Where possible, eliminate the hazards or reduce the risks; › Communicate necessary control measures, design assumptions or remaining risks to the PSCS so they can be dealt with in the Safety and Health Plan; › Ensure that the work of designers is coordinated to ensure safety; › Organise co-operation between designers; › Prepare a written Safety and Health Plan; › Prepare a safety file for the completed structure and give it to the client; and › Notify the Authority and the client of non-compliance with any written directions issued.		
Operational Phase					

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM31	Human Health	Ch. 5: Population and Human Health Appendix 4-4	› Prepare a safety file for the completed structure and give it to the client; and › Access to the turbines is through a door at the base of the structure, which will be locked at all times outside maintenance visits. The doors will only be unlocked as required for entry by authorised personnel and will be locked again following their exit. › Staff associated with the project will conduct frequent visits, which will include inspections to establish whether any signs have been defaced, removed, faded, or are becoming hidden by vegetation or foliage, with prompt action taken as necessary. › Signs will also be erected at suitable locations across the Site as required for the ease and safety of operation of the wind farm. These signs include: › Buried cable route markers at 50m (maximum) intervals and change of cable route direction; › Directions to relevant turbines at junctions; › "No access to Unauthorised Personnel" at appropriate locations; › Speed limits signs at Site entrance and junctions › "Warning these Premises are alarmed" at appropriate locations; › "Danger HV" at appropriate locations; › "Warning – Keep clear of structures during electrical storms, high winds or ice conditions" at Site entrance; › "No unauthorised vehicles beyond this point" at specific Site entrances; and › Other operational signage required as per Site-specific hazards. › The proposed substation, which will be operated by Eirgrid/ESBN will be locked and fenced off from public access. The substation will be operational remotely and manually 24 hours per day, 7 days a week. Supervisory operational and monitoring activities will be carried out remotely using a SCADA system, with the aid of computers connected via a telephone modem link. › Periodic service and maintenance work which include some vehicle movement. › For operational and inspection purposes, substation access is required. › Servicing of the substation equipment will be carried out in accordance with the manufacturer's specifications, which would be expected to entail the following: ○ Six-month service – three-week visit		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			○ Annual service – six-week visit ○ Weekly and daily visits as required. › An operational phase Health and Safety Plan will be developed to fully address identified Health and Safety issues associated with the operation of the Site. Access for emergency services will be available at all times. › A Fire Risk Management and Emergency Response Plan has been developed in relation to the effects on the environment and health and safety of the proposed Battery Energy Storage System following a fire emergency. The report outlines the mitigation design, procedures and actions to protect lives and safety of site and emergency services personnel, the protection of the environment, minimisation of damage and disruption and the return to normal operations. The report states the design factors which contribute to reducing the escalation in the severity of a potential incident, facilities for the emergency services and the safeguarding of the environment through fire water retention.		
MM32	Shadow Flicker	Ch. 5: Population and Human Health	<u>Screening Measures</u> In the event of an occurrence of shadow flicker exceeding guideline threshold values of 30 minutes per day at residential receptor locations, mitigation options will be discussed with the affected homeowner, including: › Installation of appropriate window blinds in the affected rooms of the residence; › Planting of screening vegetation; › Other site-specific measures which might be agreeable to the affected party and may lead to the desired mitigation. If agreement can be reached with the homeowner, then it would be arranged for the required mitigation to be implemented in cooperation with the affected party as soon as practically possible and for the full costs to be borne by the wind farm operator. <u>Wind Turbine Control Measures</u>		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			The draft Guidelines limit of zero shadow flicker occurrences at any sensitive receptors will be adhered to and shadow flicker control units will be fitted with shadow flicker control units to allow the turbines to be controlled to prevent the occurrence of shadow flicker at properties surrounding the wind farm. The shadow flicker control units will be added to any required turbines. All predicted incidents of shadow flicker will be pre-programmed into the wind farm's control software. The wind farm's SCADA control system can be programmed to shut down any particular turbine at any particular time on any given day to avoid any shadow flicker occurrences at properties which are not naturally screened nor can be screened in any other manner. In order to ensure that the model and SCADA system is accurate and working well a site visit will be carried out to verify the system. The shadow flicker prediction data will be used to select dates on which a shadow flicker event could be observed at one or multiple affected properties and the following process will be adhered to. 1. *Recording the weather conditions at the time of the site visit, including wind speeds and direction (i.e. blue sky, intermittent clouds, overcast, moderate breeze, light breeze, still etc.).* 2. *Recording the house number, time and duration of site visit and the observation point GPS coordinates.* 3. *Recording the nature of the sensitive receptor, its orientation, windows, landscaping in the vicinity, any elements of the built environment in the vicinity, vegetation.* 4. *In the event of shadow flicker being noted as occurring the details of the duration (times) of the occurrence will be recorded.* 5. *The data will then be sent to the wind farm operational team to confirm that the model and SCADA system are working.* 6. *Following 12 months of full operation of the Proposed Project a report can be prepared for the Local Authority describing the shadow flicker mitigation measures used at the wind farm and confirming the implementation and successful operation of the system.*		
Chapter 6 Biodiversity					

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Pre-Construction Phase		
MM33	Linear features	Ch. 6: Biodiversity Appendix 6-4	To facilitate the Proposed Project, there is requirement for permanent loss of 1.34 km of linear features within the Proposed Wind Farm site. To compensate these losses, a Biodiversity Enhancement and Management Plan has been prepared, included as Appendix 6-4, which provides for the bolstering and/or planting of native hedgerow throughout the site. These measures, as detailed in Appendix 6-4, will be undertaken prior to any felling works required to facilitate the Proposed Project. This will reduce and mitigate the proposed losses at the earliest possible time, mitigating the effects discussed in Chapter 6.		
MM34	Bats	Ch. 6: Biodiversity Appendix 6-4	To facilitate the Proposed Project, there is requirement for permanent loss of 1.34 km of linear features within the Proposed Wind Farm site. To compensate this loss of commuting and foraging habitat for bats, a Biodiversity Enhancement and Management Plan has been prepared, included as Appendix 6-4, which provides for the bolstering and/or planting of native hedgerow throughout the site. These measures, as detailed in Appendix 6-4, will be undertaken prior to any felling works required to facilitate the Proposed Project. This will reduce and mitigate the proposed losses at the earliest possible time, mitigating the effects discussed in Chapter 6.		
MM35	Otter	Ch. 6: Biodiversity	No significant effects are anticipated. However, taking a precautionary approach, and due to the time that can elapse between the original surveys, any future planning consent and commencement of construction, a pre-construction otter survey will be carried out by a qualified ecologist to identify the presence of any breeding/ resting sites within 150m of proposed works, that may have been established in the intervening period. As such, prior to the commencement of construction works associated with the installation of watercourse crossings, particularly the proposed Grid Connection Route, the following measures will be undertaken for the avoidance of disturbance/displacement and direct mortality and to ensure that no otter holts/breeding sites have been established since the original surveys were undertaken (TII, 2008b):		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			A pre-commencement otter survey will be undertaken in accordance with standard best practice guidance prior to the commencement of site works. Should the surveys identify the presence of an otter holt, the following measures will be undertaken. › A National Parks and Wildlife Service derogation licence will be applied for (although compliance with such a licence has not been relied on in this assessment). › No works will be undertaken within 150m of any holts at which breeding females or cubs are present. › No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance will also not take place within 15m of such holts, except under licence (TII, 2008b). › All of the above works will be undertaken or supervised by an appropriately qualified ecologist. Currently based on the finding of the surveys and current information regarding the Site, no derogation licence is required for this application, as no breeding/resting sites have been recorded in close proximity to the Site. However, should the pre-commencement surveys identify a new breeding/resting site and exclusion is required, a derogation licence will be obtained from the NPWS prior to any works being carried out.		
MM36	Badger	Ch. 6: Biodiversity	Prior to the commencement of any construction works associated with the Proposed Wind Farm, Proposed Grid Connection Route and Turbine Delivery Route, the following measures will be undertaken for the avoidance of disturbance and/or direct mortality to badger and to ensure no additional setts have been established since the original surveys undertaken. The following measures are in line with Guidelines For The Treatment Of Badgers Prior To The Construction Of National Road Schemes (TII 2009).		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			From a precautionary basis, a pre-commencement badger survey will be undertaken in accordance with standard best practice guidance prior to the commencement of site works to determine whether the identified sett is still in use and to ensure that no additional setts in close proximity to proposed infrastructure have been established. In the event that a badger sett is identified within or immediately adjacent to the Proposed Project footprint, mitigations as per the above referenced TII document will be implemented for the new sett.		
MM37	Red Squirrel/ Pine Marten	Ch. 6: Biodiversity	Due to time that can elapse between the original surveys, any future planning consent and commencement of construction, a pre-construction survey for pine marten/red squirrel will be carried out to identify the presence of any breeding sites. These surveys will focus on areas of Conifer plantation (WD4) to be felled and all suitable habitat within 50m of the felling blocks. Any potential breeding sites should be monitored to ascertain if they are active breeding sites. Surveys will be undertaken in line with Nature Scot[4] and TII[5] guidelines. Should active dreys/dens be identified within the blocks to be felled, the following mitigations and best practice procedures will be followed to ensure that no breeding site for either red squirrel or pine marten are impacted: › Felling works to be undertaken in October–January inclusive, this will avoid the main breeding season (February-September) when vulnerable young are most likely to be found within breeding sites for both species. › Any breeding sites identified within the 50m buffer that wouldn't be directly affected by felling works or disturbance related activity should be clearly marked out with an exclusion zone and works/access through these areas avoided as much as possible. › Plant machinery will be turned off when not in use. Operating machinery will be restricted to the Proposed Project works site area (and outside any exclusion zone)		

[4] https://www.nature.scot/sites/default/files/2018-09/Species%20Planning%20Advice%20-%20red%20squirrel.pdf
[5] *TII guidance (TII, 2009, Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. Dublin: National Roads Authority).*

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM38	Reptiles and Amphibians	Ch. 6: Biodiversity	Prior to construction of the Proposed Project, pre-commencement surveys for viviparous lizard, common frog, and smooth newt will be undertaken within potential supporting habitat identified within the Site. Surveys will be undertaken by a suitably qualified ecologist and during the optimal season for each species, as per TII (2008) guidelines. Any individuals or population of these species will then be translocated outside of the works area to other areas of suitable habitat. An Ecological Clerk of Works will also be appointed for the construction works, who will translocate any further individuals recorded during the construction works.		
			Construction Phase		
MM39	Assessment of Potential Effects on Groundwater, Surface Watercourses, and Sensitive Aquatic Faunal Species	Ch. 4: Description of the Proposed Project	Mitigation measures addressing surface watercourses and sensitive aquatic faunal species during construction are dealt with in Section MM19.		
MM40	Bats	Ch. 6: Biodiversity Appendix 6-2	The below describes the best practice and site-specific mitigation measures that are in place to avoid and reduce the potential for significant effects on local bat populations. **Noise Restrictions**		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			During the construction phase, plant machinery will be turned off when not in use and all plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (S.I. No. 632 of 2001, as amended). **Lighting Restrictions** In accordance with the Institute of Lighting Professionals Guidance Note 08/23 (ILP, 2023), lighting associated with the Proposed Project will be designed to maintain dark commuting corridors and minimise light spill onto woodland, treelines, hedgerows, roost features and other habitats used by bats. During the construction phase, lighting requirements will be temporary and limited to areas where required for health, safety and security purposes, including temporary compounds and works associated with the Proposed 110kV substation. Where works are required during hours of darkness, lighting will be directed away from retained treelines, hedgerows, roost features and bat commuting or foraging habitats. Directional accessories, including baffles, hoods, cowls and louvres, will be used where appropriate to reduce light spill and focus illumination only where required. The same restrictions will apply during decommissioning. **Bat Felling Buffers** In accordance with NatureScot (2021) and NIEA (2021) guidance, a minimum 50 m buffer is applied between turbine blade tips and habitat features used by bats (e.g. hedgerows, treelines). Although increased buffers of 100–200m are recommended around woodland by Eurobats Publication No. 6 and NIEA, these recommendations are not currently supported by empirical evidence from the UK or Ireland and are not routinely applied in wind farm planning. For the Proposed Wind Farm, a 50 m buffer between turbine blade tip and the nearest habitat feature has been implemented, based on a conservative worst-case turbine specification (the turbine model to be installed on the Proposed Wind Farm site will have an overall ground-to-		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			blade tip height of 185m, rotor diameter of 163m, and hub height of 103.5m). Buffer distances were calculated using the Natural England formula (NatureScot, 2021) and have been incorporated into the turbine layout. Note: Due to the proximity of T2 to the confirmed bat roosts within the Farm Complex, existing linear habitat features surrounding this turbine will be retained to the north-west and south-east to maintain connectivity between the identified roosts and suitable commuting and foraging habitats within the wider landscape. The retention of these features is intended to avoid the severance of established commuting routes and minimise potential disturbance to bats associated with the roosts.		
MM41	Otter	Ch. 6: Biodiversity	An ecological clerk of works will supervise the proposed HDD works required to cross the River Nore. They will ensure that all best practice noise measures are correctly implemented.		
			Operational Phase		
MM42	Assessment of Potential Effects on Groundwater, Surface Watercourses, and Sensitive Aquatic Faunal Species	Ch. 4: Description of the Proposed Project	Mitigation measures addressing surface watercourses and sensitive aquatic faunal species during operation are dealt with in Section MM19.		
MM43	Bats	Ch. 6: Biodiversity	**Blade Feathering**		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			In accordance with current best practice guidance (NatureScot, 2021; NIEA, 2021; BCI, 2026), blade feathering will be implemented across all turbines as a standard embedded mitigation measure. When wind speeds fall below the turbine cut-in speed, turbine blades will be pitched parallel to the wind (i.e. feathered) to minimise rotation, thereby reducing the risk of bat collisions during periods when turbines would otherwise idle. Blade feathering will be applied at all turbines throughout the operational life of the Proposed Wind Farm and will not be limited spatially. In addition to blade feathering, a site-specific curtailment strategy will be implemented to reduce collision risk to Leisler's bat. This approach has been selected because the residual collision risk for Leisler's bat cannot be addressed through habitat-based mitigation alone, given the species' open-air foraging behaviour, higher flight profile and widespread activity across the Proposed Wind Farm. Although activity for this species was classified as Low Risk at median levels, it was classified as Medium Risk at peak levels, thereby triggering the requirement for site-specific mitigation in accordance with BCI (2026) guidance for Medium Risk (Amber) scenarios. **Operational Monitoring** A programme of post-construction monitoring (PCM) will be implemented to assess the effects of the Proposed Wind Farm on bat activity and collision mortality, and to evaluate the effectiveness of the mitigation measures described above, including blade feathering and site-specific curtailment. The primary objective of the monitoring programme is to evaluate the effectiveness of the mitigation strategy and to ensure that the Favourable Conservation Status of local bat populations is maintained, as required under Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			The monitoring programme has been designed in accordance with NatureScot (2021), NIEA (2021) and BCI (2026) guidance and will follow an adaptive management approach. In accordance with NatureScot (2021) and BCI (2026), PCM will comprise two integrated components: › Fatality monitoring (carcass searches) to quantify collision mortality; and › Acoustic monitoring to assess bat activity patterns and potential displacement or attraction effects.		
Decommissioning Phase					
MM44	Decommissioning Phase	Ch. 6: Biodiversity	› The same mitigation to prevent significant impacts on water quality and associated aquatic fauna and other terrestrial fauna during construction will be applicable to the decommissioning phase. It can be concluded that following the implementation of preventative mitigation, there is no potential for the decommissioning of the Proposed Project to result in significant effects on biodiversity.		
Chapter 7 Ornithology					
Construction Phase					
MM45	Ornithology	EIAR Chapter 7	› To minimise the potential for disturbance to breeding kingfisher, construction works at the River Nore crossing will be undertaken outside the core breeding season (April to July, inclusive). In addition, targeted kingfisher surveys will be undertaken at the Proposed 110kV Underground Cabling crossing of the River Nore if the works are to commence here between February and September. This precautionary period accounts for early courtship and the potential for multiple/late broods. Full details are provided in Appendix 7-7.		
MM46	Ornithology	EIAR Chapter 7	› It is proposed that construction works at the Proposed 110kV Underground Cabling crossing of the River Nore will be conducted outside the kingfisher core nesting season (April to July inclusive), as described in Section 7.6.3 of Chapter 7 of the EIAR.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Chapter 8: Land, Soils & Geology					
Construction Phase					
MM47	Soil, Subsoil and Bedrock Excavation	Chapter 8 Section 8.5.2.2	**Proposed Mitigation Measures by Design:** › Placement of turbines and associated infrastructure in areas with suitable ground conditions/avoidance of karst features (based on detailed iterative site investigation data); › During earthworks, emphasis on FILL rather than CUT at proposed turbine locations T1 to T3 to preserve the topography in areas of shallow limestone; › Excavated soils/subsoils shall be excavated and stored separately to topsoil; this will prevent mixing of materials and facilitate reuse afterwards; › All materials which require storage shall be stockpiled at low angles (< 5-10°) to ensure their stability and secured using silt fencing where necessary. This will help to mitigate erosion and unnecessary additions of suspended solids to the drainage system; › Spoil disposal shall take place within a minimal distance of each turbine to avoid excessive transport of materials within the site; › Spoil shall be deposited, in layers of 0.50m and will not exceed a total thickness of 1m and 2m as indicated on the drawings; › Spoil shall only be deposited on slopes of less than 5 degrees to the horizontal and greater than 10m from the top of a cutting; and, No turbines or Proposed Wind Farm infrastructure shall be constructed within 300m of any European designated sites such as SACs or SPAs.		
MM48	Contamination of Soils by Leakages	Chapter 8 Section 8.5.2.3	**Proposed Mitigation Measures:** › On-site re-fuelling shall be undertaken using a fuel truck with spill kits kept on site for accidental leakages or spillages; › Only designated trained operatives shall be authorised to refuel plant on-site;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	and Spillages of Hydrocarbons or Chemicals		› Taps, nozzles or valves associated with refuelling equipment shall be fitted with a lock system; › All fuel storage areas will be bunded appropriately for the duration of the construction phase. All bunded areas shall be fitted with a storm drainage system and an appropriate oil interceptor. Ancillary equipment such as hoses, pipes shall be contained within the bunded area; › Fuel, oil and chemical stores including tanks and drums shall be regularly inspected for leaks and signs of damage; › The electrical control building (at the substation) shall be bunded appropriately to the volume of oils likely to be stored and to prevent leakage of any associated chemicals to groundwater or surface water. The bunded area shall be fitted with a storm drainage system and an appropriate oil interceptor; › The plant used during construction shall be regularly inspected for leaks and fitness for purpose; › Safety data sheets for all chemicals used shall be kept on-site; › No storage of fuels, oils or chemicals will be permitted within the Clomantagh/Killoshulan Group Water Scheme source protection area (SPA); › Refuelling of mobile plant (i.e. diggers, dumpers etc) will only be permitted outside the SPA; › Refuelling of large immobile plant (i.e. cranes) will only be carried out with a refuelling truck that will be removed from SPA immediately after use; › Spill kit stations will be present at each turbine location (T1 to T4); and, › An emergency response plan for the construction phase to deal with accidental spillages is contained within the Construction and Environmental Management Plan (which is contained in **Appendix 4-5**).		
MM49	Erosion of Exposed Soils and Subsoils and	Chapter 8 Section 8.5.2.4	**Proposed Mitigation Measures:** › The upper vegetative layer (where still present) of excavated soil shall be stored with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the stored soil within the spoil storage areas;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	During Construction of Infrastructure		› Re-seeding and spreading/planting shall also be carried out in these areas; and, › Brash/bog mats shall be put in place to support vehicles on soft ground, reducing soil and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur		
MM50	Karst Related Ground Instability	Chapter 8 Section 8.5.2.5 Appendix 8-3	**Proposed Mitigation Measures:** Mitigation measures for karst related ground instability are shown in the karst Assessment Report (FT, 2026) (**Appendix 8-3**). The measures are summarised below. Mitigation by Design: ***Karst Protocol:*** A karst protocol for the Proposed Project is provided in the FT Karst Assessment and is presented below. The karst risk or potential for karst features along the access road alignments and at turbine locations has been characterised in the Karst Assessment. The designer will further review the risk of features affecting works and outline any change to risk and locations during construction. A standard set of solutions is available in the SED drawings for typical features and dimensions encountered. A karst protocol, provided in Appendix E [of the Karst Assessment Report], has been developed to translate the karst risk to the construction stage. In all cases the formation level is to be checked by the Resident Engineer (RE) for any local soft / weak or loose areas. The RE is to be notified if any soft / weak or loose areas are identified. Due to potential karst risks around turbines T1 and T2 and extending along the access road towards turbine T4, the following investigations shall be carried out: › Formations for embankments or cuttings to be proof rolled and observed for signs of weakness; and, › Formations for structure (turbine) foundations to be proof rolled as above. The excavation shall be extended to rock head (where feasible) in areas where the		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			karst risk is high or where evidence of karst features is encountered during overburden excavation. Karst features identified within the works areas shall be investigated as shown in the flowchart in Appendix E [of the Karst Assessment Report – **Appendix 8-3**]. The results will be documented for each feature. Where karstic features are encountered, they shall be investigated by excavating a trial pit. Following the findings of this trial excavation the RE shall consider if further additional ground investigation is required. The RE will direct the Contractor on which SED to employ. Where the feature is more extensive than shown on the SEDs the designer shall design the remediation measures. The design will be certified by an independent Cat III checker before implementation. Each karstic feature and the remediation measures shall be documented and included in the Safety File for the operational phase of the project. Features identified will be investigated by probing or further rolling as appropriate to be agreed between the RE and the Contractor. The RE may request additional ground investigation such as geophysics, rotary boreholes or other intrusive methods, to be agreed on site. Where karst features are identified the details as shown on the standard earthworks drawings (SED's) (as illustrated on drawings (P26-112-FT-XX-XX-SD-GE-0001 to 0004 – Appendix B of the Karst Assessment Report- **Appendix 8-3**) will be used as instructed by the RE. Where a significant karst feature is suspected below a turbine foundation, a structural solution, such as a raft footing spanning over the feature, or a piled foundation, will be considered. ***Piled Foundations:*** Where small-scale dissolution and voiding are encountered at turbine foundations during detailed ground investigation, one potential mitigation strategy is the use of drilled or grouted piles. The use of piles transfers structural loads to competent rock beneath karst-affected zones. This approach bypasses voids and weak soils, reducing the risk of differential settlement or collapse.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Rock Infill: This methodology involves 'choking' the throat of the sinkhole with coarse granular fill, and progressive backfilling upwards with progressively finer granular fill. All backfill is to be placed in layers 150mm deep and compacted. Soil around the sinkhole is to be excavated to a radius of 3-5m, before being replaced and compacted with or without incorporation of anchored geogrid. ***Grouting:*** Pressure grouting can be employed to stiffen soil over limestone and prevent its movement into fissures, to fill localised fissures, and to stabilise fractured rock. It is worth noting that the injection of a fluid grout can result in significant losses into adjacent caves before sealing karstic fissures. The detailed designer/contractor shall consider which grouting method shall be most appropriate and the potential negative consequences for contamination and pollution of the aquifer. ***Binding Layers and Geo-grids:*** One of the most effective and widely adopted engineering solutions to mitigate the risks of unacceptable settlement and unexpected collapse at access tracks is the use of bridging layers reinforced with geogrids. Bridging layers are designed to span across potential voids or weak zones, redistributing loads and preventing localised collapse. When combined with geogrid reinforcement, these layers gain enhanced tensile strength and load-spreading capacity, allowing them to maintain structural integrity even in the event of subsurface failure. ***Drainage Control:*** Surface and subsurface drainage systems will be designed to prevent water ingress into karst features, reducing the potential for solutional enlargement and subsidence. This includes the installation of sub-drainage systems, the use of impermeable liners or membranes, and pumping and dewatering during construction.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			As described in the Chapter 9: Hydrology and Hydrogeology, all Proposed Wind Farm site surface water drainage outfalls at level spreaders will be placed outside the 30m karst feature buffer zones (enclosed depressions and sink holes).		
MM51	Turbine Delivery Route Works	Chapter 8 Section 8.5.2.6	**Proposed Mitigation Measures:** › All works are minor and localised and cover very small areas; › These works are distributed over a wide area; › All works are temporary in nature; and, › Excavations will be reinstated		
Operational Phase					
MM52	Operational Phase	Chapter 8 Section 8.5.3	Mitigation measures for land, soils and geology during the operational phase include the use of aggregate from authorised quarries for use in road and hardstand maintenance. 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 ground/soil and subsoils and groundwater or surface water quality. The substation transformer shall be in a concrete bunded area, capable of holding 110% of the stored oil volume. Turbine transformers are located within the turbines, so any leaks shall be contained within the turbine. These mitigation measures are considered sufficient to eliminate potential risks to ground/soils and subsoils, and groundwater and surface water quality		
Decommissioning Phase					
MM53	Decommissioning Phase	Chapter 8 Section 8.5.4	Mitigation measures applied during decommissioning activities will be similar to those applied during construction phase. Some of the impacts will be avoided by leaving elements of the Proposed Project in place where appropriate. The substation will be retained by EirGrid. The turbine bases will be rehabilitated by covering with local topsoil in order to regenerate vegetation which will reduce		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			runoff and sedimentation effects. Internal roads will remain as amenity pathways and forestry access roads. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures		
Chapter 9: Hydrology & Hydrogeology					
Pre-Construction Phase					
MM54	Earthworks (Removal of Vegetation Cover, Excavations and Stock Piling) Resulting in Suspended Solids Entrainment in Surface Waters	Chapter 9: Section 9.5.2.3	**Pre-commencement Temporary Drainage Works** Prior to the commencement of new road/hardstand (or road upgrades) the following key temporary drainage measures will be installed: › All existing dry drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using temporary check dams/silt traps; › Clean water diversion drains will be installed upgradient of the works areas; › Check dams/silt fence arrangements (silt traps) will be placed in all existing drains that have surface water flows and also along existing roadside drains; and, › A double silt fence perimeter will be placed down-slope of works areas that are located inside the 50m watercourse and 10m drain buffer zones such as at watercourse crossings		
Construction Phase					
MM55	Potential Effects on	Chapter 9:	**Impact Assessment/Proposed Mitigation Measures:**		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	the Clomantagh/Killoshulan (Balief) Group Water Scheme and Other Local Wells	Section 9.5.2.1	**Assessment of Quantitative Effect (i.e. flow volumes to the source springs) and Proposed Mitigation Measures** Groundwater level monitoring carried out at the Proposed Wind Farm site, show that groundwater levels are deep in the limestone, approximately 10 to 20mbgl. The proposed turbine base excavations (gravity base foundation) will be a maximum 3mbgl. As stated previously, the proposed borrow pit is not located inside the SoPA (source protection area). and therefore, no excavations deeper than 3m will be required within the SoPA Therefore, there is no potential for disruption of groundwater flows towards the spring source by turbine base excavations. **Assessment of Quality Effect and Proposed Mitigation Measures** In order for potential contaminants (i.e. oils, fuels, cements, sediments etc) to reach the source abstraction point from the Proposed Wind Farm site construction areas, a groundwater flowpath (pathway) must be present. Karst features, which are present on the southern portion of the Proposed Wind Farm site, are potential pathways that have been thoroughly investigated; and avoided as part of Proposed Wind Farm layout. **Mitigation By Design:** **Avoidance of Ground Surface Karst features:** All mapped enclosed depressions and swallow holes at the Proposed Wind Farm site have been avoided by the Proposed Wind Farm infrastructure. All Proposed Wind Farm infrastructure surface water drainage outfalls at level spreaders will be located outside the 30m karst feature buffer zones.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			During the construction phase all runoff from works areas (i.e. dirty water) will be attenuated and treated to a high quality prior to being released outside of 30m karst feature buffer zones. Refer to Section 9.5.2.3 below for drainage mitigation details. **Avoidance of Subsurface Karst features:** Detailed drilling and geophysical surveys have been carried out to investigate the potential presence of sub surface karst features at proposed turbines T1 to T4. Investigations carried out at the proposed turbines T1 to T2 identified potential subsurface karst features (clay infills) near both turbines (refer to in Section 9.3.9.3 above for commentary on the investigations. No evidence of karst was found at turbine location T3. However, as illustrated on the annotated ERT and Seismic Refraction profile (**Appendix 8-5**), the T1 and T2 turbine foundations can be constructed on competent limestone and will have no interaction with any potential subsurface karst feature. The required cut and fill at each turbine location will also have no interaction with any potential subsurface karst feature (see following mitigation below). Turbine T3 will be constructed on competent limestone and turbine T4 on mudstone bedrock. **Cut and Fill Design Measures:** Due to the presence of shallow limestone bedrock in the areas around T1, T2, T3 and locally at T4, the proposed earthworks associated with the access roads and hardstands has been designed in such a way as to minimise the cutting (excavation) extents and depths. Where possible infilling is emphasised out over cut. Refer to **Table 8-13** of Chapter 8 (Land, Soils and Geology) which show that infill volumes significantly exceed cut volumes and therefore this mitigation approach has been achieved.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			This preserves the existing overburden cover present above the limestone bedrock, maintaining the current topographic regime, and as such does not increase the risk of karst reactivation or exposure. This has included a bespoke hardstand layout for turbine T3 which omits the blade fingers, in order to avoid significant cutting at this location. The alignment of the access roads has also avoided the mapped karst features in this area which lowers the risk of drainage associated with the access roads leading to reactivation of karst. **Construction Phase Karst Protocol:** A karst protocol, provided in Appendix E [of the FT Karst Assessment Report shown in **Appendix 8-3** of the EIAR], has been developed to translate the karst risk to the construction stage. In all cases the formation level is to be checked by the Resident Engineer (RE) for any local soft / weak or loose areas. The RE is to be notified if any soft / weak or loose areas are identified. Due to potential karst risks around turbines T1 and T2 and extending along the access road towards turbine T4, the following investigations shall be carried out: › Formations for embankments or cuttings to be proof rolled and observed for signs of weakness; and, › Formations for structure (turbine) foundations to be proof rolled as above. The excavation shall be extended to rock head (where feasible) in areas where the karst risk is high or where evidence of karst features is encountered during overburden excavation. **Water Quality Protection/Pollution Prevention Measures:** The following mitigation is proposed at all construction works areas inside the Clomantagh/Killoshulan (Balief) GW SoPA:		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› No storage of fuels, oils, cements, or chemicals will be permitted within the SoPA; › Refuelling of mobile plant (i.e. diggers, dumpers etc) will only be permitted outside the SoPA; › Refuelling of large immobile plant (i.e. cranes) will only be carried out with a refuelling truck that will be removed from SoPA immediately after use; › Spill kit stations will be present at each turbine location (T1 to T4); › A geotextile liner will be placed below the founding layer (lean mix concrete) where concrete is to be poured. These both prevent vertical loss of wet concrete at turbine bases; › Use of perimeter shuttering at turbine bases to prevent lateral loss of wet concrete; › All temporary cement washout lagoons will be located outside the SoPA; › No wind farm drainage will be released inside the 30m karst buffer; › There will be clear signage in place inside the refined SoPA to remind construction workers that the area is inside a drinking water protection area; and, › A double silt fence perimeter will be placed around all nearby karst features.		
MM56	Clear Felling of Coniferous Plantation and Potential Surface Water Quality Effects	Chapter 9: Section 9.5.2.2	**Proposed Mitigation Measures:** All felling operations will conform to current best practice Forest Service regulations, policies and strategic guidance documents as well as Coillte and DAFM guidance documents, including the specific guidelines listed below, to ensure that felling, planting and other forestry operations result in minimal potential negative effects to the receiving environment. › Forestry Standards Manual (Forest Service, 2015) › Environmental Requirements for Afforestation (Forest Service, 2016a) › Land Types for Afforestation (Forest Service, 2016b) › Forest Protection Guidelines (Forest Service, 2002) › Forest Operations and Water Protection Guidelines (Coillte, 2013) › Forestry and Water Quality Guidelines (Forest Service, 2000b)		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Forestry and the Landscape Guidelines (Forest Service, 2000c) › Forestry and Archaeology Guidelines (Forest Service, 2000d) › Forest Biodiversity Guidelines (Forest Service, 2000e) › Forests and Water, Achieving Objectives under Ireland's River Basin Management Plan 2018-2021 (DAFM, 2018) › A Guide to Forest Tree Species Selection and Silviculture in Ireland (Horgan et al., 2003) › Management Guidelines for Ireland's Native Woodlands. Jointly published by the National Parks & Wildlife Service (Cross and Collins, 2017) › Native Woodland Scheme Framework (Forest Service, 2018) › Code of Best Forest Practice (Forest Service, 2000) **Mitigation by Avoidance:** There is a requirement in the Forest Service Code of Practice and in the FSC Certification Standard for the installation of buffer zones adjacent to aquatic zones at planting stage. Minimum buffer zone widths recommended in the Forest Service (2000) guidance document *"Forestry and Water Quality Guidelines"* are shown in Table 9-21 During the Proposed Wind Farm construction phase a self-imposed buffer zone of 50 metres will be maintained for the Foyle South Stream where possible. These buffer zones are shown on Figure 9 16 of Chapter 9. Only approximately 0.0471ha of tree felling is required inside a 50m buffer zone. **Mitigation by Design**: Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses comprise best practice methods which are set out as follows: › Machine combinations (i.e., handheld or mechanical) will be chosen which are most suitable for ground conditions and which will minimise soils disturbance;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Checking and maintenance of roads and culverts will be on-going through any felling operation. No tracking of vehicle through watercourses will occur, as vehicles will use road infrastructure and existing watercourse crossing points. Where possible, existing drains will not be disturbed during felling works; › Ditches which drain from the proposed area to be felled towards existing surface watercourses will be blocked, and temporary silt traps will be constructed. No direct discharge of such ditches to watercourses will occur. Drains and sediment traps will be installed during ground preparation. Collector drains will be excavated at an acute angle to the contour (approximately 0.3%-3% gradient), to minimise flow velocities. Main drains to take the discharge from collector drains will include water drops and rock armour, as required, where there are steep gradients, and will avoid being placed at right angles to the contour; › Sediment traps will be sited in drains downstream of felling areas. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of in the peat disposal areas. Where possible, all new silt traps will be constructed on even ground and not on sloping ground; › All drainage channels will taper out before entering the 50m buffer zone. This ensures that discharged water gently fans out over the buffer zone before entering the aquatic zone, with sediment filtered out from the flow by ground vegetation within the zone. On erodible soils, silt traps will be installed at the end of the drainage channels, to the outside of the buffer zone; › Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Correct drain alignment, spacing and depth will ensure that erosion and sediment build-up are minimized and controlled; › Brash mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			➢ Timber will be stacked in dry areas, and outside a local 50 metre watercourse buffer. Straw bales and check dams to be emplaced on the down gradient side of timber storage/processing sites; ➢ Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water run-off; ➢ Checking and maintenance of roads and culverts will be on-going through the felling operation; ➢ Refuelling or maintenance of machinery will not occur within 50m of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required; ➢ A permit to refuel system will be adopted; ➢ Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but care will be taken to avoid removing natural debris deflectors; ➢ Crossing of streams will not be permitted; ➢ Trees will be cut manually from along streams and using machinery to extract whole tree; and, ➢ Travel only perpendicular to and away from stream. **Silt Traps**: Silt traps will be strategically placed down-gradient within forestry drains near streams. 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. **Drain Inspection and Maintenance**: The following items shall be carried out during pre-felling inspections and after: ➢ Communication with tree felling operatives in advance to determine whether any areas have been reported where there is unusual water logging or bogging of machines;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Inspection of all areas reported as having unusual ground conditions; › Inspection of main drainage ditches and outfalls. During pre-felling inspections the main drainage ditches shall be identified. Ideally the pre-felling inspection shall be carried out during rainfall; › Following tree felling all main drains shall be inspected to ensure that they are functioning; › Extraction tracks near drains need to be broken up and diversion channels created to ensure that water in the tracks spreads out over the adjoining ground; › Culverts on drains exiting in the Site will be unblocked; and, › All accumulated silt will be removed from drains and culverts, and silt traps, and this removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall. **Surface Water Quality Monitoring**: Sampling will be completed before, during (if the operation is conducted over a protracted time) and after the felling activity. The 'before' sampling will be conducted within 4 weeks of the felling activity commencing, preferably in medium to high water flow conditions. The "during" sampling will be undertaken once a week or after rainfall events. The 'after' sampling will comprise as many samplings as necessary to demonstrate that water quality has returned to pre-activity status (i.e., where an impact has been shown). Criteria for the selection of water sampling points include the following: › Avoid man-made ditches and drains, or watercourses that do not have year-round flows, i.e. avoid ephemeral ditches, drains or watercourses; › Select sampling points upstream and downstream of the forestry activities; › It is advantageous if the upstream location is outside/above the forest in order to evaluate the impact of land-uses other than forestry; › Where possible, downstream locations will be selected: one immediately below the forestry activity, the second at exit from the forest, and the third some distance from		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			the second (this allows demonstration of no impact through dilution effect or contamination by other land-uses where impact increases at third downstream location relative to second downstream location); and, › The above sampling strategy will be undertaken for all on-site sub-catchments streams where tree felling is proposed. Also, daily surface water monitoring forms will also be utilised at every works site near any watercourse. These will be taken daily and kept on site for record and inspection.		
MM57	Earthworks (Removal of Vegetation Cover, Excavations and Stock Piling) Resulting in Suspended Solids Entrainment in Surface Waters	Chapter 9: Section 9.5.2.3	**Mitigation by Avoidance:** The key mitigation measure during the construction phase of the Proposed Wind Farm is the avoidance of sensitive aquatic areas where possible from **Figure 9-16** it can be seen that all of the key areas of the Proposed Wind Farm infrastructure are actually significantly away from the 50m delineated buffer zones with the exception of proposed new roads, 3 no. proposed crossings on the Foyle South Stream. Additional control measures, which are outlined further on in this section, will be undertaken at these locations within buffers. The large setback distance from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures (discussed below) to be properly installed and operated effectively. The proposed buffer zone will: › Avoid physical damage to watercourses, and associated release of sediment; › Avoid excavations within close proximity to surface water courses; › Avoid the entry of suspended sediment from earthworks into watercourses; and, › Avoid the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			the buffer zone and allowing percolation across the vegetation of the buffer zone. **Mitigation by Design:** › Source controls: ○ Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sand bags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems. ○ Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures. › In-Line controls: ○ Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriate systems. › Treatment systems: ○ Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. It should be noted for the northern portion of the Proposed Wind Farm site is that an extensive network of forestry agricultural drains already exist, and these will be integrated and enhanced as required and used within the Proposed Project drainage system. The integration of the existing drainage network and the Proposed Project network is relatively simple. The key		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			elements being the upgrading and improvements to water treatment elements, such as in line controls and treatment systems, including silt traps, stilling ponds and buffered outfalls. The main elements of interaction with existing drains will be as follows: › Apart from interceptor drains, which will convey clean runoff water to the downstream drainage system, there will be no direct discharge (without treatment for sediment reduction, and attenuation for flow management) of runoff from the Proposed Project drainage into the existing site drainage network. This will reduce the potential for any increased risk of downstream flooding or sediment transport/erosion; › Silt traps will be placed in the existing drains upstream of any streams where construction works / tree felling is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area; › Runoff from individual turbine hardstanding areas will be not discharged into the existing drain network but discharged locally at each turbine location through stilling ponds and buffered outfalls onto vegetated surfaces; › Buffered outfalls which will be numerous over the site will promote percolation of drainage waters across vegetation and close to the point at which the additional runoff is generated, rather than direct discharge to the existing drains of the site; and, › Drains running parallel to the existing roads requiring widening will be upgraded, widening will be targeted to the opposite side of the road. Velocity and silt control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles, silt fences will be used during the upgrade construction works. Regular buffered outfalls will also be added to these drains to protect downstream surface waters. **Water Treatment Train:**		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			A final line of defence will be provided by a water treatment train such as a "Siltbuster". If the discharge water from construction areas fails to be of a high quality during regular inspections, then a filtration treatment system (such as a 'Siltbuster' or similar equivalent treatment train (sequence of water treatment processes) will be used to filter and treat all surface discharge water collected in the dirty water drainage system. This will apply for all of the construction phase. **Silt Fences:** Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to water courses of sand and gravel sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase. Double silt fences will be placed within drains down-gradient of all construction areas inside the 50m hydrological buffer zones. **Silt Bags:** Silt bags will be used where small to medium volumes of water need to be pumped from excavations. As water is pumped through the bag, the majority of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with natural vegetation filters or sedimats Sediment entrapment mats, consisting of coir or jute matting, will be placed at the silt bag location to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure. **Settlement Ponds:**		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			The Proposed Wind Farm infrastructure footprint has been divided into drainage catchments (based on topography, outfall locations, and catchment size) and stormwater runoff rates based on the 10-year return period rainfall event were calculated for various catchment areas in order to size the settlement ponds as shown in Table 9-22. The 10-year return period rainfall event is a recommendation of the IFI relating to other recent wind farm projects (i.e. Cahermurphy Wind Farm, Co. Clare - Planning Ref P20/658). The location and dimensions of proposed settlement ponds are shown on the Proposed Wind Farm site drainage plan drawings (Appendix 4-3). **Level Spreaders and Vegetation Filters:** The purpose of level spreaders is to release treated drainage flow in a diffuse manner, and to prevent the concentration of flows at any one location thereby avoiding erosion. Level spreaders are not intended to be a primary treatment component for development surface water runoff. They are not stand-alone but occur as part of a treatment train of systems that will reduce the velocity of runoff prior to be released at the level spreader. In the absence of level spreaders, the potential for ground erosion is significantly greater than not using them. Vegetation filters are essentially end-of-line polishing filters that are located at the end of the treatment train. In fact, vegetation filters are ultimately a positive consequence of not discharging directly into watercourses which is one of the mitigation components of the drainage philosophy. This makes use of the natural vegetation of the Site to provide a polishing filter for the Wind Farm drainage prior to reaching the downstream watercourses. Again, vegetation filters are not intended to be a single or primary treatment component for treatment of works area runoff. They are not standalone but are intended as part of a treatment train of water quality improvement/control systems (i.e. source controls → check dams → silt traps→ settlement ponds→ level spreaders →silt fences → vegetation filters). **Pre-emptive Site Drainage Management**		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			The works programme for the entire construction stage of the Proposed Project will also take account of weather forecasts, and predicted rainfall in particular. Large excavations and movements of peat/subsoil or vegetation stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast. The following forecasting systems are available and will be used on a daily basis at the site to direct proposed construction activities: › General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates; › MeteoAlarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale; › 3-hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events; › Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive; and, › Consultancy Service: Met Eireann provides a 24-hour telephone consultancy service. The forecaster will provide an interpretation of weather data and give the best available forecast for the area of interest. Using the safe threshold rainfall values will allow work to be safely controlled (from a water quality perspective) in the event of forecasting of an impending high rainfall intensity event.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Works will be suspended if forecasting suggests either of the following is likely to occur: › >10 mm/hr (i.e., high intensity local rainfall events); › >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or, › >half monthly average rainfall in any 7 days. › Prior to works being suspended the following control measures will be completed: › Secure all open excavations; › Provide temporary or emergency drainage to prevent back-up of surface runoff; and, › Avoid working during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded. **Management of Runoff from the Spoil Management Area:** It is proposed that excavated spoil will be used for landscaping where required. The excess material will then be placed in 1 no. Spoil Management Area. The Spoil Management Area is located outside of 50m watercourse buffers and also outside of 30m karst feature buffers (enclosed depression or sink holes). During the initial construction of deposition area, silt fences, straw bales and biodegradable geogrids will be used to control surface water runoff from works areas. Where applicable, the vegetative top-soil layer of the soil and spoil management areas will be rolled back to facilitate placement of excavated spoil, following which the vegetative-top soils layer will be reinstated. Where reinstatement is not possible, spoil management areas will be sealed with a digger bucket and seeded as soon possible to reduce sediment entrainment in runoff.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Drainage from spoil storage areas will ultimately be routed to an oversized swale and a number of stilling ponds with appropriate storage and settlement designed for a 1 in 10-year return period before being discharged to the on-site drains. Subsoil reinstatement areas will be sealed with a digger bucket and vegetated as soon possible to reduce sediment entrainment in runoff. Once re-vegetated and stabilised peat/subsoil reinstatement areas will no longer be a potential source of silt laden runoff. **Timing of Site Construction Works:** Construction of the site drainage system will only be carried out during periods of low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. Construction of the drainage system during this period will also ensure that attenuation features associated with the drainage system will be in place and operational for all subsequent construction works.		
MM58	Excavation Dewatering and Potential Impacts on Surface Water Quality	Chapter 9: Section 9.5.2.5	**Proposed Mitigation Measures:** Management of excavation inflows and subsequent treatment prior to discharge into the drainage network will be undertaken as follows: › Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place; › If required, pumping of excavation inflows will prevent build-up of water in the excavation; › The interceptor drainage will be discharged to the site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› The pumped water volumes will be discharged via volume and sediment attenuation ponds adjacent to excavation areas, or via specialist treatment systems such as a silt bags or silt buster; › There will be no direct discharge to surface watercourses, and therefore no risk of hydraulic loading or contamination will occur; › Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work will immediately be stopped and a geotechnical assessment undertaken; › At the turbine locations adequately sized settlement ponds will be constructed to treat pumped water prior to discharge into a local manmade drain; › mobile 'Siltbuster' or similar equivalent specialist treatment system can be made available at turbine locations for emergencies in order to treat sediment polluted waters from settlement ponds or excavations should they occur. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction-sites. They will be used as final line of defence if needed		
MM59	Potential Release of Hydrocarbons During Construction and Storage	Chapter 9: Section 9.5.2.6	**Proposed Mitigation Measures:** Mitigation measures proposed to avoid release of hydrocarbons at the site are as follows: › On site re-fuelling of machinery will be carried out using a dedicated fuel truck. The fuel truck will also carry fuel absorbent material and pads in the event of any accidental spillages; › Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations; › On-site refuelling will be carried out by trained personnel only; › A permit to fuel system will be put in place;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Fuels stored on site will be minimised. Fuel storage areas if required will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor; › The plant used during construction will be regularly inspected for leaks and fitness for purpose; and, › An emergency plan for the construction phase to deal with accidental spillages will be included within the Construction and Environmental Management Plan (Appendix 4.5). Spill kits will be available to deal with and accidental spillage in and outside the re-fuelling area.		
MM60	Groundwater and Surface Water Contamination from Wastewater Disposal	Chapter 9: Section 9.5.2.7	**Proposed Mitigation Measures:** › It is proposed to manage wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. It is not proposed to treat wastewater on-site		
MM61	Release of Cement-Based Products	Chapter 9: Section 9.5.2.8	**Proposed Mitigation Measures:** › No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place; › Where possible pre-cast elements for culverts and concrete works will be used; › Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water practicable. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water will be undertaken		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			at lined cement washout ponds located outside of Clomantagh/Killoshulan Group Water Scheme ZoC; › Weather forecasting will be used to plan dry days for pouring concrete; and, › The pour site will be kept free of standing water and plastic covers will be ready in case of a sudden rainfall event		
MM62	Morphological and Hydrological Effects due to New Watercourse Crossing Works	Chapter 9: Section 9.5.2.9	**Proposed Mitigation Measures:** › All proposed 3 no. new stream crossings will be bottomless or clear span structures and the existing banks will remain undisturbed. No in-stream excavation works are proposed and therefore there will be no direct impact on the stream at the proposed crossing location; › Where the proposed cable route follows an existing road or road proposed for upgrade, the cable will pass over or below the culvert within the access road; › All guidance / mitigation measures proposed by the OPW or the Inland Fisheries Ireland6 is incorporated into the design of the proposed crossings; › As a further precaution, near stream construction work, will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to the Eastern Regional Fisheries Board (2004) guidance document "Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites", i.e., May to September inclusive. This time period coincides with the period of lowest expected rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses (any deviation from this will be done in discussion with the IFI); › During the near stream construction work double row silt fences will be emplaced immediately down-gradient of the construction area for the duration		

[6] *Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			of the construction phase. There will be no batching or storage of cement allowed in the vicinity of the crossing construction areas; and, › All new river/stream crossings will require a Section 50 application (Arterial Drainage Act, 1945). The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent		
MM63	Potential Hydrological Effects on Designated Sites	Chapter 9: Section 9.5.2.10	**Impact Assessment & Proposed Mitigation Measures:** Drainage mitigation measures for surface water quality protection during the construction phase are summarised again below: (Please refer to Sections 9.5.2.2, 9.5.2.3 & 9.5.2.5 of Chapter 9 for the full description of these measures and how they will be applied). › The proposed mitigation measures which will include 50m buffer zones for avoidance of sensitive hydrological features (streams and rivers); › 30m karst feature buffers; › Pre-construction drainage control measures; › Robust drainage control measures (i.e. interceptor drains, swales, settlement ponds and treatment trains such as Siltbuster) will ensure that the quality of runoff from Proposed Project areas will be very high; › Best practice measures with regard use of oils, fuels (Section 9.5.2.6) and cement-based compounds (Section 9.5.2.8); and, › Mitigation relating to HDD works are presented in Section 9.5.2.15 which will be applied during the River Nore crossing,		
MM64	Potential Effects on Local Groundwater Well Supplies from	Chapter 9: Section 9.5.2.11	It has been assessed that the Proposed Project site will not impact in any significant way on any potential down-gradient private wells to the northeast of the Proposed Wind Farm site for the following reasons: › The large set back distances between turbine locations and downstream potential well locations (740m); › The proposed project will involve relatively shallow excavations (3 – 10mbgl) where ground elevations are high (>200m OD);		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	Excavations		› The low permeability of the glacial deposits in which the turbine gravity base foundations will be constructed; › The low recharge characteristics of the underlying SILTSTONE/MUDSTONE aquifer that underlies the north of the Proposed Wind Farm site; › Localised groundwater flow patterns in the glacial deposits which is towards local streams that flow through the Site; › Groundwater flow patterns are expected towards the watercourses that drain the Proposed Wind Farm site; and, › The shallow excavation depths required for Proposed Grid Connection cable, Substation and BESS.		
MM65	Turbine Delivery Route Works	Chapter 9: Section 9.5.2.12	**Proposed Mitigation Measures:** › All works are minor and localised and cover very small areas; › These works are distributed over a wide area; › All works are temporary in nature; and, › Application of the Pre-Construction Drainage Measures (see Section 9.5.2.3) for surface water quality protection		
MM66	Effects of Construction Works on the WFD Status of Downstream Waterbodies	Chapter 9: Section 9.5.2.13	**Proposed Mitigation Measures:** Project design measures and comprehensive groundwater mitigation and drainage control measures for works within the Clomantagh/Killoshulan Group Water Scheme ZoC are provided in Section 9.5.2.1. Comprehensive surface water mitigation and drainage controls are outlined in Section 9.5.2.2 (Felling of Coniferous Plantations), Section 9.5.2.3 (Earthworks), Section 9.5.2.5 (Excavation Dewatering), Section 9.5.2.6 (Hydrocarbons), Section 9.5.2.8 (Cement-based Products) and Section 9.5.2.9 (Morphological Changes to Watercourses). These will ensure the protection of surface water quality and flows in all downstream receiving watercourses		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM67	Use of Siltbuster and Impacts on Downstream Surface Water Quality	Chapter 9: Section 9.5.2.14	**Mitigation Measures:** Measures employed to prevent overdosing and potential chemical carryover: › The siltbuster system comprises an electronic in-line dosing system which provides an accurate means of adding reagents, as a result the risk of over dosing is minimised; › Continued monitoring and water analysis of pre and post treated water by means of an inhouse lab and dedicated staff, means the correct amount of chemical is added by the dosing system; › Dosing rates of chemical to initiate settlement is small, being in the order of 2-10 mg/L and the vast majority of the chemical is removed in the deposited sediment; › Final effluent not meeting the discharge criteria is recycled and retreated, which has a secondary positive effect of reducing carryover; and, › Use of biodegradable chemical agents can be used at very sensitive sites (i.e. upstream of SACs)		
MM68	Potential Surface Water Quality Effects of the Proposed Grid Connection Earthworks and Watercour	Chapter 9: Section 9.5.2.15	**Proposed Mitigation Measures:** Pre-commencement Temporary Drainage Works: Prior to the commencement of substation, cable trenching or access road works the following key temporary drainage measures will be installed: › All existing roadside drains (where present) that intercept the proposed works area will be temporarily blocked down-gradient of the works using check dams/silt traps; › Culverts, manholes and other drainage inlets (where present) will also be temporarily blocked; and,		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	se Crossings		› A double silt fence perimeter will be placed along the road verge on the down-slope side of works areas that are located inside a watercourse 50m buffer zone The following mitigation measures are proposed for the underground cabling watercourse crossing works: › No stockpiling of construction materials will take place along the grid route; › No refuelling of machinery or overnight parking of machinery is permitted in this area; › No concrete truck chute cleaning is permitted in this area; › Works will not take place at periods of high rainfall, and will be scaled back or suspended if heavy rain is forecast; › Local road drainage, culverts and manholes will be temporarily blocked during the works; › Machinery deliveries will be arranged using existing structures along the public road; › All machinery operations will take place away from the stream and ditch banks, apart from where crossings occur. No instream works are proposed; › Any excess construction material will be immediately removed from the area and sent to a licenced waste facility; › No stockpiling of materials will be permitted in the constraint zones; › Spill kits will be available in each item of plant required to complete the stream crossing; and, › Silt fencing will be erected on ground sloping towards watercourses at the stream crossings if required. Fracture Blow-out (Frac-out) Prevention and Contingency Plan for HDD: › The drilling fluid/bentonite will be non-toxic and naturally biodegradable (i.e. Clear Bore Drilling Fluid or similar will be used); › The area around the drilling fluid batching, pumping and recycling plants will be bunded using terram and/or sandbags to contain any potential spillage;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			▪ One or more lines of silt fencing will be placed between the works area and the adjacent river; ▪ Spills of drilling fluid will be cleaned up immediately and transported off-site for disposal at a licensed facility; ▪ Adequately sized skips will be used where temporary storage of arisings are required; ▪ The drilling process / pressure will be constantly monitored to detect any possible leaks or breakouts into the surrounding geology or local watercourse; ▪ This will be gauged by observation and by monitoring the pumping rates and pressures. If any signs of breakout occur, then drilling will be immediately stopped; ▪ Any frac-out material will be contained and removed off-site; ▪ The drilling location will be reviewed, before re-commencing with a higher viscosity drilling fluid mix; and, ▪ If the risk of further frac-out is high, a new drilling alignment will be sought at the crossing location		
MM69	Biodiversity Enhancement and Management Plan	Chapter 9: Section 9.5.2.16	**Mitigation Measures:** A site-specific monitoring and evaluation programme will be implemented to ensure that the success of the proposed measures remains long-term. It will also assist in situations where the habitat establishment may not have been successful by providing evidence of shortcomings, allowing a revised management plan to be formulated. Monitoring results will be reported by the Project Ecologist within an Annual Environmental Report. Reports detailing the monitoring works carried out, the results obtained and a review of their success, along with any suggestions for amendments to the plan will be prepared. The enhancement plan will be updated and amended where required to improve the efficacy of the enhancement work		
Operational Phase					
MM70	Removal of	Chapter 9:	**Proposed Mitigation by Design:**		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	Vegetation Cover and Progressive Replacement of Natural Surface with Low Permeability Surfaces	Section 9.5.3.1	The proposed drainage philosophy outlined in Section 9.4.1 states that runoff control and drainage management are key elements in terms of mitigation against impacts on surface water bodies. Two distinct methods will be employed to manage drainage water within the Proposed Project. The first being 'keeping clean water clean' and the second involving the collection of any drainage waters from work area and to route them towards stilling ponds prior to controlled diffuse release over vegetated surfaces. The second method relates to proposed design measures that will prevent road surface and other hardstand areas acting as preferential flowpaths. All development site runoff will be collected, attenuated, treated and then released in a diffuse and regular manner that does not significantly change the natural drainage regime/hydrology of the site. The operational phase drainage system of the Proposed Project will be installed and constructed in conjunction with the road and hardstanding construction work as described below and as shown on the drainage drawings (Appendix 4-2) submitted with this planning application: › Interceptor drains will be maintained up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it will be re-distributed over the ground by means of a level spreader; › Swales/road side drains will be used to collect runoff from access roads and turbine hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to settlement ponds for sediment settling; › On steep sections of access road transverse drains ('grips') will be constructed in the surface layer of the road to divert any runoff off the road into swales/road side drains; › Check dams will be used along sections of access road drains to intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Settlement ponds, emplaced downstream of road swale sections and at turbine locations, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses; and, › Settlement ponds will be designed in consideration of the greenfield runoff rate. These measures will ensure all surface water runoff from upgraded roads and new road surfaces (including hardstands and turbine base areas) will be captured and treated prior to discharge/release. Settlement ponds, check dams and buffered outfalls will prevent roads acting as preferential flowpaths by providing attenuation and water quality treatment.		
MM71	Runoff Resulting in Suspended Solids Entrainment in Surface Waters	Chapter9: Section 9.5.3.2	**Proposed Mitigation Measures:** The mitigation measures outlined in Sections 9.5.2.3 & 9.5.3.1 will ensure all surface water runoff from upgraded roads and new road surfaces (including hardstand and turbine base areas) will be captured and treated prior to discharge/release. Settlement ponds, check dams and buffered outfalls will prevent roads acting as preferential flowpaths by providing attenuation and water quality treatment. It is proposed that bedrock from off-site sources will be used to construct the sub-base layer of proposed upgraded and new access roads, hardstand areas and turbine base areas. Once installed the subbase layer will be overlain by a clean capping layer of high-grade stone material which will be sourced from local quarries also		
MM72	Potential Effects on the Clomantagh/Killoshulan Group	Chapter 9: Section 9.5.3.3	During the operational phase of the Proposed Project, the only regular plant which will be required on site will be maintenance/inspection vehicles (jeeps/vans/quads) and these will not be refuelled on-site. Any hydrocarbons (oil) present within the turbine generator and gear box will be enclosed within a bund with 110% capacity. There will be no storage of fuels, oils and chemicals inside any of the turbines.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	Water Scheme and Other Local Wells		Automated oil leak detectors will be placed in each of the turbines which will allow early detection of even the smallest leaks of oil or hydraulic fluid that may arise from components such as the transformer or gearbox. The automated detection system will then rapidly notify the wind farm operator by cloud-based systems. This early detection system will prevent large leaks of oil or hydraulic fluid		
			Decommissioning Phase		
MM73	Decommissioning Phase	Chapter 9: Section 9.5.4	The turbine bases will be rehabilitated by covering with local topsoil/peat in order to regenerate vegetation which will reduce runoff and sedimentation effects. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures		
			Chapter 10: Air Quality		
			Construction Phase		
MM74	Exhaust Emissions: Construction of Proposed Project Infrastructure	Ch 10 Air Quality	› Proposed Project Construction staff will be trained how to inspect and maintain construction vehicles and plant to ensure good operational order while onsite, thereby minimising any emissions that arise. The Site Supervisor/Construction Manager will produce and follow a site inspection and machinery checklist which will be followed and updated as required. › All construction vehicles and plant used onsite during the construction phase will be maintained in good operational order. If a vehicle requires repairs this work will be caried out, thereby minimising any emissions that arise. › Turbines components will be transported to the Site on specified routes only, unless otherwise agreed with the Planning Authority. Please see Chapter 15 Material Assets for details. › All machinery will be switched off when not in use. › Users of the Site will be required to ensure that all plant and vehicles are suitably maintained to ensure that emissions of engine generated pollutants are kept to a minimum.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› The majority of aggregate materials for the construction of the Proposed Project will be obtained from the borrow pit on site. This will significantly reduce the number of delivery vehicles accessing the site, thereby reducing the amount of emissions associated with vehicle movements. › Aggregate materials for the construction of the Proposed Project will be sourced from local quarries. › The Materials Recovery Facility (MRF) facility will be local to the Proposed Wind Farm site to reduce the amount of emissions associated with vehicle movements. The nearest licensed waste facility to the Proposed Wind Farm site is Dunmore Recycling and Waste Disposal located approximately 14.5km to the southeast of the site of the Proposed Project. › A Construction and Environmental Management Plan (CEMP Appendix 4-3) will be in place throughout the construction phase.		
MM75	Dust Emissions	Ch 10 Air Quality	› Sporadic wetting of loose stone surface will be carried out during the construction phase to minimise movement of dust particles to the air. In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. › Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff. › All plant and materials vehicles shall be stored in dedicated areas within the Proposed Wind Farm site. › Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction. › Turbines and construction traffic will be transported to the Site on specified haul routes only. › Proposed Grid Connection infrastructure will be transported to the Site on specified haul routes only. › Construction materials for the Proposed Grid Connection and a small volume for the proposed Wind Farm site will be sourced locally from licenced quarries. › The agreed haul route road adjacent to the Proposed Wind Farm site will be regularly inspected for cleanliness and cleaned as necessary. › The roads adjacent to the Site entrances will be checked weekly for damage/potholes and repaired as necessary.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› The transportation of materials from the borrow pits around the Proposed Wind Farm site will be covered by tarpaulin or similar covered vehicles where necessary. › The transportation of construction materials from locally sourced quarries for the Proposed Grid Connection infrastructure and a small volume for the Proposed Wind Farm site will be covered by tarpaulin where necessary. › If necessary, excavated material will be dampened prior to transport to the spoil management areas. › Waste material will be transferred to a licensed/permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal. The MRF facility will be local to the Proposed Project to reduce the amount of emissions associated with vehicle movements. › A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-3). The CEMP includes dust suppression measures		
Operational Phase					
MM76	Exhaust Emissions	Ch. 10: Air Quality	› Any vehicles or plant brought on-site during the operational phase will be maintained in good operational order that comply with the Road Traffic Acts 1961 as amended, thereby minimising any emissions that arise. › When stationary, delivery and on-site vehicles will be required to turn off engines		
MM77	Dust Emissions	Ch. 10: Air Quality	› Maintenance vehicles brought on-site during the operational phase will be maintained in good operational order, thereby minimising any dust emissions that arise.		
Decommissioning Phase					
MM78	Decommissioning	Ch. 10: Air Quality	› The mitigation measures prescribed for the construction phase of the Proposed Project will be implemented during the decommissioning phase thereby minimising any potential impacts		
Chapter 11: Climate					

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Construction Phase		
MM79	Greenhouse Gas Emissions	Ch. 10: Air Quality Ch.11: Climate Ch. 15: Material Assets Appendix 4-3	› All construction vehicles and plant will be maintained in good operational order while on-site, thereby minimising any emissions that arise. › When stationary, delivery and on-site vehicles will be required to turn off engines. › Turbines and construction materials will be transported to the Site on specified routes only unless otherwise agreed with the Planning Authority. Please see Chapter 15 Material Assets for details. › It is intended to obtain the majority of materials for the construction of the Proposed Wind Farm from the proposed on-site borrow pits (with some material being imported from local licenced quarries as needed). This will significantly reduce the number of delivery vehicles accessing the Site, thereby reducing the amount of emissions associated with vehicle movements. › A Construction and Environmental Management Plan (CEMP) (Appendix 4-3) will be in place throughout the construction phase. › The CEMP (Appendix 4-3) includes a Waste Management Plant (WMP) which outlines the best practice procedures that will occur during the construction phase relating to waste material. • The WMP outlines the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of construction of the Proposed Project. Disposal of waste will be seen as a last resort. • Section 4.3.4.7 of Chapter 4 for this EIAR refers to the methodology that will be utilised to manage on-site waste. This waste material will be transferred to a licensed /permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor, • The MRF facility will be local to the Proposed Project site to reduce the amount of emissions associated with vehicle movements. › Where applicable, low carbon intensive construction materials will be sourced and utilised on-site.		
			Operational Phase		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM80	Greenhouse Gas Emissions	Ch. 11: Climate Appendix 6-1	› Ensure that all maintenance and monitoring vehicles will be maintained in good operational order while on-site, and, when stationary, be required to turn off engines thereby minimising any emissions that arise. › As detailed in Appendix 6-1, a BEMP, for the Proposed Wind Farm has identified biodiversity enhancement and management activities such as the protection and maintenance of species rich grassland habitat and linear connectivity.		
Decommissioning Phase					
MM81	Decommissioning Phase	Ch. 11: Climate	› Any impact and consequential effect that occurs during the decommissioning phase are similar to that which occur during the construction phase, be it of less impact. The mitigation measures prescribed for the construction phase of the Proposed Project will be implemented during the decommissioning phase thereby minimising any potential impacts.		
Chapter 12: Noise & Vibration					
Construction Phase					
MM82	Noise & Vibration	Chapter 12: Section 12.7.1 Appendix 12-1: Section 5	No Mitigation measures proposed, though good practice during construction is recommended; Section 8 of BS 5228-1:2009+A1:2014 recommends a number of simple control measures as summarised below that shall be employed onsite: › Keep local residents informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern; › All vehicles and mechanical plant will be fitted with effective exhaust silencers and be subject to programmed maintenance; › Select inherently quiet plant where appropriate - all major compressors will be 'sound reduced' models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use; › All ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Machines will be shut down between work periods (or when not in use) or throttled down to a minimum; › Regularly maintain all equipment used onsite, including maintenance related to noise emissions; › Vehicles will be loaded carefully to ensure minimal drop heights so as to minimise noise during this operation; and › All ancillary plant such as generators and pumps will be positioned so as to cause minimum noise disturbance and if necessary, temporary acoustic screens or enclosures will be provided. At any location within 50m of a residential receptor where jointing bay activities are required for the Proposed Grid Connection Route, the installation of temporary boarding or 'acoustic blanket panels' hanging from Heras fencing (or similar) can be considered to minimise noise.		
			Operational Phase		
MM83	Noise & Vibration	Chapter 12	No mitigation proposed for noise during the operational phase. The assessment shows the predicted wind turbine noise emission levels meet the Site Specific Noise Limits under all conditions and at all locations for both daytime and night-time periods. Whilst it is not possible to predict if Other Amplitude Modulation (OAM) will occur, in the event that complaints are received regarding OAM, mitigation measures are available. The design of such mitigation measures can only be determined once the wind farm is operational if OAM is found to occur frequently and at sustained levels. For the Proposed Project, the developer is committed to investigating noise complaints, inclusive of any complaint which may relate to OAM. To deal with the eventuality of a complaint, the developer proposes the following: › A community liaison officer will be appointed prior to first generation of electricity and contact details made publicly available;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Any complaint relating to noise can be reported to the community liaison officer, who will undertake an initial screening of the complaint (review of logs submitted, review of wind conditions and turbine data etc.) and speak to the complainant in person, with an eventual visit to the complainant location if possible; › Following initial screening, the community liaison officer will be responsible for commissioning a detailed noise complaint investigation. This will include appointing a qualified acoustic consultant to undertake noise measurements at the complaint location and quantify the occurrence and depth (in dB) of OAM for every 10 minutes of the measurement campaign. The measured 10-minute noise levels and OAM depth will also be correlated with 10-minute wind conditions and operational data to find patterns and potential character penalties in accordance with good practice at the time of the assessment; and, › If frequent and sustained OAM is found, then appropriate mitigation will be designed and implemented and the complainant informed by the community liaison officer. Mitigation measures considered will include changes to the operation of the relevant wind turbine(s) by changing software parameters such as blade pitch for specific wind conditions and time periods, addition of blade furniture (such as vortex generators) to alter the flow of air over the wind turbine blades; and, in extreme cases, targeted wind turbine shutdowns in specific conditions		
Decommissioning Phase					
MM84	Noise & Vibration	Chapter 12: Section 12.7.1 Appendix 12-1: Section 5	No mitigation measures proposed, however the same good practice measures proposed during the construction phase are recommended.		
Chapter 13 - Landscape and Visual					
Construction Phase					

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM85	Landscape Effects during Construction	Chapter 13	The above predicted landscape effects during construction assume the implementation of the following mitigation measures for the Proposed Wind Farm and Proposed Grid Connection Route. All construction activities will follow best practice methods to reduce impacts upon the environment and landscape of the Site. Further details are presented in the Construction and Environmental Management Plan (CEMP) contained in Appendix 4-3 of this EIAR. The following measures should be implemented to mitigate landscape effects during the construction phase of the Proposed Project: › In all circumstances, excavation depths and volumes will be minimised, and excavated material will be re-used where possible. › For the proposed Grid Connection, where the cable trench is to be located in the road verge, subsoil will be piled on-site and re-used after cabling works. Should any medium planting be removed, it should be replaced with the same or similar species whenever it is not possible to salvage and reinstate. › Any areas of bare soil remaining after the landscaping phase will be seeded as soon as possible with a grass-seed mix to minimise sediment run-off.		
MM86	Visual Effects during Construction	Chapter 13	General housekeeping measures, necessary for Health & Safety requirements, will ensure that the active construction areas will be kept tidy, mitigating localised visual impacts during the construction phase		
Operational Phase					
MM87	Landscape Effects during Operation	EIAR Chapter 13	Regarding mitigation measures to help reduce landscape effects of the Proposed Wind Farm, this LVIA points to the Biodiversity Enhancement and Management Plan (BEMP) which has been prepared as part of this EIAR (see Appendix 6-4). The BEMP will have the dual effect of providing ecological enhancement to the landscape area of the Proposed Wind Farm site as well as potential visual screening of some lower lying infrastructure of the Proposed Wind Farm, thereby also mitigating effects on landscape character during the Operational Phase.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			The following measures from the BEMP which have been included in the Proposed Wind Farm design are deemed to have the effect of avoiding or reducing direct effects on landscape receptors, meaning individual landscape features and the landscape character of the Proposed Wind Farm site as a whole: › New planting and management of native hedgerow habitat within the Proposed Wind Farm site, including new planting of advance native stock. › Protection and maintenance of high diversity dry grassland habitat which occurs outside the development footprint within the Proposed Wind Farm site.		
Chapter 14: Cultural Heritage					
Construction Phase					
MM88	Recorded Monuments	Chapter 14: Section 14.4.3.3	› The location of all recorded monuments located within the Site shall be shown on the site layout drawings in the CEMP. › A 30m buffer/exclusion zone shall be established around the outer enclosing elements of Enclosure KK009-051— prior to the commencement of the construction stage of the Proposed Project. The buffer/exclusion zone shall comprise durable fencing and display 'Keep Out' signage. No tracking of machinery, storage of topsoil or other materials shall take place within the buffer/exclusion zone. The requirement for the buffer/exclusions zone shall be included in the CEMP.		
MM89	Sub-surface Archaeological Potential	Chapter 14: Section 14.4.3.5	› Archaeological monitoring under licence from the NMS of any geotechnical / engineering trial pits or investigations shall be carried out by a suitably qualified archaeologist. A report detailing the results of the monitoring shall be compiled on completion of the work and submitted to the NMS and Planning Authority/Body. › Pre-development testing, under licence from the NMS, shall be carried out. Testing will only be undertaken in areas where ground disturbance will take place as part of the Proposed Project. The areas to be tested will be chosen by the appointed archaeologist and the number of test trenches agreed between the archaeologist and the NMS through		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			the licensing system. A report on the testing will be compiled on completion of the work. Should archaeological finds, structures or deposits be uncovered as a result of the testing further mitigation measures such as preservation in situ or preservation by record (excavation) may be required and will be decided in consultation with the NMS. Such mitigation measures will be implemented, where relevant, following consultation with the NMS. › Archaeological monitoring of ground works during the construction stage of the Proposed Project under licence from the NMS shall be carried out by a suitably qualified archaeologist. Should archaeological finds, structures or deposits be uncovered as a result of the monitoring further mitigation measures such as preservation in situ or preservation by record (excavation) may be required and will be decided in consultation with the NMS. Such mitigation measures will be implemented where relevant following consultation with the NMS. A report detailing the results of the monitoring and/or any further necessary mitigation as referred to above will be compiled on completion of the work and submitted to the NMS and Planning Authority/Body. › A walk-over survey of any areas currently forested and where infrastructure is proposed shall be carried out post-clear-felling but prior to any other works. › The location of any potential Cultural Heritage features therein will be recorded and a photographic record made of same. A report on the results of the walk-over survey shall be compiled on completion of same and will include any further required mitigation measures such as buffer zones, etc, deemed necessary.		
MM90	Items of Local Cultural Heritage Merit	Chapter 14: Section 14.4.3.8	› The location of all items of local cultural heritage merit located within the Site shall be shown on the site layout drawings in the CEMP. › A methodology for clear-felling of forestry around CH5 and CH6 shall be devised prior to the commencement of this phase of the Proposed Project. The methodology shall ensure that trees are removed from around the structures while ensuring that direct effects to same do not occur. › A post clear-felling walk-over survey of the area of CH5 and CH6 shall be undertaken. A full descriptive and photographic record of the surviving remains shall be carried out.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› A 10m buffer/exclusion zone shall be established around CH5 and CH6 post clear-felling and prior to the commencement of ground works. The buffer/exclusion zone shall comprise durable fencing with 'Keep Out' signage and be maintained for the duration of the construction stage of the Proposed Project		
			Decommissioning Phase		
MM91	Decommissioning Phase	Chapter 14: Section 14.5	› There will be no significant potential effects to the archaeological, architectural and cultural heritage environment during the decommissioning phase of the Proposed Project. Any potential direct effects will already have been resolved through mitigation measures during the construction phase. Therefore, there is no potential for any cumulative effects to arise during the decommissioning phase		
			Chapter 15: Material Assets (Traffic)		
MM92	Mitigation by Design	Chapter 15: Section 15.1.13.5	**Mitigation by Design** Mitigation by design measures include the following: › Selection of the most appropriate delivery route to transport the wind turbine components, requiring the minimum remedial works to accommodate the vehicles as set out in Section 15.1.9. › Selection of the shortest underground grid connection route, minimising the impacts on the existing road network and traffic.		
			Construction Phase		
MM93	Construction Stage	Chapter 15: Section 15.1.13.5	The successful completion of the Proposed Project will require significant coordination and planning, and a comprehensive set of mitigation measures will be put in place before and during the construction stage of the Proposed Project in order minimize the effects of the additional traffic generated. A detailed TMP incorporating all the mitigation measures included as Appendix 15-2 of this EIAR, will be finalised and confirmatory detailed provisions in respect of traffic management agreed with the roads authority and An Garda Síochána prior to construction works commencing on Site. In addition, the traffic management measures		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			proposed for the following construction traffic scenarios are set out for the Proposed 110kV Underground Cabling in Appendix 15-2: **Traffic Management Plan for Killoshulan Wind Farm;** › Delivery of Abnormally sized loads, › Traffic management measures during construction of the Proposed 110kV Underground Cabling. The detailed TMP will include the following: **Traffic Management Coordinator –** a competent Traffic Management Co-ordinator will be appointed for the duration of the construction of the Proposed Project, and this person will be the main point of contact for all matters relating to traffic management. **Delivery Programme –** a programme of deliveries will be submitted KCC and other relevant authorities in advance of deliveries of turbine components to the Site. Liaison with the relevant local authorities including the roads sections of local authorities that the delivery routes traverse and An Garda Siochana, during the delivery phase of the large turbine vehicles, when an escort for all convoys will be required. **Information to locals** – Locals in the area will be informed of any upcoming traffic related matters e.g. delivery of turbine components at night, via letter drops and posters in public places. Information will include the contact details of the Contract Project Co-ordinator, who will be the main point of contact for all queries from the public or local authority during normal working hours. An "out of hours" emergency number will also be provided. **A Pre and Post Construction Condition Survey –** A pre-condition survey of roads associated with the Proposed Project will be carried out prior to construction commencement to record the condition of the road. A post construction survey will be carried out after works are completed. Where required the timing of these surveys will be agreed with the local authority.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Implementation of temporary alterations to road network at critical junctions – At locations where required highlighted in Section 15.1.9. **Identification of delivery routes** – These routes will be agreed and adhered to by all contractors. **Travel plan for construction workers to Proposed Project site–** While the assessment above has assumed the worst case that construction workers will drive to the Proposed Project site, the construction company will be required to provide a travel plan for construction staff, which will include the identification of a routes to / from the site and identification of an area for parking. **Travel plan for construction workers to underground electric cabling route –** Due to the transient nature of the proposed underground grid connection construction site which will generally be on a section of the public road, construction workers will be transported to and from the site by the construction company at the beginning and end of each shift. **Drivers conduct** – All drivers will follow normal rules of the road and will receive toolbox talk regarding the delivery route and planned holding points prior to any deliveries. **Standard permitted axial loads** – This will ill not be exceeded. **Temporary traffic signs** – As part of the traffic management measures temporary traffic signs will be put in place at all key junctions, including the access junction on the R693 during the 18 month construction period. All measures will be in accordance with the *"Traffic Signs Manual, Section 8 – Temporary Traffic Measures and Signs for Road Works"* (DoT now DoTT&S) and "Guidance for the Control and Management of Traffic at Roadworks" (DoTT&S). **Delivery times of large turbine components** - The management plan will include the delivery of large wind turbine plant components at night in order to minimise disruption to general traffic during the construction stage.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Re-instatement works - All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers. All works will be done in accordance with the Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads, DTToS, September 2015. **Additional measures** - Various additional measures will be put in place in order to minimise the effects of the development traffic on the surrounding road network including wheel washing facilities on Site and sweeping / cleaning of local roads as required. It is confirmed that details for the TMP for the Proposed Project will be agreed with TII and the Road Section of KCC prior to construction and contact will be maintained with the Road and Traffic Section throughout the construction phase.		
Operational Phase					
MM94	Operational Phase	Chapter 15: Section 15.1.13.5	Due to the very low volumes of traffic forecast to be generated during this stage no mitigation measures are required		
Decommissioning Phase					
MM95	Decommissioning Phase	Chapter 15: Section 15.1.13.5	In the event that the Proposed Project is decommissioned after the 35 years of operation, a decommissioning plan, will be prepared for agreement with the local authority, as described in Chapter 4 and Appendix 4-6 Decommissioning Plan. This plan will include a material recycling / disposal and traffic management plan will be prepared for agreement with the local authority prior to decommissioning, in accordance with Scottish Natural Heritage (SNH) report *Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms* (SNH, 2013).		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Chapter 15 Material Assets (Other)		
			Construction Phase		
MM96	Electricity	Chapter 15 Section 15.3.3.2.1	› Goal posts will be established under overhead lines for the entirety of the construction phase. They will not exceed a height of 4.2 metres, unless specifically agreed with ESB Networks[7] › The suitability of machinery and equipment for use near power lines will be risk assessed. › All staff will be trained on the routes and operating voltages of OHLs running across the proposed main site entrance. All staff will be trained to be aware of the risks associated with overhead lines. All contractors that may visit the sites are made aware of the location of lines before they come on to site. › Barriers will run parallel to the OHL at a minimum horizontal distance of 6 metres on plan from the nearest overhead line conductor wire. › Prior to the delivery of turbines to the Proposed Wind Farm site, a dry run of the route using vehicles with similar dimensions will occur. Please see Section 15.1.9 for details. › When activities must be carried out beneath overhead lines, e.g. component delivery or grid cable laying, a site-specific risk assessment will be undertaken prior to any works. The risk assessment must take into account the maximum potential height that can be reached by the plant or equipment that will be used is undertaken prior to any works. OHL proximity detection equipment will be fitted to machinery when such works are required. › Information on safe clearances will be provided to all staff and visitors. › Signage indicating locations and health and safety measures regarding overhead lines will be erected in canteens and on site. › All staff will be made aware of and adhere to the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021'. This will encompass the		

[7] *https://www.esbnetworks.ie/docs/default-source/publications/code-of-practice-for-avoiding-danger-from-overhead-electricity-lines.pdf*

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan. › All health and safety measures as detailed in Section 5 of Construction Environment Management Plan and Chapter 5 Population and Human Health will be adhered to during the construction, operation and decommissioning phases. › Any area where excavations are planned will be surveyed and all existing services will be identified prior to commencement of any works. › Liaison will be had with the relevant sections of the Local Authority including all the relevant area engineers to ensure all services are identified. › Excavation permits will be completed, and all plant operators and general operatives will be inducted and informed as to the location of any services. › The contractor must comply with and standard construction codes of practice in relation to working around electricity, gas, water, sewage and telecommunications networks		
MM97	Water	Chapter 15 Section 15.3.3.2.2	› In advance of any construction activity, the contractor will undertake pre-commencement surveys to confirm the presence or otherwise of any services such as water supply. If found to be present, the relevant service provider will be consulted with in order to determine the requirement for specific excavation or relocation methods and to schedule a suitable time to carry out works. In the event that water mains are encountered the water supply will be turned off by the utility so work can commence on diverting the service. The section of existing pipe will be removed and will be replaced with a new pipe along the new alignment of the service. The works will be carried out in accordance with the specifications of the relevant utility provider.		
MM98	Broadband Services	Chapter 15 Section 15.3.3.2.3	Specific measures are incorporated into the CEMP, included as Appendix 4-3 of this EIAR, to ensure that the construction of the Proposed Project will not have effect on underground electrical cables and built services at the Site. The mitigation measures include the following: › Any area where excavations are planned will be surveyed and all existing services will be identified prior to commencement of any works. › Liaison will be had with the relevant sections of the Local Authority including all the relevant area engineers to ensure all services are identified.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Excavation permits will be completed, and all plant operators and general operatives will be inducted and informed as to the location of any services. › The contractor must comply with and standard construction codes of practice in relation to working around electricity, gas, water, sewage and telecommunications networks.		
Decommissioning Phase					
MM99	Decommissioning Phase	Chapter 15 Section 15.3.3.2.5	The wind turbines proposed as part of the Proposed Wind Farm are expected to have a lifespan of approximately 35 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Wind Farm will be decommissioned fully as described in Chapter 4 and the accompanying decommissioning plan in Appendix 4-6. It is not intended that the Proposed 110kV Underground Cabling will be removed at the end of the useful life of the Proposed Wind Farm. By the time the decommissioning of the Proposed Wind Farm is to be considered, the Proposed 110kV Substation and Proposed 110kV Underground Cabling will likely form an integral part of the local electricity network. Therefore, it is intended that the Proposed Grid Connection (including the proposed new access and maintenance tracks) will be retained as permanent structures and will not be decommissioned. The works required during the decommissioning phase are described in Section 4.10 in Chapter 4 of this EIAR. Any impact and consequential effect that occurs during the decommissioning phase will be similar to that which occurs during the construction phase, however to a lesser extent. Based on the assessment outlined in Section 15.3.3.2, there will be no significant effects on existing and built services, or waste management as part of the decommissioning phase		
Chapter 16 Major Accidents & Natural Disasters					

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM100	Mitigation Measures During Construction, Operation and Decommissioning	Chapter 16 Section 16.4.3	The Proposed Project will be designed and built in line with current best practice and, as such, mitigation against the risk of major accidents and/or disasters will be embedded through the design. In accordance with the provision of the European Commission "*Guidance on the preparation of Environmental Impact Assessment Reports*"[8], a Risk Management Plan (RMP) will be prepared and implemented on the Site to ensure an effective response to disasters or the risk of accidents. The RMP will include sufficient preparedness and emergency planning measures		
MM101	Contamination Events	Chapter 16 Section 16.4.3.1	Potential effects associated with contamination during construction, operation and decommissioning are addressed fully in in Section 8.5 of Chapter 8: Land, Soils and Geology and Section 9.5 of Chapter 9: Hydrology & Hydrogeology. The mitigation measures outlined in Chapter 8 and Chapter 9 to protect environmental receptors as well as the procedures and measures described in the CEMP will ensure that the risk from these sources is low. A CEMP has been prepared for the Proposed Project and is included in Appendix 4-3 of this EIAR. The above Major Accidents and Natural Disaster Risk Assessment forms the basis of the Emergency Response Plan (ERP) which is contained within the CEMP. Upon a grant of planning permission for the Proposed Project, the CEMP will be updated to reflect the conditions stipulated in the consent prior to the commencement of the development. The CEMP will be a live document, maintained by the contractor, that will work to ensure that potential risks of major accident and/or disaster are identified, avoided and mitigated, as necessary. Refer to Appendix 4-3 for the CEMP that sets out the minimum standards to be employed by the contractor.		

[8] *European Commission, 2017. Guidance on the preparation of Environmental Impact Assessment Reports. Available at: https://op.europa.eu/en/publication-detail/-/publication/2b399830-cb4b-11e7-a5d5-01aa75ed71a1*

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM102	Major Fire	Chapter 16 Section 16.4.3.2	The Proposed Project will also be subject to a fire safety risk assessment in accordance with Chapter 19 of the Safety, Health and Welfare at Work Acts 2005 to 2021, which will assist in the identification of any major risks of fire on the Site, and mitigation of the same during construction, operation and decommissioning. The ERP includes hazard identification procedures and mitigation measures which the site Supervisor/Construction Manager will carry out in case of a fire/explosion at the Site. Refer to Appendix 4-3 for an outline CEMP that sets out the minimum standards to be employed by the contractor. Appendix 4-4 of the EIAR details the Fire Risk Management and Emergency Response Plan in relation to the Proposed Project. The Plan has been developed in relation to the effects on the environment and health and safety of the BESS following a fire emergency. The report outlines the mitigation design, procedures and actions to protect lives and safety of site and emergency services personnel, the protection of the environment, minimisation of damage and disruption and the return to normal operations. The report states the design factors which contribute to reducing the escalation in the severity of a potential incident, facilities for the emergency services and the safeguarding of the environment through fire water retention.		
MM103	Karst Risk	Chapter 16 Section 16.4.3.3	The potential risk associated with ground instability subsidence and localised ground collapse during the construction phase is addressed fully in in Section 8.5 of Chapter 8: Land, Soils and Geology and Section 9.5 of Chapter 9 Hydrology & Hydrogeology. The mitigation measures outlined in Chapter 8 and Chapter 9 to protect environmental receptors as well as the procedures and measures described in the Karst Assessment Report (Appendix 8-3) will ensure that the residual effect is considered negative, imperceptible to slight, direct, long term, unlikely effect. A Karst Risk Assessment has been prepared for the Proposed Project and is included in Appendix 8-3 of this EIAR. A Karst Protocol has been developed and will be implemented during the construction phase to ensure that any potential karst features encountered are appropriately identified, investigated and mitigated. The protocol includes geotechnical supervision, inspection of excavation formation levels, additional ground investigations where		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			required, and the implementation of suitable engineering solutions to ensure ground stability. Subject to the implementation of these measures, the risk of ground instability or localised collapse affecting the Proposed Project during the construction phase is considered to be low. Refer to the Karst Assessment Report in Appendix 8-3 for further details on the assessment, proposed mitigation measures and Karst Protocol.		

8. MONITORING PROPOSALS

All monitoring proposals relating to the pre-commencement, construction and operational phases of the Proposed Project are set out in various sections of the EIAR, NIS and Biodiversity Enhancement and Management Plan prepared as part of the planning application to An Coimisiún Pleanála (ACP).

This section of the Construction and Environment Management Plan groups together all of the monitoring proposals presented in the EIAR. The monitoring proposals are presented in the following pages. The monitoring proposals are also outlined within Chapter 18: Schedule of Mitigation and Monitoring Measures. Decommissioning Phase monitoring measures are not included in the table below, however, can be viewed in Appendix 4-6 (Decommissioning Plan) of this EIAR.

By presenting the monitoring proposals in the below format, it is intended to provide an easy to audit list that can be reviewed and reported on during the future phases of the Proposed Project. The tabular format in which the below information is presented, can be further expanded upon during the course of future project phases to provide a reporting template for site compliance audits

Table 8-1 Proposed Monitoring Measures

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
Chapter 4 Description of the Proposed Project						
MX1	Drainage Maintenance	Ch. 4: Description of the Proposed Project, 9 Appendix 4-3 CEMP Section 3,4 Appendix 4-5: Surface Water Management Plan	› Prior to commencement of works in sub-catchments across the site, main drain inspections will be competed to ensure ditches and streams are free from debris and blockages that may impede drainage. It is proposed to complete these inspections on a catchment-by-catchment basis as the construction works develop across the site, as works in all areas will not commence simultaneously. › Drainage and associated pollution control measures will be implemented on-site before the main construction works commence. Where possible drainage controls will be installed during seasonally dry ground conditions. This will reduce the possibility of impact on surface waters by suspended sediment released during construction and entrained in surface run-off. › The routes of any natural drainage features will not be altered as part of the Proposed Project. Turbine locations have been selected to avoid natural watercourses. It is proposed that 3 no. new clear span watercourse crossings are required within the Proposed Wind Farm site. › There will be no direct discharges to natural watercourses. All discharges from the proposed works areas or from interceptor drains will be made over vegetated ground at an appropriate distance from natural watercourse and lakes. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Project and are indicated on the drainage design drawings.	On going	Monthly	Project Hydrologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			› Where artificial drains are currently in place in the vicinity of proposed works areas, these drains may have to be diverted around the proposed works areas to minimise the amount of water in the vicinity of works areas. Where it may not be possible to divert artificial drains around proposed work areas, the drains will be blocked to ensure sediment laden water from the works areas has no direct route to other watercourses. Where drains have to be blocked, the blocking will only take place after an alternative drainage system to handle the same water has been put in place. › Existing artificial drains in the vicinity of existing site roads will be maintained in their present location where possible. If it is expected that these artificial drains will receive drainage water from works areas, check dams will be added (as specified below) to control flows and sediment loads in these existing artificial drains. If road widening or improvement works are necessary along the existing roads, where possible, the works will take place on the opposite side of the road to the drain.			
MX2	Surface Water Management Plan	Appendix 4-5: Surface Water Management Plan Ch. 9: Hydrology & Hydrogeology	› Water quality field testing and laboratory analysis will be undertaken prior to commencement of felling and construction at the Site. › Analysis will be for a range of parameters with relevant regulatory limits along with Environmental Quality Standard's (EQSs) and sampling will be undertaken for each stream that drains from the construction site. › Baseline sampling will be completed on at least two occasions, and these will coincide with low flow and high flow stream conditions. The high flow sampling event will be undertaken after a period of	As required	As required	Project Hydrologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			sustained rainfall, and the low flow event will be undertaken after a dry spell. › There is an existing drainage network across the Site and runoff drains relatively freely to local watercourses and streams. This existing drainage system will continue to function as it is during the pre-construction phase. › However, prior to commencement of works in sub-catchments across the Site, main drain inspections will be completed to ensure ditches and streams are free from debris and blockages that may impede drainage. These inspections will be done on a catchment-by-catchment basis as the construction works develop across the Site, as works in all areas will not commence simultaneously.			
MX3	Environmental Management	Appendix 4-3 CEMP Section 4	› The Project Developer will be required to engage a qualified Environmental Engineer, Environmental Scientist, or equivalent, with experience in wind farm construction to fulfil the role of Environmental Clerk of Works (ECoW) to oversee the construction works and audit the implementation of the CEMP. The ECoW will report to the Project Developer and Project Contractor but will liaise closely with the Construction Manager in relation to the Project Contractor's day-to-day implementation of the CEMP on site. › The Environmental Clerk of Works (ECoW) will be nominated by the Project Developer to oversee the Project Contractor's effective implementation of the Proposed Project's environmental requirements and obligations, as captured in the CEMP. The ECoW will be responsible for monitoring the works of the Project Contractor from an environmental perspective on behalf of the Project Developer. For the sake of expediency, the ECoW will report their ongoing audit	As required	As required	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			findings, monitoring results and site observations to both the Project Developer and the Proposed Contractor, having been nominated by the developer to fulfil the role. › The level, detail and frequency of reporting expected from the ECoW for the Construction Manager, Developer's Project Manager, and any Authorities or other Agencies, will be agreed by all parties prior to commencement of construction, and may be further adjusted as required during the course of the Proposed Project.			
MX4	Decommissioning	Appendix 4-6	As noted in the Scottish Natural Heritage report (SNH) *Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms* (SNH, 2013) reinstatement proposals for a wind farm are made approximately 30 years in advance, so within the lifespan of the wind farm, technological advances and preferred approaches to reinstatement are likely to change. According to the SNH guidance, it is therefore: *"best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the wind farm".* In this regard, the Decommissioning Plan (DP) (Appendix 4-7) will be reviewed and updated prior to commencement of decommissioning works to take account of the relevant conditions of the planning permission and current health and safety standards.	End of Operational Life	As Required	Developer Appointed/ Contractor
MX5	Decommissioning	Appendix 4-6	› The ECoW will maintain responsibility for monitoring the decommissioning works and Contractors/Sub-contractors from an environmental perspective. The ECoW will act as the regulatory interface on environmental matters. The Site Manager will be	End of Operational Life	As Required	Site Manager/ ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			responsible for reporting to and liaising with Kilkenny County Council and other statutory bodies as required.			
MX6	Decommissioning	Appendix 4-6	› The Site Manager in consultation with the ECoW will be responsible for employing the services of a suitably qualified ecologist and any other suitably qualified professionals as required throughout the decommissioning works.	End of Operational Life	As Required	Site Manager/ ECoW
MX7	Decommissioning	Appendix 4-6	› Prior to decommissioning, a suitably qualified ecologist will complete an invasive species survey of the site to identify invasive species where any minor excavation will be required. If present in these areas, the ecologist will propose suitable management measures.	End of Operational Life	As Required	Project Ecologist
MX8	Health and Safety	Appendix 4-6	› Report on site activities to include but not limited to information on accidents and incidents, disciplinary action taken and PPE compliance; › Monitor the compliance of contractors and others and take corrective action where necessary; and › Notify the Authority and the client of non-compliance with any written directions issued.	End of Operational Life	As Required	PSCS
Chapter 5: Population and Human Health						
MX9	Noise and Vibration	Chapter 5: Section 5.10.2.2.4	› Monitoring typical levels of noise and vibration during critical periods and at sensitive locations;	As required	As required	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX10	Health and Safety	Chapter 5: Section 5.10.3.2.1	› Staff associated with the project will conduct frequent visits, which will include inspections to establish whether any signs have been defaced, removed, faded, or are becoming hidden by vegetation or foliage, with prompt action taken as necessary › The Proposed 110kV Substation, which will be operated by EirGrid/ESBN will be locked and fenced off from public access. The Proposed 110kV Substation will be operational remotely and manually 24 hours per day, 7 days a week. Supervisory operational and monitoring activities will be carried out remotely using a Supervisory Control and Data Acquisition (SCADA) system, with the aid of computers connected via a telephone modem link.	As required	As required	ECoW
MX11	Shadow Flicker	Chapter 5: 5.10.3.2.7	› Should shadow flicker associated with the Proposed Wind Farm be perceived to cause nuisance at any home, the affected homeowner is invited to engage with the Wind Farm operator. Should a complaint or query in relation to shadow flicker be received within 12 months of commissioning of the Proposed Wind Farm, field investigation/monitoring will be carried out by the wind farm operator at the affected property. The homeowner will be asked to log the date, time and duration of shadow flicker events occurring on at least five different days. The provided log will be compared with the predicted occurrence of shadow flicker at the residence, and if necessary, a field investigation will be carried out. Likewise, the Proposed Project can be brought in line with the requirements of the Draft 2019 Guidelines (DoHPLG, 2019) should they be adopted during the planning application process for this development	As required	As required	CLO

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
Chapter 6: Biodiversity						
Operational Phase						
MX12	Bats	Ch. 6: Biodiversity Appendix 6-2	**<u>Operational Monitoring</u>** A programme of post-construction monitoring (PCM) will be implemented to assess the effects of the Proposed Wind Farm on bat activity and collision mortality, and to evaluate the effectiveness of the mitigation measures described above, including blade feathering and site-specific curtailment. The primary objective of the monitoring programme is to evaluate the effectiveness of the mitigation strategy and to ensure that the Favourable Conservation Status of local bat populations is maintained, as required under Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). The monitoring programme has been designed in accordance with NatureScot (2021), NIEA (2021) and BCI (2026) guidance and will follow an adaptive management approach. In accordance with NatureScot (2021) and BCI (2026), PCM will comprise two integrated components: › Fatality monitoring (carcass searches) to quantify collision mortality; and	As required	As required	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			Acoustic monitoring to assess bat activity patterns and potential displacement or attraction effects.			
Chapter 7: Ornithology						
Pre-Construction Phase						
MX13	Proposed Wind Farm site	Appendix 7-7	It is proposed that construction works at the Proposed Wind Farm site will commence outside the bird nesting season (1st of March to 31st of August inclusive) to avoid the most sensitive time of the year for most bird species with the potential to use the Site and its environs. Pre-commencement confirmatory surveys will be undertaken prior to the initiation of works at the Proposed Wind Farm site. This survey will be conducted a maximum of three weeks before the commencement of works. Following commencement, construction phase surveys will be conducted during works. These surveys will be conducted once per month during the breeding season (April to July) and once at the start of the winter season (October). These surveys will continue to be conducted each season for the duration of the construction period. The aim of the pre-commencement and construction phase surveys is to identify sensitive sites (e.g., nests or roosts) in proximity to works. The surveys will be undertaken by a suitably qualified ornithologist. The survey will include a thorough walkover survey to a 500m radius of the development footprint and/or all works areas. If winter roosts or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the	Once	As required	Project Ornithologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			first winter or breeding season of the construction phase. If the roost/nest is found to be active during the construction phase works will cease within a species-specific buffer of this location in line with best practice guidance (e.g., Forestry Commission Scotland, 2006; Goodship and Furness 2022; Ruddock and Whitfield, 2007). No works shall be permitted within the buffer until it can be demonstrated that the roost or nest is no longer occupied. All site staff and subcontractors will be made aware of any restrictions to be imposed by means of a toolbox talk and a map of the 'no-work zone' will be made available to all construction staff. The restricted area will also be marked off to alert all personnel on site to the suspension of works within that area			
MX14	Proposed 110kV Underground Cabling crossing of the River Nore	Appendix 7-7	It is proposed that construction works at the Proposed 110kV Underground Cabling crossing of the River Nore will be conducted outside the kingfisher core nesting season (April to July inclusive), as described in Section 7.6.3 of Chapter 7 of the EIAR. In addition, targeted kingfisher surveys will be undertaken at the Proposed 110kV Underground Cabling crossing of the River Nore if the works are to commence here between February and September. This precautionary period accounts for early courtship and the potential for multiple/late broods. The survey will be conducted a maximum of two weeks before the commencement of works at the River Nore, and preferably within one week if possible. Surveys will follow the transect routes established during the pre-planning surveys. The aim is to establish if active nesting is occurring or if the surrounding river corridor is being utilised for foraging by adults provisioning dependent young. The surveys will be undertaken by a suitably qualified ornithologist. If a kingfisher breeding site is identified, works will cease within a species-	Once	As required	Project Ornithologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			specific buffer of this location in line with current best practice guidance (e.g., NatureScot, 2022). No works shall be permitted within the buffer until it can be demonstrated that the nest is no longer occupied. The ornithologist will also monitor foraging routes of the breeding kingfisher and if works are found to interfere with adults provisioning dependent young, works will cease within a species-specific buffer of foraging routes until it can be demonstrated that the nest is no longer occupied			
Construction Phase						
MX15	Ornithology	EIAR Chapter 7	› Targeted kingfisher surveys will be undertaken at the Proposed 110kV Underground Cabling crossing of the River Nore if the works are to commence here between February and September.	Once	As required	Project Ornithologist
Operational Phase						
MX16	Ornithology	EIAR Chapter 7	› Vantage point surveys will be undertaken to monitor flight activity within a 500m radius of the Proposed Turbines. › Breeding raptor surveys will be undertaken to establish whether a raptor breeding attempt was initiated and subsequently, whether it was successful. › Breeding woodcock surveys will be undertaken to monitor breeding woodcock activity during the operational phase. › Carcass searches for bird casualties shall be conducted at each turbine.	As required	As required	Project Ornithologist
MX17	Vantage Point Surveys	Appendix 7-7 Section 2.2.1	Vantage point surveys will be undertaken to monitor flight activity within a 500m radius of the Proposed Turbines. The objective of the surveys is to provide information on bird use of the area and interactions with turbines	As required	As required	Project Ornithologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			after construction of the Proposed Wind Farm that can be compared to pre-planning data. Vantage point surveys will be conducted from four fixed locations that were used during pre-planning surveys (VP1, VP2, VP4, and VP5) in order to provide complete coverage of all Proposed Turbines. Should vantage point locations need to be moved, a viewshed analysis will be conducted to ensure there is still comprehensive coverage of the 500m radius of Proposed Turbines at the new locations. Surveys will be conducted monthly. Survey methodology should follow NatureScot (2025) and any revisions to the same. Behavioural categories for the observation of bird interactions with operational wind farms will be in line with terminology outlined by Meredith *et al.,* (2002). The surveyor should collect data on bird observations and flight activity from the scanning arc of 180° to a 2km radius at the fixed vantage point locations for two 3-hour watches separated by a minimum 30-minute break (i.e., 6 hours total) per month. Surveys should be spread over the full daylight period, including dawn and dusk watches to coincide with the highest periods of bird activity. Flight activity of target species will be mapped and recorded as per three defined flight bands chosen in relation to the dimensions of the turbines as built: below rotor swept height, at the rotor swept height and above rotor swept height, in this case 0-22m, 22-185m, and 185+m. When a target species is detected, the location of the bird will be recorded on a map and the surveyor will provide the following details: time, species, number of birds, activity/behaviour, the primary habitat used (and secondary and tertiary habitat if applicable) and any other notes of interest			

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX18	Breeding Raptor Surveys	Appendix 7-7 Section 2.2.2	Breeding raptor surveys will be undertaken to establish whether a raptor breeding attempt was initiated and subsequently, whether it was successful. The objective of the surveys is to provide information on the raptor (in particular KOR species) use of the area for breeding after construction of the Proposed Wind Farm that can be compared to their breeding activity in pre-planning data. Surveys should be conducted at the territories with nest sites identified within 500m of the Proposed Wind Farm site during pre-planning surveys in each monitoring year, or at additional locations if it is believed that the raptor nest may have moved to a new location within 500m of the Proposed Wind Farm site. Surveys should be undertaken from April to July inclusive and from at least four breeding raptor vantage points. Survey methods should follow Hardey *et al.* (2013) or any revisions to the same or updated guidance. Up to four visits are necessary: (1) to establish occupancy, (2), to establish if an active nest is present, (3) to check if young have hatched and (4) to check if young have fledged. During any visit, when a raptor is detected, the location of the bird will be recorded on a map and the following details will be recorded: time, species, number of birds, breeding activity/behaviour, the primary habitat used (secondary and tertiary habitat if applicable) and any other notes of interest (such as male or female.	As required	As required	Project Ornithologist
MX19	Breeding Woodcock Surveys	Appendix 7-7 Section 2.2.3	Breeding woodcock surveys will be undertaken to monitor breeding woodcock activity during the operational phase. Survey methods should follow Gilbert et al. (1998) or any revisions to the same or updated guidance. Three visits should be undertaken in May and June inclusive. Surveys should be undertaken from one hour before sunset to one hour after sunset or until it is too dark to see. The same transect routes (or as close as possible)) as those used during preplanning surveys should be	As required	As required	Project Ornithologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			followed to provide comparable data. All woodcock activity, in particular breeding behaviour, should be recorded			
MX20	Breeding Kingfisher Surveys	Appendix 7-7 Section 2.2.4	Breeding kingfisher surveys will be undertaken in the first year of the operational lifetime of the River Nore underground cable crossing. This is to establish that kingfisher continue to breed along the watercourse post-construction. If potential breeding kingfisher are found to be utilising the river in Year 1 there is no requirement for further surveys. If potential breeding kingfisher are not found to be utilising the river, surveys are to be undertaken in the subsequent monitoring year, and so forth. Three survey visits should be undertaken between March and May, following the same transects routes as the pre-planning surveys. Survey methodology follows Cummins et al. (2010), and are to take place between 08:00 and 18:00, the surveyor should walk as close as is safe to the watercourse searching for kingfisher, signs of kingfisher nesting holes, and suitable kingfisher nesting habitat.	As required	As required	Project Ornithologist
MX21	Collision Monitoring	Appendix 7-7 Section 2.2.5	Carcass searches for bird casualties as a result of collision with turbines will follow survey methods broadly based on guidelines issued by the SNH (2009) and search methods adopted by Duffy and Steward (2008). The study area will be visited once per month during operational Years 1, 2, 3, 5, 10 and 15 of the lifetime of the Proposed Wind Farm. During each visit, the base of each operating turbine will be searched for bird carcasses. The area to be searched will be based on the turbine size and surrounding landscape. A trained dog and handler should be used to locate carcasses. If a bird carcass is found, the following details will be recorded: GPS location of each bird carcass, photographic record, carcass condition (intact - carcass that is completely intact or not badly composed; scavenged - evidence that the carcass was fed upon by a scavenger/predator; or feather spot - ten or more feathers indicating predation or scavenging or two or	As required	As required	Project Ornithologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			more primary feathers must be present to consider the carcass a casualty), distance from the turbine, date and time. Carcass removal trials and searcher efficiency trials will be undertaken to account for the ability of the dog to find bird carcasses and the likelihood of scavenging of carcasses by animals. This is done to ensure a more accurate estimation of the total number of collision victims. During carcass removal trials, a carcass is placed in a study area periodically and is monitored for a set number of days or until scavengers remove the carcass. A determination on carcass removal is made when no body parts containing flesh or bone or >10 disarticulated feathers can be found. During searcher efficiency trials, a number of carcasses are placed in a study area by one worker, then searched for by the dog later. The result of these trials is a correction factor that can be applied to the results of the carcass searches			
Decommissioning Phase						
MX22	Decommissioning Monitoring	Appendix 7-7 Section 2.3	An appropriate decommissioning plan will be prepared in advance of the decommissioning of the Proposed Turbines. This plan will include the measures proposed for the construction monitoring (Section 2.1 of Appendix 7-7) and will be developed in consultation with the Planning Authority and the NPWS. The aim of the plan will be to identify and protect sensitive nests, roosts or other key areas in proximity to decommissioning works. The requirements of the plan will be informed by the findings of the operational monitoring, along with the findings of other relevant ornithological surveys conducted in the interim where available. Methodologies should follow the current best practice guidance at the time the plan is prepared.	As required	As required	Project Ornithologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			Chapter 8 Land, Soils & Geology			
MX23	Biodiversity Enhancement and Management Plan (BEMP)	Chapter 8 Section 8.5.2.7	A site-specific monitoring and evaluation programme will be implemented to ensure that the success of the proposed measures remains long-term. It will also assist in situations where the habitat establishment may not have been successful by providing evidence of shortcomings, allowing a revised management plan to be formulated. Monitoring results will be reported by the Project Ecologist within an Annual Environmental Report. Reports detailing the monitoring works carried out, the results obtained and a review of their success, along with any suggestions for amendments to the plan will be prepared. The enhancement plan will be updated and amended where required to improve the efficacy of the enhancement work	As required	As required	ECoW
			Chapter 9 Hydrology & Hydrogeology			
			Construction Phase			
MX24	Clear Felling of Coniferous Plantation and Potential Surface Water Quality Effects	Chapter 9 Section 9.5.2.2	**Surface Water Quality Monitoring**: Sampling will be completed before, during (if the operation is conducted over a protracted time) and after the felling activity. The 'before' sampling will be conducted within 4 weeks of the felling activity commencing, preferably in medium to high water flow conditions. The "during" sampling will be undertaken once a week or after rainfall events. The 'after' sampling will comprise as many samplings as necessary to demonstrate that water quality has returned to pre-activity status (i.e., where an impact has been shown).	As Required	As Required	Project Hydrologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			Criteria for the selection of water sampling points include the following: › Avoid man-made ditches and drains, or watercourses that do not have year-round flows, i.e. avoid ephemeral ditches, drains or watercourses; › Select sampling points upstream and downstream of the forestry activities; › It is advantageous if the upstream location is outside/above the forest in order to evaluate the impact of land-uses other than forestry; › Where possible, downstream locations will be selected: one immediately below the forestry activity, the second at exit from the forest, and the third some distance from the second (this allows demonstration of no impact through dilution effect or contamination by other land-uses where impact increases at third downstream location relative to second downstream location); and, › The above sampling strategy will be undertaken for all on-site sub-catchments streams where tree felling is proposed. Also, daily surface water monitoring forms will also be utilised at every works site near any watercourse. These will be taken daily and kept on site for record and inspection			
MX25	Earthworks (Removal of Vegetation Cover, Excavations and Stock Piling) Resulting in	Chapter 9: Section 9.5.2.3	**Monitoring:** An inspection and maintenance plan for the on-site construction drainage system will be prepared in advance of commencement of any works. Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is	On-going	As Required	Project Hydrologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
	Suspended Solids Entrainment in Surface Waters		no build-up of standing water in parts of the systems where it is not intended. Inspections will also be undertaken after tree felling. Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. Checks will be carried out on a daily basis. During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for each primary watercourse and specifically following heavy rainfall events (as per the CEMP is included in Appendix 4-3 of this EIAR).			
MX26	Excavation Dewatering and Potential Impacts on Surface Water Quality	Chapter 9 Section 9.5.2.5	Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work will immediately be stopped and a geotechnical assessment undertaken	Daily	Monthly	Project Hydrologist
MX27	Use of Siltbuster and Impacts on Downstream Surface Water Quality	Chapter 9 Section 9.5.2.14	Continued monitoring and water analysis of pre and post treated water by means of an inhouse lab and dedicated staff, means the correct amount of chemical is added by the dosing system	On-going	Monthly	Project Hydrologist
MX28	Potential Surface Water Quality Effects of the Proposed Grid Connection Earthworks and Watercourse Crossings	Chapter 9 Section 9.5.2.15	The drilling process / pressure will be constantly monitored to detect any possible leaks or breakouts into the surrounding geology or local watercourse; This will be gauged by observation and by monitoring the pumping rates and pressures. If any signs of breakout occur, then drilling will be immediately stopped;	On-going	Monthly	Project Hydrologist
MX29	Biodiversity Enhancement and Management Plan	Chapter 9	A site-specific monitoring and evaluation programme will be implemented to ensure that the success of the proposed measures remains long-term. It will also assist in situations where the habitat establishment may not have	As required	As required	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
		Section 9.5.2.16	been successful by providing evidence of shortcomings, allowing a revised management plan to be formulated. Monitoring results will be reported by the Project Ecologist within an Annual Environmental Report. Reports detailing the monitoring works carried out, the results obtained and a review of their success, along with any suggestions for amendments to the plan will be prepared. The enhancement plan will be updated and amended where required to improve the efficacy of the enhancement work			
Chapter 10: Air Quality						
Construction Phase						
MX30	Dust Emissions	Chapter 10 Section 10.3.2.3	Sporadic wetting of loose stone surface will be carried out during the construction phase to minimise movement of dust particles to the air. In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff	As required	As required	ECoW
Chapter 12 Noise & Vibration						
Operational Phase						
MX31	Mitigation during Operation	Chapter 12 Section 12.7.2	› A community liaison officer will be appointed prior to first generation of electricity and contact details made publicly available; › Any complaint relating to noise can be reported to the community liaison officer, who will undertake an initial	As Required	As Required	CLO

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			screening of the complaint (review of logs submitted, review of wind conditions and turbine data etc.) and speak to the complainant in person, with an eventual visit to the complainant location if possible; › Following initial screening, the community liaison officer will be responsible for commissioning a detailed noise complaint investigation. This will include appointing a qualified acoustic consultant to undertake noise measurements at the complaint location and quantify the occurrence and depth (in dB) of OAM for every 10 minutes of the measurement campaign. The measured 10-minute noise levels and OAM depth will also be correlated with 10-minute wind conditions and operational data to find patterns and potential character penalties in accordance with good practice at the time of the assessment; and, › If frequent and sustained OAM is found, then appropriate mitigation will be designed and implemented and the complainant informed by the community liaison officer. Mitigation measures considered will include changes to the operation of the relevant wind turbine(s) by changing software parameters such as blade pitch for specific wind conditions and time periods, addition of blade furniture (such as vortex generators) to alter the flow of air over the wind turbine blades; and, in extreme cases, targeted wind turbine shutdowns in specific conditions.			

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
Chapter 14 Cultural Heritage						
Construction Phase						
MX32	Sub-surface Archaeological Potential	Chapter 14 Section 14.4.3.5	› Archaeological monitoring under licence from the NMS of any geotechnical / engineering trial pits or investigations shall be carried out by a suitably qualified archaeologist. A report detailing the results of the monitoring shall be compiled on completion of the work and submitted to the NMS and Planning Authority/Body. › Archaeological monitoring of ground works during the construction stage of the Proposed Project under licence from the NMS shall be carried out by a suitably qualified archaeologist. Should archaeological finds, structures or deposits be uncovered as a result of the monitoring further mitigation measures such as preservation in situ or preservation by record (excavation) may be required and will be decided in consultation with the NMS. Such mitigation measures will be implemented where relevant following consultation with the NMS. A report detailing the results of the monitoring and/or any further necessary mitigation as referred to above will be compiled on completion of the work and submitted to the NMS and Planning Authority/Body.	On-going	As Required	Project Archaeologist
Chapter 16 Major Accidents & Natural Disasters						

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
Construction Phase						
MX33	Monitoring During Construction	Chapter 16 Section 16.4.5.1	The CEMP will be prepared/revised prior to the commencement of any works and will be a live document maintained by the contractor that will work to ensure that potential risks of major accident and/or disaster are identified, avoided and mitigated, as necessary. Refer to Appendix 4-3 for the CEMP that sets out the minimum standards to be employed by the contractor	As required	As required	ECoW
MX34	Monitoring During Operation	Chapter 16 Section 16.4.5.2	The operator of the Proposed Project will continue to assess the risk of major accidents and/or disasters on site on an ongoing basis during operation. The maintenance programme, record of reported incidents, as well as general site activities will be monitored on an ongoing basis to ensure risk of major accidents does not increase over time.	As required	As required	ECoW
MX35	Monitoring During Decommissioning	Chapter 16 Section 16.4.5.3	A Decommissioning Plan has been prepared (Appendix 4-6) the detail of which will be agreed with the local authority prior to any decommissioning. The Decommissioning Plan will be updated before the end of the 35-year operational period of the Proposed Wind Farm, in line with best practice decommissioning methodologies that are in place at the time of decommissioning and will be agreed with the competent authority prior to implementation. The Decommissioning Plan includes mitigation and monitoring measures that will be in place during the decommissioning phase. These can also be found in a Chapter 18: Schedule of Mitigation and Monitoring Measures which sets out all proposed Mitigation and Monitoring Measures for all three phases of the Proposed Project.	As required	As required	ECoW

9. PROGRAMME OF WORKS

9.1 Construction Schedule

The construction phase will take approximately 18-24 months to complete from starting on site to the commissioning of the electrical system and export of electricity from site.

The EIAR stipulates that in the interest of breeding birds, construction will not commence during the breeding bird season, which runs from April to July. The EIAR stipulates that construction may commence between August to the end of March, so that construction activities are ongoing by the time the next breeding bird season comes around and can continue throughout the next breeding season.

Works during the construction phase of the development, including delivery of construction materials will generally take place between 7 a.m. and 7 p.m. daily Monday to Friday and 7 a.m. and 1 p.m. on Saturday with large concrete pours requiring an earlier start when deemed necessary. Delivery of abnormal loads such as turbine tower sections and blades will take place at night outside of peak traffic hours.

The phasing and scheduling main construction task items are outlined in Figure 9-1 below.

		Year 1				Year 2			
ID	Task Name	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Site Health and Safety								
2	Grid Connection								
3	Site Compounds								
4	Site Roads								
5	Substation and Electrical Works								
6	Turbine Hardstands								
7	Turbine Foundations								
8	Backfilling and Landscaping								
9	Turbine Delivery and Erection								
10	Substation Commissioning								
11	Turbine Commissioning								

Figure 9-1 Indicative Construction Schedule

10. COMPLIANCE AND REVIEW

10.1 Site Inspections and Environmental Audits

Routine inspections of construction activities will be carried out on a daily and weekly basis by the ECoW and the Site Supervisor/Construction Manager to ensure all controls to prevent environmental impact, relevant to the construction activities taking place at the time, are in place.

Environmental inspections will ensure that the works are undertaken in compliance with this CEMP and all other planning application documents. Only suitably trained staff will undertake environmental site inspections.

10.2 Auditing

An Environmental audit will first be carried out prior to the construction phase of the Proposed Project to ensure the implementation of pre-construction mitigation measures, completion of baseline studies and implementation of pre-construction felling mitigation measures. Further environmental audits will be carried on a monthly basis during the construction phase of the Proposed Project and again after the commissioning of the wind turbines and substation.

In contrast to monitoring and inspection activities, audits are designed to shed light on the underlying causes of non-compliance and not merely detect the non-compliance itself. In addition, audits are the main means by which system and performance improvement opportunities may be identified. Environmental audits will be carried out by the ECoW on behalf of the Project Developer, in an and objective manner. Environmental audits will be conducted at planned intervals to determine whether the CEMP is being properly implemented and maintained. The results of environmental audits will be provided to the Project Developer and Project Contractor.

An audit of compliance with the pre-commencement mitigation measures will be completed by the ECoW prior to the commencement of the construction phase of the Proposed Project. An audit of compliance with the construction phase mitigation measures will be completed monthly during the construction phase. The findings of each audit will be documented by the ECoW within the EMP for the site. The findings of each audit will be made available to Kilkenny County Council on request.

Once the Proposed Project is operational and turbines have been commissioned, a report of compliance with operational phase mitigation measures will be prepared.

10.3 Environmental Compliance

The following definitions shall apply in relation to the classification of Environmental Occurrences during construction of the wind farm:

Environmental Near Miss: An occurrence which if not controlled or due to its nature could lead to an Environmental Incident.

Environmental Incident: Any occurrence which has potential, due to its scale and nature, to migrate from source and have an environmental impact beyond the site boundary.

Environmental Exceedance Event: An environmental exceedance event occurs when monitoring results indicate that limits for a particular environmental parameter (as indicated in the Environmental Monitoring Programme) has been exceeded.

An exceedance will immediately trigger an investigation into the reason for the exceedance occurring and the application of suitable mitigation where necessary.

Exceedance events can be closed out on achieving a monitoring result below the assigned limit for a particular environmental parameter.

Environmental Non-Compliance: Non-fulfilment of a requirement and includes any deviations from established procedures, programs and other arrangements related to the EMP.

10.4 Corrective Action Procedure

A corrective action is implemented to rectify an environmental problem on-site. Corrective actions will be implemented by the Site Supervisor/Construction Manager, as advised by the Site Environmental Clerk of Works. Corrective actions may be required as a result of the following:

- Environmental Audits;
- Environmental Inspections and Reviews;
- Environmental Monitoring;
- Environmental Incidents; and,
- Environmental Complaints.

A Corrective Action Notice will be used to communicate the details of the action required to the main contractor. A Corrective Action Notice is a form that describes the cause and effect of an environmental problem on site and the recommended corrective action that is required. The Corrective Action Notice, when completed, will include details of close out and follow up actions.

If an environmental problem occurs on site that requires immediate attention, direct communications between the Site supervisor/Construction Manager and the Site Environmental Clerk of Works will be conducted. This in turn will be passed down to the site staff involved. A Corrective Action Notice will be completed at a later date.

10.5 Construction Phase Review

The Project Contractor's CEMP will be the subject of review by the ECoW on behalf of the Project Developer whenever a revised version of the CEMP is presented for approval.