APPENDIX 4-3

CONSTRUCTION ENVIRONMENT MANAGEMENT PLAN

1. INTRODUCTION

This Construction and Environmental Management Plan (CEMP) has been developed by MKO on behalf of Buirios Ltd., to accompany an application for planning permission to An Bord Pleanála relating to the construction of a renewable energy development which will comprise 9 No. wind turbines and all associated infrastructure (the Proposed Wind Farm) in the townland of Borrisbeg and adjacent townlands, north of Templemore, County Tipperary. The Proposed Project comprises the Proposed Wind Farm (subject of this Section 37E planning application) and the Proposed Grid Connection (subject to separate planning application under Section 182A of the Planning & Development Act 2000, as amended).

The construction and operation of the Proposed Wind Farm is dependent on the Proposed Grid Connection, as such, both the Proposed Wind Farm and Proposed Grid Connection will be developed simultaneously, therefore the environmental management during the construction of both is considered together in this CEMP as the 'Proposed Project.'

This CEMP has been prepared in conjunction with the Environmental Impact Assessment Report (EIAR) and the Natura Impact Statement ('NIS') which accompany this planning application for the Proposed Wind Farm.

Prior to the commencement of construction of the Proposed Project, the CEMP will be updated, in line with all conditions and obligations which apply to any relevant grant of permission. The CEMP should be read in conjunction with the EIAR 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:

- 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 Construction and Environmental Management Plan

This CEMP is presented as a guidance document for the construction of the Proposed Project in the townland of Borrisbeg and adjacent townlands in Co. Tipperary. The CEMP outlines clearly the mitigation measures and monitoring proposals that are required to be adhered to in order to complete the works in an appropriate manner.

For the purposes of the CEMP:

- The **'Proposed Wind Farm'** refers to the 9 no. turbines and supporting infrastructure which is the subject of this Section 37E application.
- The **'Proposed Grid Connection'** refers to the 110kV substation and supporting infrastructure which will be the subject of a separate Section 182A application.
- The **'Proposed Project'** comprises the Proposed Wind Farm and the Proposed Grid Connection, all of which are located within the EIAR Study Boundary (the '**Site**') and assessed together within this EIAR.

Please see section 1.1.1 of this EIAR for further details. A detailed description of the Proposed Project is provided in Chapter 4 of the EIAR.

The CEMP is divided into nine 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 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.

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:

- Adopt a sustainable approach to construction and, ensure sustainable sources for materials supply where possible;
- Keeping all watercourses free from obstruction and debris;
- 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;
- Correct fuel storage and refuelling procedures to be followed; Air and noise pollution prevention to be implemented;
- Construction Methods and designs will be altered where it is found there is an adverse effect on the environment;
- Good waste management and house-keeping to be implemented;
- Using recycled materials if possible, e.g. excavated stone, soil and subsoil material; Avoidance of vandalism;
- Monitoring of the works and any adverse effects that it may have on the environment and,
- Provide adequate environmental training and awareness for all project personnel.

The key site objectives are as follows:

- Keep impact of construction to a minimum on the local environment, watercourses and wildlife;
- Comply with all relevant water quality legislation;
- Ensure construction works and activities are completed in accordance with mitigation and best practice approach presented in the Environmental Impact Assessment Report (EIAR) and associated planning documentation;
- Ensure construction works and activities are completed in accordance with any planning conditions for the development;
- 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.

2. SITE AND PROPOSED PROJECT DETAILS

2.1.1 Site Location and Description

The Site is located within a rural setting in north Tipperary, approximately 11km south of Roscrea Town and approximately 2.5km northeast of Templemore town centre. The N62 National Road runs north-south along the western boundary of the Proposed Project Site. The site is served by a number of existing agricultural roads and tracks. Existing access is via farm entrances off the N62 to the west, the L-3248 to the north and the L-7039 and L-70391 to the southeast.

The Proposed Grid Connection includes for a permanent onsite 110kV substation, temporary construction compound, c.2km underground cable route connection which will run through the L-7039 road and new track through agricultural land) and end mast towers which break into the existing 110kV Ikerrin to Thurles overhead line.

Landuse within the Site comprises a mix of pastoral agriculture small scale commercial forestry and local roads. The surrounding landuse predominantly comprises pastoral agriculture, commercial and residential (Templemore town) and a national/local road network. 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.

	Project Component	Townlands
Proposed Project Assessed in this EIAR & NIS	Proposed Wind Farm	Borrisbeg Skehanagh, Ballycahill, Clonmore, Eastwood, Knockanroe, Graffin
	Proposed Grid Connection	Clonmore, Strogue

2.2 Description of the Proposed Project

This section of the CEMP describes the Proposed Project (Wind Farm and Grid Connection) and its component parts which are the subject of separate planning applications under Section 37E (Proposed Wind Farm) and Section 182A (Proposed Grid Connection) of the Planning and Development Act 2000, as amended. The current application for planning permission to An Bord Pleanála in accordance with Section 37E of the Planning and Development Act 2000, (as amended) is for the Proposed Wind Farm. The development description for the current planning application for the Proposed wind farm appears in the public notices as follows:

The proposed development will consist of the provision of the following:

i. *9 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 associated foundations and hard-standing areas;*
ii. *A thirty-year operational life of the wind farm from the date of full commissioning of the wind farm and subsequent decommissioning;*
iii. *Underground electrical cabling (33kV) and communications cabling;*
iv. *A temporary construction compound;*
v. *A temporary security cabin;*
vi. *A meteorological mast with a height of 30 metres and associated foundation and hard-standing area;*
vii. *A new gated site entrance on the L3248;*
viii. *Junction accommodation works and a new temporary access road off the L3248, to facilitate turbine delivery to the site;*
ix. *Upgrade of existing site tracks/ roads and provision of new site access roads, junctions and hardstand areas.*
x. *Upgrade of the existing L7039/ L70391 junction for secondary site access off the L70391;*
xi. *A borrow pit;*
xii. *Spoil Management;*
xiii. *Tree felling;*
xiv. *Site Drainage;*
xv. *Biodiversity Enhancement Plan (including restoration of a segment of the Eastwood River, and planting of natural woodland and hedgerow);*
xvi. *Operational Stage site signage; and*
xvii. *All ancillary works and apparatus.*

This application is seeking a ten-year planning permission and 30-year operational life from the date of commissioning of the renewable energy development.

The Proposed Grid Connection, which will be subject to a separate planning application under Section 182A of the Planning and Development Act, 2000 (as amended) is entirely located within the townlands of Strogue and Clonmore, Co. Tipperary, and will consist of the following:

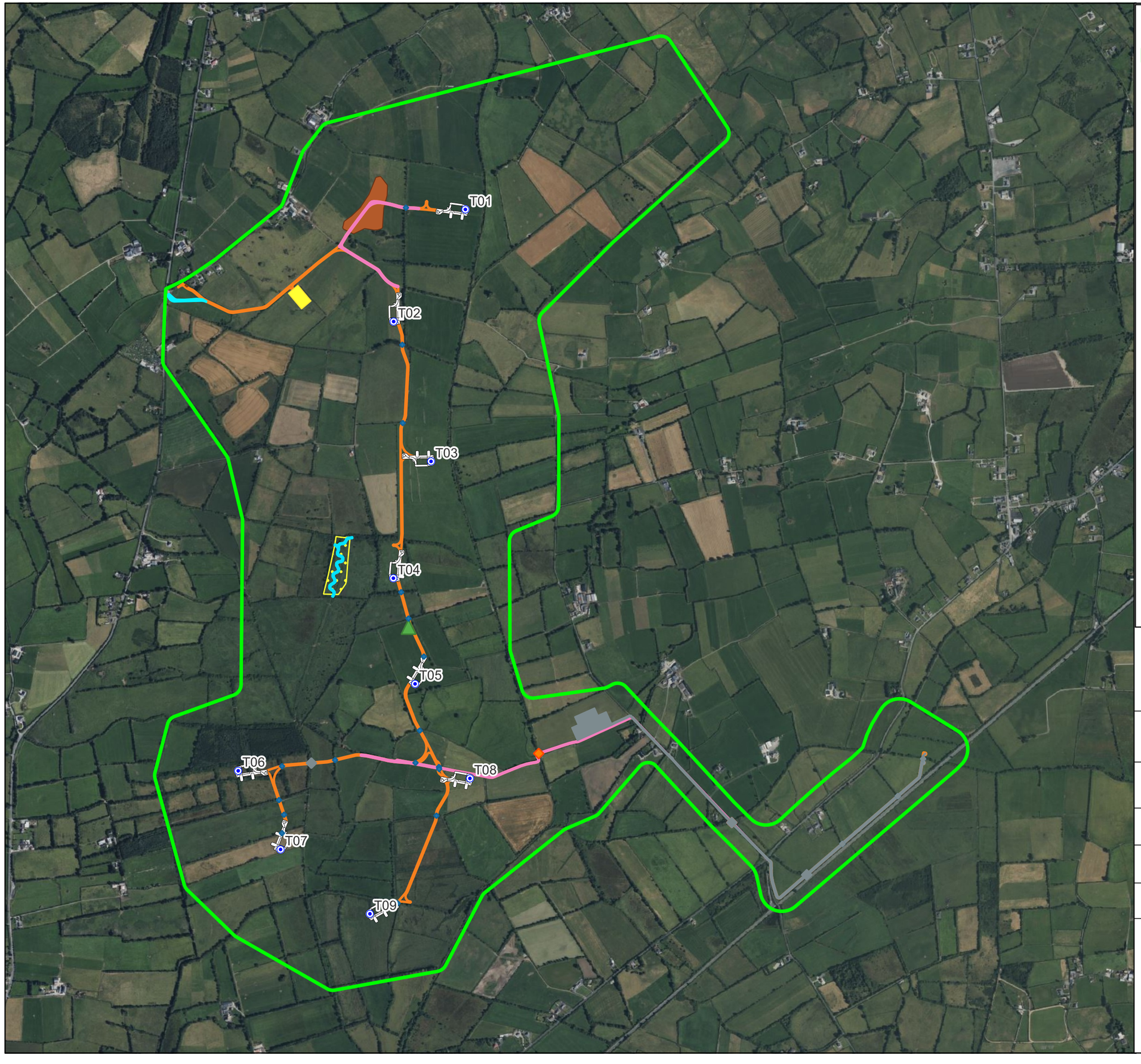
1. *1 no. permanent 110kV substation compound (2 no. control buildings with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, wastewater holding tank, site drainage and all ancillary works);*
2. *a temporary construction compound;*
3. *2km underground 110kV electrical cabling route (including joint bays and watercourse crossings) which will run through the L-7039 road and new track through agricultural land; and*
4. *2 no. new end masts that will break the existing Ikerrin to Thurles 110kV OHL.*

The Proposed Wind Farm makes use of the existing road network insofar as possible. It is proposed to upgrade approximately 930m of existing site roads and tracks and approximately 1.1km of the L-70391 which is within the Site, and to construct approximately 6 kilometres of new access roads. The upgrade of the L-70391 comprises widening of approximately 460m and resurfacing of the entire route. It is estimated that the internal wind farm roads will require resurfacing approx. 3 times during the operational life.

As part of the Proposed Project, tree felling will be required within and around development footprint. Approximately 3.44 hectares of conifer will be felled to accommodate Turbine 9 and its associated infrastructure. Turbine no. 6 is located adjacent private forestry and as a result, felling 0.78 hectares will be required to ensure appropriate setbacks for bat foraging. Please see Appendix 6-2 Bat report for details. Therefore, a total of 4.22 hectares will be felled as part of the Proposed Wind Farm construction. In addition to the commercial forestry felling, segments of hedgerows will require removal to facilitate the construction of wind farms roads and ancillary infrastructure, and to achieve the required Bat foraging buffers from the proposed turbines. Please see Chapter 6 for details.

The Site is illustrated on Figure 2-1 and includes the layout of the Proposed Wind Farm infrastructure alone, the subkect of this planning application. The Proposed Grid Connection Infrastructure alone is illustrated on Figure 2-2 and is suject to a future planning application. Figure 2-3 illustrates both Proposed Project (i.e. the Proposed Wind Farm and Proposed Grid Connection together). All three figures include the Site or EIAR Study Boundary.

Planning application drawings for the Proposed Wind Farm application are provided in Appendix 4-1, while drawings of the proposed Grid Connection which will be subject to a future S182A application are provided in Appendix 4-5 of the EIAR.



Map Legend

- EIAR Study Boundary
- Proposed Turbines
- Proposed Turbine Hardstands
- Proposed Met Mast
- Proposed Temporary Construction Compound
- Proposed Temporary Borrow Pit
- Proposed Temporary Security Cabin
- Existing Roads for Upgrade/ Resurface
- Proposed New Roads
- Proposed Temporary Abnormal Entrance
- Proposed Clear Span Crossing
- HDD Crossings
- Proposed Culverts
- River Enhancement 1.8ha Natural Woodland
- River Enhancement Segment
- Separate 182A Application

Drawing Title
Proposed Wind Farm Design

Project Title
Borrisbeg Renewable Energy Development

Drawn By	Checked By
NS	KM
Project No. 220310	Drawing No. Figure 4-1
Scale 1:16,000	Date 2023-12-07

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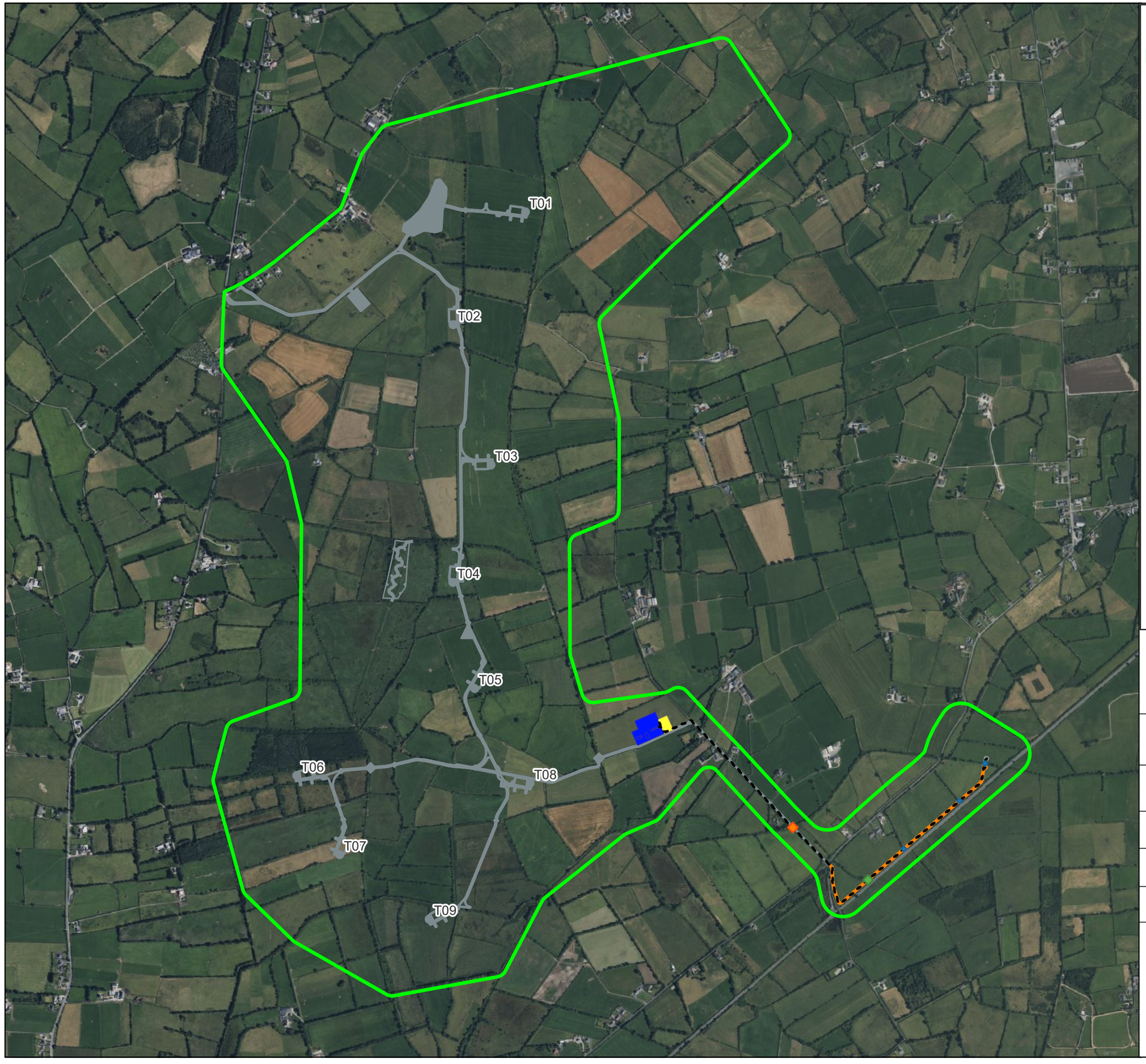

Map Legend

- EIAR Study Boundary
- Proposed Grid Connection Cable Route
- Proposed End Masts
- Proposed New Road for Underground Cable
- Proposed Permanent 110kV Substation
- Temporary Substation Construction Compound
- Proposed Clear Span Crossing
- Proposed HDD Crossing
- Proposed Culverts
- S37 Infrastructure

N

Drawing Title
Proposed Grid Connection Design

Project Title
Borrisbeg Renewable Energy Development

Drawn By	Checked By
NS	KM
Project No. 220310	Drawing No. Figure 4-2
Scale 1:16,000	Date 2023-12-07

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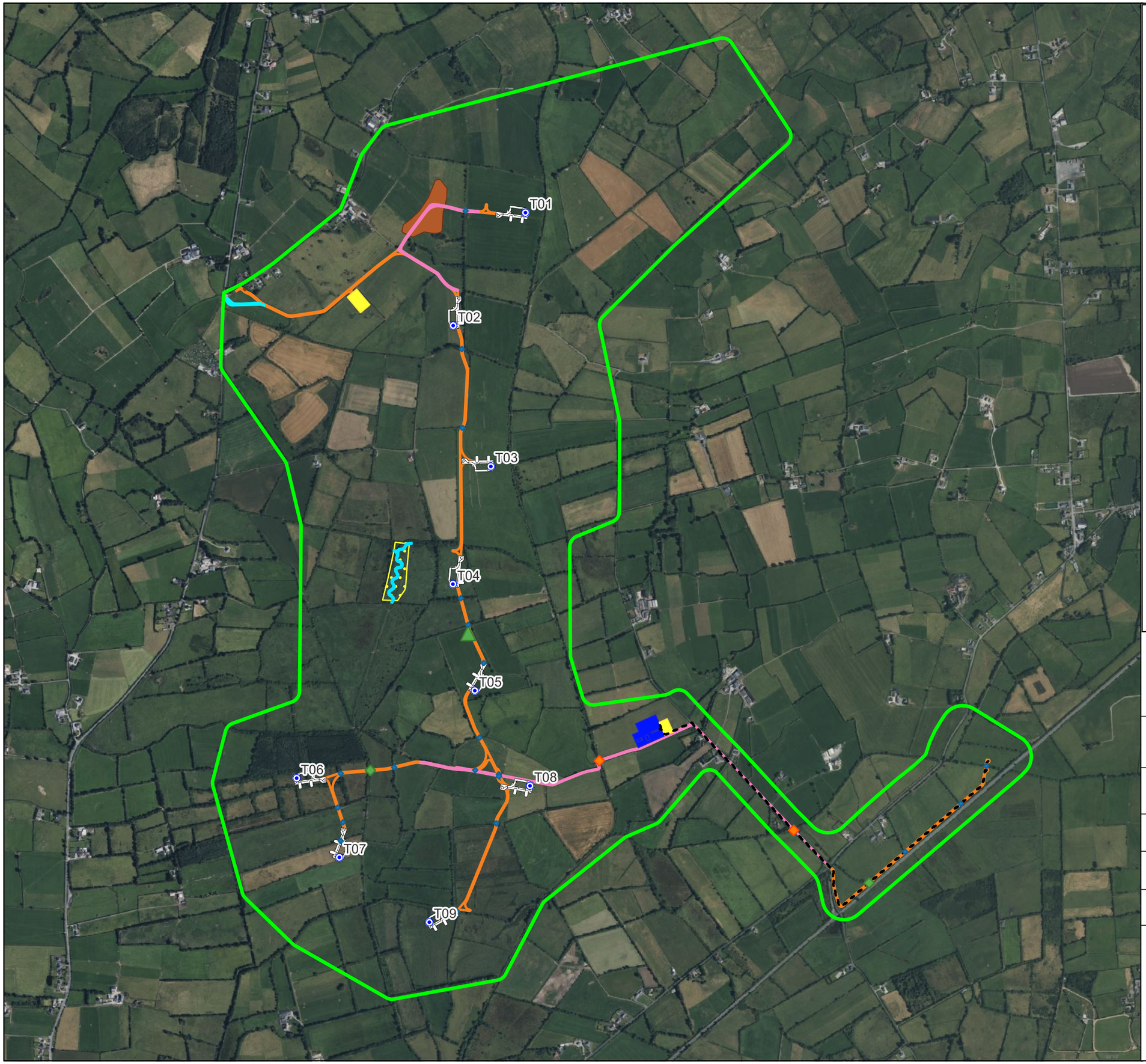

Map Legend

- EIAR Study Boundary
- Proposed Turbines
- Proposed Turbine Hardstands
- Proposed Met Mast
- Proposed Temporary Compounds
- Proposed Permanent 110kV Substation
- Proposed Grid Connection Cable Route
- Proposed End Masts
- Proposed Temporary Borrow Pit
- Proposed Temporary Security Cabin
- Existing Roads for Upgrade/ Resurface
- Proposed New Roads
- Proposed Temporary Abnormal Entrance
- Proposed Clear Span Crossing
- Proposed HDD Crossing
- Proposed Culverts
- River Enhancement 1.8ha Natural Woodland
- River Enhancement Segment

N

Drawing Title
Proposed Project

Project Title
Borrisbeg Renewable Energy Development

Drawn By	Checked By
NS	KM
Project No. 220310	Drawing No. Figure 4-3
Scale 1:16,000	Date 2023-12-07

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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.

1. *Site Drainage;*
2. *Site Entrance Management.*
3. *Access Roads (New and Upgrade to existing tracks);*
4. *Watercourse Clear Span crossing;*
5. *Borrow Pit;*
6. *Temporary Construction Compounds;*
7. *Tree Felling and Replanting;*
8. *Spoil Management Areas;*
9. *Temporary Turbine Haul Route Accommodating Works;*
10. *Temporary Turbine Component Site Entrance;*
11. *Turbine and Meteorological Mast Foundations;*
12. *Hardstanding Areas*
13. *Wind Farm Underground Electrical and Communication Cabling;*
14. *River Restoration.*
15. *Electricity Substation and Control Buildings Construction;*
16. *Temporary Construction Compound;*
17. *Underground Electrical 110kV and Communication Cabling for grid connection;*
18. *Grid Connection Point to the National Grid.*

2.3.3 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 onsite. 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 of the EIAR.

2.3.4 Site Entrance Management

Temporary Turbine Component Entrance

A temporary entrance will be constructed on the L-3248, adjacent to the N62 in the northwest of the Site. This entrance will facilitate the delivery of the turbine components and will be manned for the duration of the turbine component delivery phase. This new entrance measures approx.. 1,349m^2 and was subject to autotrack assessment to identify the turning area required, as described in Chapter 15, Section 15.2 of the Traffic and Transport Assessment of the EIAR.

General Construction Entrance

The main construction entrance will be constructed off the L-3248, approximately 70m northeast of the N62. This entrance will be used as the main entrance for construction traffic and staff vehicles. Appropriate sightlines will be established to the north and south of the proposed Site entrance for the safe egress of traffic during the operational phase. An existing farm entrance adjacent to this new entrance will be closed permanently. This new main construction entrance on the L-3248 will continue to provide operational phase access to the Proposed Project and agricultural use access in lieu of the existing field gate being closed permanently. On completion of the construction phase, the Site entrance will be reduced in size and gated for security.

Secondary Site Entrance

A secondary site access will be established to the southeast of the site with the upgrade of the L-70391 Local Road which is within the Site and upgrade of the junction between the L-70391 and the 7039. This entrance was subject to autotrack assessment to identify the turning area required, as described in Section 15.2 of the EIAR. Appropriate sightlines will be established to the north and south of this entrance for the safe egress of traffic. The proposed works will result in the widening of 460m of the L-70391 road and resurfacing of the of the entire L-70391 (approx. 1.1km total length). This secondary Site entrance will also facilitate the construction of the Proposed Grid Connection, with the proposed substation located immediately adjacent to the L70391 and will provide operational access for maintenance of the Proposed Project and existing public access to lands involved in the Proposed Project.

2.3.5 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 930m of existing site roads and tracks and approximately 1.1km of the L-70391, and to construct approximately 6 kilometres of new internal access roads. The proposed access roads will be constructed using the methodology summarised below:

Upgrade of Existing Access Roads or Tracks

The existing tracks on-site were constructed using the excavate and replace construction technique, therefore proposed road widening will to be founded on competent stratum. Cross section details of widening of existing roads is shown in Figure 4-8 and Appendix 4-1 of this EIAR.

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

1. *Access road construction shall be to the alignment of the existing road/ track.*

2. *Excavation will be required on one or both sides of the existing access track to a competent stratum.*
3. *Granular fill to be placed in layers in accordance with the designer's specification.*
4. *The upgraded roads will be constructed at the same level as existing ground levels in order to ensure natural flow paths are maintained in areas within the floodplain.*
5. *Existing drains will be culverted under the proposed access track which will provide a drainage outlet for flood water following a significant flood event, preventing any damming effect from the proposed access roads within the site-specific flood zones.*
6. *Placement of spoil berms along the proposed access roads shall be avoided within the site-specific flood zones.*
7. *Access roads to be finished with a layer of capping material across the full width of the road (the finish of the L70391 Local Road will be subject to requirements of TCC Roads Section).*
8. *A layer of geogrid/geotextile may be required at the surface of the existing access road in areas of excessive rutting (to be confirmed by on-site engineer).*
9. *For excavations in spoil, side slopes shall be not greater than 1 (v): 2. This slope inclination will be reviewed during construction, as appropriate.*
10. *The finished road width will be approximately 5m, with localised widening at bends and changes in direction.*
11. *On side long sloping ground any road widening works required will be done on the upslope side of the existing access road, where possible.*
12. *A final surface layer shall be placed over the existing access track, as per design requirements, to provide a suitable road profile and graded to accommodate wind turbine construction and delivery traffic.*

Construction of New Roads

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

1. *Establish alignment of the new road from the construction drawings and mark out the centrelines with ranging rods or timber posts;*
2. *The proposed new roads will remain at the same level as existing ground levels in order to ensure natural flow paths over the floodplain and avoid backup of the water.*
3. *All drainage measures prescribed in the detailed drainage design for the Proposed Project will be implemented around the works area;*
4. *The road layout has been designed to avoid crossings of natural watercourses where possible;*
5. *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;*
6. *The access tracks will be of single-track design with a width of 5m with localised widening at bends and changes in direction. (depending on the location within the Site)*
7. *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 the site-specific flood modelled zone (100-yr and 1000-yr events). Some topsoil may be temporarily stockpiled locally for reuse for landscaping purposes.*
8. *The subsoil will be excavated down to a suitable formation layer of competent stratum;*
9. *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;*
10. *The new access roads will be constructed with a camber to aid drainage of surface water;*

11. *Excavations side slopes shall not generally be greater than 1(V): 2 (H). Design slopes will be informed by the Geotechnical Engineer;*
12. *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.*
13. *The hardstands at turbines T3, T4, T7, T8 and T9 will have finished ground levels with a freeboard of 0.5m above Q1000cc (FFL = H1000cc+ 0.5m) design flood levels and then graded down to align with the adjoining roads sited at existing ground levels.*

2.3.6 Watercourse/ Culvert Crossings

To facilitate the construction of the Proposed Wind Farm roads it is required to cross 2 no. natural watercourses, the Eastwood River and the River Suir, and several field drains. The River Suir crossing will be by horizontal directional drilling (HDD) under an existing bridge on the L-70391 to facilitate the connection of the 33kV underground cabling to the proposed 110kV substation, and the Eastwood River will be crossed by installing a new clear span crossing.

Likewise, to facilitate the construction of the Proposed Grid Connection cable route, it is required to cross the Clonmore River and Strogue Steam, and 3 no. field drains. The Clonmore Stream crossing will be by horizontal directional drilling (HDD) under an existing bridge on the L and the Strogue Stream will be crossed by installing a new clear span crossing. The construction methodologies of these three crossing types are detailed below.

2.3.6.1 Clear-Span Watercourse Crossing

It is proposed to construct 2 no. clear-span watercourse crossings within the Site; over the Eastwood River east of T6 and over the Strogue Stream along the grid connection cable route. The locations of these crossings are illustrated on Figure 2-1, 2-2 and 2-3 in Appendix 4-1 Site Layout Drawings of this EIAR. The clear-span watercourse crossing methodologies presented below will ensure that no instream works are necessary. 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:

1. *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.*
2. *All drainage measures along the proposed road will be installed in advance of the works.*
3. *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.*
4. *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.*
5. *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.*
6. *Where the box culvert is installed in sections, the joints will be sealed to prevent granular material entering the watercourse,*
7. *Once the crossing is in position stone backfill will be placed and compacted against the structure up to the required level above the foundations.*
8. *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 Appendix 4-1.

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 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.

2.3.6.2 Horizontal Directional Drilling

To facilitate the connection of the 33kV underground cabling to the proposed 110kV substation, the 33kV cable route will require crossing the River Suir via the Horizontal Directional Drilling (HDD) method. To facilitate the laying of the 110kV underground grid connection cable route in the L-7039 the 110kV cable route will require crossing the Clonmore Stream via the HDD method also, This method comprises this drilling under obstacles such as bridges, culverts, railways, water courses, etc. to install cable ducts under the obstacle. The DD method of duct installation will be carried out using Vermeer D36 x 50 Directional Drill (approximately 22 tonnes), or similar plant, for the directional drilling at watercourse/culvert crossings. The launch and reception pits will be approximately 0.55m wide, 2.5m long and 1.5m 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 shall 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 shall 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 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 directional drilling methodology is further detailed in Figure 4-37 of this EIAR.

This crossing methodology will ensure that no instream works are proposed. Please see section 4.9.2.5.1 for construction methodology and Figure 4-38 of this EIAR.

2.3.6.3 Culvert Crossings

All other drain crossings with the Site will be completed using piped culverts at minor channels or manmade drains, the crossing will be installed as follows:

1. *The access road on the approach to the channel will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the culvert and drain crossing.*
2. *The installation of the culvert will take place in low flow conditions.*
3. *Where a flow exists, the water running through the channel will be pumped around the water crossing location and back into the channel downstream of the works area.*
4. *Where over pumping is required, measures will be taken to ensure that the pumped water discharge does not disturb the stream bed with the force of water from the discharge. A steel plate to reduce the force of the flow will be used where appropriate.*
5. *The Project Engineer will determine the required gradient of the culvert. The pipe must be laid at a gradient that will ensure water is contained within the pipe at all times. Where necessary a rock armour dam will be installed within the stream to reduce flow and ensure an acceptable depth of water remains within the pipe. Where a gradient of 1 – 1.5% is identified, the use of a baffle has been recommended.*
6. *The bed of the channel will be excavated, if necessary, to achieve the correct line and to allow the pipe to be embedded 300mm into the base of the existing drain.*
7. *The embedded section will be allowed to fill naturally with existing material within the base of the drain or with suitable drainage material such as gravel or round shingle, where deemed applicable.*
8. *The culvert will be lowered into place using an excavator with a lifting mechanism.*
9. *Large stone boulders (approx. 400mm), sourced from the on-site borrow pits, will be placed over the culvert to create a headwall for the culvert and a suitable sub-base for road construction.*
10. *Smaller 50mm stone, sourced on site will be placed upon the sub-base to construct the road over the water crossing.*

All of the above works will be supervised by the ECoW and the Project Hydrologist

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

2.3.7 Borrow Pit

It is intended to obtain materials for the construction of the Proposed Wind Farm from the proposed on-site borrow pit. Please see Figure 4-17 and Figure 4-18 for details of the proposed borrow pit.

The borrow pit will be excavated and backfilled as follows:

1. *The area to be used for the borrow pit will be marked out at the corners using ranging rods or timber posts. An unrecorded crop mark located approx. 20 m northeast of the borrow pit location will be closed off with fencing and signage for the duration of the construction phase. Please see Chapter 13 for details. Drainage runs, and associated settlement ponds will be installed around the perimeter;*
2. *The initial borrow pit excavation will involve removal of soil to the top of bedrock. These materials will be stored temporarily in selected spoil management areas, see Figure 4-21 for details;*

3. *All drainage measures prescribed in the detailed drainage design for the Proposed Project will be implemented around the works area;*
4. *The bedrock material will be extracted by breaking and blasting (section 4.9.8.1.1 and 4.9.8.1.2 above) from the borrow pit and stockpiled or used as required;*
5. *The use of material won from the borrow pit will be sequential with new road construction or turbine foundation formations;*
6. *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;*
7. *As the borrow pit excavation progress and become 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;*
8. *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 access track through the borrow pit providing access to T1 will be completed; and,*
9. *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.

2.3.7.1.1 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.

2.3.7.1.2 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 one blast 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].

2.3.8 Temporary Construction Compounds

A temporary construction compound measuring approximately 4,950m^2 is located 520m from the general construction/operational entrance on the L-3248. A second temporary construction compound measuring approximately 2,539m^2 is located adjacent to the proposed permanent110kV substation. This second compound will form part of a separate Section 182A application for the Proposed Grid Connection.

The temporary construction compounds will include a bunded refuelling and containment area for the storage of lubricants, oils and site generators etc, and full retention oil interceptor, waste storage area, temporary site offices, staff facilities and car-parking areas for staff and visitors. Temporary port-a-loo toilets and 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 wastewaters being tankered off-site by a permitted waste collector to wastewater treatment plants. There will also be a water supply on-site for hygiene purposes, by way of a temporary storage tank. Construction materials, turbine and substation components will be brought directly to the proposed turbine locations and substation, respectively, following their delivery to the Site.

Both compounds will be constructed in the same manner as follows:

1. *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;*
2. *The compound platform will be established using a similar technique as the construction of the substation platform as discussed below in section 4.9.2.1;*
3. *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;*
4. *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.*
5. *A waste storage area will be provided within the compound;*
6. *The compound will be fenced and secured with locked gates if necessary; and,*
7. *Upon completion of the Proposed Project, the temporary construction compounds will be decommissioned and allowed to vegetate naturally.*

[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

2.3.9 Tree Felling and Replanting

2.3.9.1.1 *Tree Felling*

Tree felling will be required within and around Wind Farm infrastructure footprint to allow for the construction of the proposed turbine, access roads underground cabling, and the other ancillary infrastructure. Further details on tree felling required within and around development footprint is detailed in Chapters 4 & 6 of the EIAR.

Approximately 3.44 hectares of conifer will be felled to accommodate Turbine 9 and its associated infrastructure. Turbine no. 6 requires felling of 0.78 hectares of adjacent forestry to ensure appropriate setbacks for bat foraging are maintained. In addition, hedgerows and tree lines (approx. 1.8km) within bat buffers and those that intersect with the proposed road network, require removal. Please see Appendix 6-2 Bat report for details.

Therefore, a total of 4.22 hectares of forestry and 1.8km of linear vegetation will be felled and/or removed to facilitate the construction of the Proposed Wind Project.

Figure 4-15 shows the extent of the commercial forestry to be permanently felled as part of the Proposed Wind Farm.

The forestry felling activities required as part of the Proposed Wind Farm 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 Wind Farm 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 Wind Farm.

2.3.9.1.2 *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 identified 4.22 hectares of forestry that will be permanently felled for the Proposed Wind Farm 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 Wind Farm. 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 felled forestry as part of the Proposed Wind Farm may occur on any lands, within the State benefitting from Forest Service Technical Approval[3] for afforestation, should the Proposed Wind Farm 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, individually or in combination with other plans or projects is likely to have a significant effect on a European site (for Habitats purposes).

It is proposed to plant by hand, approximately 1.8 hectares of natural woodland within the Wind Farn Site along a segment of the Eastwood River, as shown in Figure 4-16. Please see Chapter 6 Biodiversity

[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.*

and Appendix 6-4 Biodiversity Management and Enhancement Plan for details. In addition to this, approximately 5.17km of hedgerow will be replanted within the Site.

For the balance of the replanting obligation, the applicant commits to replanting the remaining 2.42 hectares of conifer forestry, outside the hydrological catchment within which the Proposed Project is located. On this basis, it is reasonable to conclude that there will be no cumulative effects associated with the replanting of 2.42 hectares of forestry. Therefore, the forestry replanting is not considered further in the impact assessment chapters of this EIAR. In addition, the applicant commits to not commencing the Proposed Project until both a felling and afforestation licence(s) is in place and, therefore, this ensures the afforested lands are identified, assessed and licenced appropriately by the relevant consenting authority.

2.3.9.1.3 Hand Planting Methods

Planting will be by hand. The main forms of planting, as described in the Forestry Schemes Manual, are set out as follows.

Slit Planting

A spade is used to make a vertical slit in the ground. The tree roots are carefully positioned in the slit to ensure that roots are equally spaced in the vertical slit created. The slit is closed and firmed up ensuring the tree is vertical and upright. It is important to ensure that roots are not bent over which can lead to poor development, e.g., J root. This form of planting can be suitable for ribbons, mounds and ripped ground.

Angle Notch

A spade is used to cut a T or L-shaped slit in the ground. The spade is used to lift the slit and the tree roots placed underneath to ensure good root distribution without causing damage. The slit is closed and firmed up to ensure that stem is left vertical and upright.

Pit Planting

A spade is used to dig a hole and the tree roots placed in the centre. Soil is placed around the tree and firmed in, ensuring that it is upright and straight. This form of planting can be used in sensitive sites where no ground preparation has taken place. It may also be appropriate for steep slopes where other types of preparation may lead to sediment runoff. The Technical Approvals for the proposed replacement lands include the species approved for afforestation.

2.3.10 Spoil Management Areas

It is proposed to manage any excess overburden generated through construction activities locally within the Site, in identified spoil management areas, as shown in Figure 4-22, and in linear berms along access roads where appropriate (outside the modelled flood zones).

The spoil management areas have been selected based on the locations of spoil generation, areas suitable for spoil management and environmentally constrained areas such as identified site-specific flood modelled zones as detailed in Chapter 9: Hydrology and Hydrogeology.

The following recommendations and best practice guidelines for the placement of spoil in identified spoil management areas and alongside access roads (outside the modelled flood zones) will be adhered to during the construction of the Proposed Project:

The total estimated volume of spoil to be managed following excavations during the construction phase of the Proposed Project is approximately 140,000m^3. It is proposed to manage any excess overburden

generated through construction activities locally within the Site, by backfilling the borrow pit with spoil, roadside berms where appropriate and grading the remaining spoil across identified spoil management areas, as shown in Figure 4-21 in Chapter 4. The total capacity of the identified spoil management areas within the Site is approx. 85,000m^3 and therefore, in conjunction with backfilling the borrow pit and roadside berms, 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 4-3 and Table 4-5 in Chapter 4 of the EIAR. The spoil management areas have been selected based on the locations of spoil generation, areas suitable for spoil management and avoiding environmentally constrained areas such as identified site-specific flood modelled zones as detailed in Chapter 9 of the EIAR.

1. *At the identified spoil management areas, the vegetative top-soil layer will be removed to allow for spoil to be placed and upon reaching the recommended height, the vegetative topsoil layer will be reinstated.*
2. *The identified spoil management areas will be developed in a phased approach, with the topsoil removed and temporarily stockpiled within the defined area while the spoil it being placed. The stockpiled topsoil will then be reinstated over the placed spoil, and the exercise will continue within the same spoil management area until the area is full.*
3. *The placement of spoil will be restricted to a maximum height of 1.0m, subject to confirmation by the Geotechnical Engineer.*
4. *Where practical, the surface of the placed spoil is shaped to allow efficient run-off of surface water. Where possible, shaping of the surface of the spoil will be carried out as placement of spoil within the area progresses. This will reduce the likelihood of debris run-off and ensure stability of the placed spoil.*
5. *Finished/shaped side slopes of the placed spoil will be not greater than 1 (v): 2 (h) in the dedicated spoil management zones and not greater than 1 (v): 1 (h) alongside access tracks.*
6. *Inspections of the spoil management areas will be made by a Geotechnical Engineer through regular monitoring of the works. The appointed contractor will review work practices at spoil management areas when periods of heavy rainfall are expected so as to prevent excessive dirty water runoff from being generated.*
7. *An interceptor drain will be installed upslope of the identified spoil management areas to divert any surface water away from these areas.*
8. *Silt fences and double silt-fences will be emplaced down-gradient of spoil management areas and will remain in place throughout the entire construction phase, or until reseeding has been established to a sufficient level.*
9. *The surface of the deposited spoil will be profiled to a gradient to be agreed with the Geotechnical Engineer and vegetated or allowed to vegetate naturally as indicated by the Project Ecologist.*
10. *All the above-mentioned general guidelines and requirements will be confirmed by the Geotechnical Engineer prior to construction.*
11. *The material will be backfilled into the spoil management areas and will be spread evenly across the area.*
12. *It will be compacted to reduce air voids and reduce the migration paths for infiltration by precipitation. This will reduce the amount of potentially silt laden surface water run-off from these spoil management areas.*

2.3.11 Temporary Turbine Haul Route Accommodating Works

Minor temporary accommodation works in the form of stoning up small areas of the roadside verge are required at Exit 22 southbound on M7 to facilitate the turning of the blade transporter off the junction and onto the N62 which runs adjacent to the Site. Please see Chapter 15, Material Assets section 15.2 of the EIAR for further details. These works are minor, temporary, and are all located within the existing road corridor. Upon completion of turbine delivery, these areas will be reinstated. The construction methodology of these minor works areas is outlined as follows:

1. *Overburden within the required areas for the accommodation works will be excavated and temporarily stockpiled adjacent to the works area, where possible, until a competent stratum is reached.*
2. *Any excess excavated overburden will be removed from the works area to the on-site spoil management areas or a licensed tip as appropriate.*
3. *A layer of geogrid/geotextile may be required at the surface of the competent stratum to provide further structural formation, if required.*
4. *The competent stratum will be overlain with granular fill sourced from local quarries.*
5. *A final surface running layer will be placed over the granular fill to provide a suitable surface to accommodate the turbine delivery/abnormal load vehicles.*
6. *The temporary accommodation areas along the turbine delivery route will only be used by the turbine delivery/abnormal load vehicles and other vehicles associated with the delivery process.*
7. *The temporary accommodation areas when not in use will be cordoned off from the public road, using bollards, where boundary walls, hedgerows or ditches have been removed.*
8. *Upon completion of the turbine delivery phase, the granular surface of the accommodation works location will be re-instated to its original condition. Any and all kerbing, barriers and boundary fencing will be reinstated.*

The base layer will be left in place within the accommodation areas to allow these to be used again in the future should it become necessary (i.e., at decommissioning stage for turbine removal, or in the unlikely event of having to swap out a blade component during the operational phase). Should this be required these areas will again be temporarily re-established and managed as set out above.

An outline of the traffic management proposals are presented in Section 3.4 of this CEMP. A detailed Traffic Management Plan will be provided specifying details relating to traffic management and will be included in the CEMP prior to the commencement of the construction phase of the Proposed Project.

2.3.12 Temporary Turbine Component Site Access

A temporary entrance and access road into an agricultural field will be constructed on the L-3248, adjacent to the existing junction with the N62 in the northwest of the Site. This entrance will facilitate the delivery of the turbine components and will be supervised for the duration of the turbine component delivery phase. This new entrance was subject to autotrack assessment to identify the turning area required, as described in Chapter 15, Section 15.2 of the Traffic and Transport Assessment. The construction methodology for the temporary abnormal load entrance is outlined as follows:

1. *Overburden within the required areas for the accommodation works will be excavated and temporarily stockpiled adjacent to the works area, where possible, until a competent stratum is reached.*
2. *Any excess excavated overburden will be removed from the works area to the on-site spoil management areas or a licensed tip as appropriate.*

3. *A layer of geogrid/geotextile may be required at the surface of the competent stratum to provide further structural formation, if required.*
4. *The competent stratum will be overlain with granular fill sourced from the onsite borrow pit.*
5. *A final surface running layer will be placed over the granular fill to provide a suitable surface to accommodate the turbine delivery/abnormal load vehicles.*
6. *The temporary abnormal load entrance will only be used by the turbine delivery/abnormal load vehicles and other vehicles associated with the turbine delivery process.*
7. *Upon completion of the turbine delivery phase, the granular surface will be removed and the ground reseeded to its original condition.*

Once deliveries have been complete, this entrance will be reinstated through replanting of hedgerows and reseeding of grasses. The delivery of abnormal loads to the site will be undertaken in accordance with a Transport Management Plan which will be issued to and agreed with the competent authority at that time as part of a permit application for the delivery of abnormal loads using the local roads under the Road Traffic (Special Permits for Particular Vehicles) Regulations 2007. The Transport Management Plan will provide for all necessary safety measures, including a convoy and Garda escort as required, off-peak turning/reversing movements and any necessary safety controls.

2.3.13 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. The turbine foundation transmits any load on the wind turbine into the ground. The proposed horizontal and vertical extent of the turbine foundation will be 25m and 4m respectively, which has been assessed in the EIAR.

After the foundation level of each turbine has been formed using piling methods or on competent strata (i.e. bedrock or subsoil of sufficient load bearing capacity), the “Anchor Cage” 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 following completion of the foundation.

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;*
2. *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;*
3. *No material will be removed from site with excavated spoil being transported to the identified spoil management areas within the Site.*
4. *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;*
5. *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;*
6. *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.*

Reinforced concrete piled foundations will be completed 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;*
2. *No excavated material will be removed from site with excavated spoil being transported and stored in the identified spoil management areas within the Site.*
3. *No material will be removed from site and placement areas will be stripped of vegetation prior to stockpiling in line with best working practices;*
4. *A piling platform for the piling rig will be constructed by excavating to a suitable intermediate mineral subsoil and backfilling to formation level by compacted layers of well graded granular material spread and compacted to provide a hard area for the piling rig;*
5. *The piling rig, fitted with an auger, will then bore through the soft material with a sleeve fitted around the auger to prevent the sidewalls of the soil and overburden from collapsing. The borehole is then extended to a suitable depth into the subsoil/bedrock.*
6. *When the auger and the sleeve are removed high tensile steel cages will be lowered into the boreholes. These steel cages will extrude above the level of the top of the concrete pile.*
7. *As the auger is removed concrete is pumped into the borehole.*
8. *Reinforcing steel on the top of the pile will tie to the foundation base steel.*
9. *The procedure for standard excavated reinforced concrete bases as outlined above can be applied form here.*

2.3.14 Meteorological Mast Foundation

One metrological (met) mast is proposed as part of the Proposed Project. The met mast will be equipped with wind monitoring equipment at various heights. The proposed met mast will be located at ITM X618790, ITM Y746386 as shown on Figure 2-1. The mast will be a free-standing slender lattice structure 30 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 4-11. It is anticipated that the formation level of the met mast 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;*
2. *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;*
3. *No material will be removed from site with excavated spoil being transported and stored in the identified spoil management areas within the Site.*
4. *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;*
5. *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;*
6. *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.*

The met mast foundation will then be installed using the standard excavated reinforced concrete bases methodology as detailed above in Section 2.3.15.

2.3.15 Hard Standing Areas

Hard standing areas consisting of levelled and compacted hardcore are required around each turbine base to 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, offloading and storage of turbine components, and provide a safe, level working area around each turbine position. The hard-standing areas are extended to cover the turbine foundations once the turbine foundation is in place. 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 detailed in section 2.3.5 and will measure approximately 35m x 75m. The hardstands at turbines T3, T4, T7, T8 and T9 and the substation will have finished ground levels with a freeboard of 0.5m above Q1000cc (FFL = H1000cc+ 0.5m) design flood levels and then graded down to align with the adjoining roads sited at existing ground levels. The sizes, arrangement and positioning of hard standing areas are dictated by turbine suppliers. The proposed hard standing areas are illustrated in the detailed drawings included in Appendix 4-1 of the EIAR. The extent of the required areas at each turbine location may be optimised on-site depending on topography, position of the Site access road, the proposed turbine position and the turbine supplier's exact requirements.

2.3.16 Underground Electrical (33kV) and

2.3.17 Communications Cabling

Each turbine will be connected to the on-site electricity substation (part of the Proposed Grid Connection) via underground 33 kV (kilovolt) electricity cabling. Fibre-optic cables will also connect each wind turbine and the met mast to the on-site substation. The electricity and fibre-optic cabling connecting to the on-site substation compound will be run in cable ducts approximately 1.2 metres beneath ground level, along the sides of roadways or under the roadways. The route of the cable ducts will follow the access track to each turbine location and are illustrated on the site layout drawings included as Appendix 4-1, the exact number and configuration of cable ducting may vary within the cabling trench. Figure 4-12 below shows two variations of a typical cable trench, one for off-road trenches and one for on-road trenches. The cabling may be placed on either side of the roads, 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.

Clay plugs (water flow barrier) will be installed at regular intervals of not greater than 50 metres along the length of the trenches where required to prevent the trenches becoming conduits for runoff water. Backfill material will be compacted in layers with approved engineer's specified material, which may be imported onto the Site should sufficient volumes of suitable material not be encountered on-site.

2.3.18 River Restoration

The enhancement of a portion of the Eastwood River within the Site will involve the restoration of a previously deepened and straightened channel to appropriate dimensions, pattern and profile and the establishment of a native woodlands buffer.

A new meandering channel will be excavated adjacent to the existing channel using dimensions based on the drainage area of the reach along with reference reach data collected in the field. The new channel will include riffle pool sequences to improve instream habitat diversity with the channel. In addition to constructed riffles, a number of structures including cross-banes may be incorporated into the stream design as required. Bank stability will be achieved through the installation of coir fibre matting, and the use of bioengineering techniques such as live staking.

Once the new stream channel has been completed and stabilised, flow will be diverted to the new channel and the old channel will be plugged using clay plugs and back filled with material excavated from the new channel. The following construction methods will be used to construct the new stream channel.

2.3.18.1 Channel excavation and grading

A new channel will be excavated using a tracked excavator. All work will be conducted in the dry and will proceed from the upstream to downstream. Construction of relocated stream channel shall be conducted so as to prevent the release of sediment to downstream waters. Where possible the new stream channel should be constructed in advance and water redirected into the new channel once complete. The following measures should be employed to ensure that there is no release of sediment to downstream waters:

1. *All stream work to be performed "in the dry" either by pump-around or stream diversion with silt curtain.*
2. *Impervious dikes or sand bags are to be used to isolate work from stream flow.*
3. *The contractor shall not disturb more area than can be stabilised the same working day.*
4. *Maintenance of stream flow operation shall be incidental to the work. This includes pumps and hoses.*
5. *Pumps and hoses shall be of sufficient size to dewater the work area.*
6. *Graded stream banks shall be stabilised, with matting, prior to predicted rain fall events.*
7. *Silt bags and stilling basins shall be used to collect silt and sediment from work area dewatering.*
8. *Work area to be stabilised at the end of each day.*

2.3.18.2 Constructed Riffle

Constructed riffles have been incorporated into the stream restoration design for the purposes of increasing habitat diversity, providing grade control, and increasing oxygenation within the channel. The following methodology shall be used to install constructed riffles:

1. *Variable constructed riffles shall be installed in newly graded channel.*

2. *Elevation control points shall be designated at the beginning and end of riffle points to establish part of the profile of the channel. Survey of control points shall be required to establish accurate riffle installation within the tolerance specified by the designer.*
3. *Backfill material, if needed to establish a riffle subpavement and/or to raise the channel bed due to scour/incision, shall be soil or coarse material with type and size and gradation, if applicable, specified by the designer. Backfill shall be placed such that the addition of the specified thickness of riffle material shall achieve the designated grades.*
4. *Riffle material shall be comprised of rocks and wood. The rock material shall be of a type, size, and gradation as specified by the designer to be mobile or non-mobile as the conditions in the channel warrant. Rock riffle material may be excavated, stockpiled, and re-used from abandoned channel sections. Otherwise rock riffle material shall be slightly rounded, "river-type" rock, unless other rock characteristics are appropriate for the channel. In addition, logs and woody debris and boulders shall be included with the rock material as specified by the designer.*
5. *The placement of backfill and/or riffle material shall be done in a manner to create a smooth profile, with no abrupt "jump" (transition) between the upstream pool-glide and the riffle, and likewise no abrupt "drop" (transition) between the riffle and the downstream run-pool. The finished cross section of the riffle material shall generally match the shape and dimensions shown on the riffle typical section with some variability of the thalweg location as a result of the small pools, logs, and boulders.*
6. *The end of riffle control point may tie into a drainage structure or other in-stream structure (e.g. – cross vane, etc.)*
7. *The constructed riffle shall be keyed into the stream banks and/or bed as designated by the designer. The "key" shall extend beyond the top of bank at the beginning (crest) of the riffle.*

2.3.18.3 Cross Vanes

A cross vane is made up of a set of upstream angled lines of boulders, connected by a section of smaller rocks upstream. While water usually covers the lower section during normal flows, the higher sections deflect flow away from the banks of the stream. Flow is diverted over the rock walls and concentrated down the centre of the channel. The scouring associated with high flow velocities in the centre of the channel and the "waterfalling" over the structure itself creates a deep, elongated pool.

The purpose of the cross vane is to protect the banks downstream of the vane and to provide grade control to reduce the potential for headcutting in the channel. A headcut is an abrupt vertical drop in the bed of a stream that is an active erosional feature).

The following methodology shall be used to install cross vanes:

1. *A boulder cross vane is a grade control, in-stream structure that directs stream flow away from the stream banks and in toward the centre of the channel.*
2. *Elevation control points shall be designated at the upstream invert (centre) of the Cross vane to establish part of the profile. Pool elevation control points or excavation to a specified maximum pool depth shall be designated to establish the remaining profile. Survey of control points shall be required to establish accurate cross vane installation within the tolerance specified by the designer.*
3. *The vane arm shall intercept the stream bank at a height equal to between ½ bankfull Stage and bankfull stage, (Bankfull is the breakpoint between the active channel of a river and it's floodplain). Elevation control points may be established at the left and Right stream bank/vane arm intercept points. Bankfull is not necessarily the top of the stream bank slope.*
4. *The cross vane shall be constructed with flat-sided boulders of a size (750mm x 500mm x 500mm approx.)*

5. *Non-woven filter fabric shall be used to seal the gaps Between the boulders and under the coarse backfill material. There shall be no filter Fabric visible in the finished work; edges shall be folded, tucked, or trimmed as needed.*
6. *Coarse backfill of the boulder cross vane shall be of a type, size, and gradation as specified by the designer. Coarse backfill shall be placed to a thickness equal to the Depth of the header and footer boulders and shall extend out from the vane arms to the Stream bank and upstream a distance specified by the designer.*
7. *The invert (centre) of the boulder cross vane shall be constructed first, followed by One vane arm and then the other vane arm. The floodplain sills shall be constructed Last.*
8. *Boulder cross vane shall be built typically as follows:*
    a. *Over-excavate stream bed to a depth equal to the total thickness of the header and footer boulders.*
    b. *Place footer boulders. There shall be no gaps between boulders.*
    c. *Install filter fabric.*
    d. *Place coarse backfill behind the footer boulders.*
    e. *Install header boulders on top of and set slightly back from the footer boulders (such that part of the header boulder is resting on the coarse backfill). Header Boulders shall span the seams of the footer boulders. There shall be no gaps Between boulders. The slope of the vane arm is measured along the vane arm which Is installed at an angle to the stream bank and profile.*
    f. *Place coarse backfill behind header boulders ensuring that any voids between the Boulders are filled.*
9. *If any erosion control matting is specified for use in the vicinity of the vane arm Intercept points and floodplain sills all matting edges shall be neatly secured around the boulders.*

2.3.18.4 Coir Fibre Matting

Coir is the outside hard layer of husk that surrounds the shell of the coconut. It consists mainly of fibres, which have traditionally been used to manufacture rope, carpets, doormats, upholstery stuffing, brushes etc. Coir fibre matting is a biodegradable erosion control fabric that provides good surface protection against erosion while allowing for the germination of seed and promotion of vegetation cover. At a minimum coir fibre matting shall be installed on the outside of all meander bends where shear stress is likely to be highest, and in other locations where erosion control may be necessary. Coir matting can be omitted from the inside of meander bends when the stream channel is constructed in the dry and fully revegetated before flow is diverted to the new channel. The installation of the coir fibre matting shall be accomplished by hand using the following methodology:

1. *Coir fibre matting shall be at least 700 grams/m^2 weight.*
2. *Matting shall be anchored in a trench at top of the stream bank. Stout stakes (38mm x 38mm minimum) shall be used to secure the matting into the toe and top of bank trench.*
3. *The stream bank shall be prepared by smoothing with shovels to remove large clumps of deposited peat, seeded, and mulched with straw prior to the placement of the matting.*
4. *The matting shall be installed so as to not be in tension, but be placed neatly, flush against the soil, and with no gaps or wrinkles.*
5. *Matting overlaps shall be 0.6m in width, and overlaps shall be oriented in a down-slope direction, downstream direction, or otherwise "shingle-style" in accordance with the direction of the dominant erosive action so that the matting end is protected against movement.*
6. *The field of the matting over the surface of the stream bank shall be secured with hardwood matting stakes of at least 0.3 cm in length. Matting stakes shall be installed in a triangular grid pattern at 0.6m OC.*
7. *Matting shall be neatly secured around any projecting stream structures or rocks to prevent any loose or frayed edges.*
8. *There shall be no loose ends or unsecured matting on the completed work.*

9. *No matting will be placed on the bed of the channel.*

2.3.18.5 Live staking

Live willow cuttings (live stakes) shall be installed through the coir fibre matting along both sides of the stream channel following the installation of coir fibre matting). The purpose of the live cuttings is to provide bank stability through the establishment of fast-growing native willows. The live stakes will be installed using the following methodology:

1. *Cuttings shall be between 60cm and 90cm in length, and between 2cm and 8cm in diameter. They will be cut in the dormant season, i.e., between Nov and Mar. Cuttings will have an angled cut at the bottom end of the stake and a flat cut at the top of the stake to aid with installation.*
2. *Cuttings shall be installed in a two-row triangular grid pattern at 75cm on centre (o.c.). The first row shall be located on the side of the existing channel with the second row being located on the flat adjacent to the channel.*
3. *Cuttings shall be fashioned from live, dormant native willow species (Salix cinerea, Salix caprea and Salix aurita).*
4. *Cuttings shall be sourced locally on-site (or within 20km max of the establishment site if necessary).*

The following methodology will be implemented for the handling, preparation, and installation of cuttings to ensure the highest possible survival rate:

1. *Cuttings shall be cut and installed on the same day where possible.*
2. *If same-day installation is not possible, cuttings shall be stored for no more than 1 week with the bottom end of each stake fully submerged in water to prevent drying out of the material.*
3. *All lateral branches shall be carefully removed from the woody cuttings prior to installation.*
4. *Cuttings shall be driven into the ground using a "dead blow" plastic hammer.*
5. *Peat shall be firmly packed around the hole after installation, where required.*
6. *Cuttings shall be tamped in at a right angle to the ground with between 70%- 80% of the stake installed below the ground surface. Between 20%-30% and two buds (or pruned, lateral branch locations) on the cutting shall be above the ground surface.*
7. *Split or otherwise damaged cuttings shall not be used.*

2.3.19 Electricity Substation and Control Buildings Construction

A new 110kV substation along with ancillary control buildings is proposed to be constructed in the southeast of the Site, adjacent to the L7039/-01 local road. new section of road in the southern section of the site, as shown in Figure 2-2 and Figure 2-3. The dimensions of the substation area will be set to meet the requirements and specifications of EBS/EirGrid and the necessary equipment to safely and efficiently operate the wind farm, refer to Appendix 4-5 for detailed drawings of the proposed substation.

The works will consist of construction of substation, 2 no. control buildings, perimeter fencing, electrical plant and apparatus, and associated site works. The substation will be constructed using the following methodology:

1. *The area of the substation will be marked out using ranging rods or wooden posts and the soil stripped and removed to a temporary placement area for later use in landscaping. A stoned-out hardstand area will then be established using locally sourced materials.*

2. *No material will be removed from site and the temporary placement areas will be stripped of vegetation prior to stockpiling within the identified spoil management areas.*
3. *The dimensions of the onsite substation area have been designed to meet the requirements of the EirGrid and the necessary equipment to safely and efficiently operate the Proposed Project..*
4. *2 no. control buildings will be built within the onsite substation compound;*
5. *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;*
6. *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;*
7. *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;*
8. *The roof slabs will be lifted into position using an adequately sized mobile crane;*
9. *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.*
10. *The substation plinths, transformer bund and oil interceptor will be shuttered and poured with reinforced concrete. An anti-bleeding admixture will be included in the concrete mix;*
11. *The electrical equipment will be installed on the concrete plinths and commissioned*
12. *Underground cabling connecting the substation to the turbines will also be installed using standard methodology.*
13. *Lightning poles will be erected at appropriate locations adjacent to the substation. All lightning poles will be appropriately earthed.*
14. *Perimeter fencing will be erected around the substation and control buildings compound area.*
15. *The construction and components of the substation are to EirGrid specifications.*
16. *All drainage measures prescribed in the detailed drainage design for the Proposed Project will be implemented around the works area;*
17. *The wind farm control buildings will be set out by an engineer within the substation compound;*
18. *All wastewater from the staff welfare facilities in the control buildings will pass to a sealed storage tank. This tank will be fitted with an automated alarm system that will provide sufficient notice that the tank required emptying. The wastewater will be transported off site by a waste management contractor holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007 (as amended).*
19. *The construction and components of the substation will be to EirGrid specifications.*
20. *All excavations will be observed by a suitable qualified archaeologist.*

2.3.20 Connection to the Existing Overhead Line

It is proposed to connect the proposed permanent 110kV substation to the existing 110kV Ikerrin to Thurles overhead line (OHL). The OHL will be broken with 2 no. new end masts (lattice-type towers) to facilitate the connection to the proposed onsite substation via the underground electricity cabling route. Once constructed, electricity on the Ikerrin-Thurles 110kV OHL will be transmitted through the proposed substation, hence the 'loop-in/loop-out' nature of the proposed substation. The methodology for construction of the Grid Connection underground cable route is presented below. The underground electrical cabling route is illustrated in Figure 2-2 and Figure 2-3. The 110kV grid connection cabling trench cross sections are shown in Figure 4-29.

2.3.21 Underground Electrical (110kV) and Communication Cabling

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 loop connection between the proposed 110kV on-site substation and the existing 110kV Ikerrin to Thurles OHL. The grid connection cabling route will be c.2km in length and will run through a mix of local road /L7039) and agricultural land. This underground cabling route requires crossing of 2 no. watercourses, one within the L7039 which will be crossed via a Directional Drilling method (see section 2.3.21.1.1 below) and the second crossing will be crossed within private agricultural land via a clear span culvert (see section 2.3.21.1.2 below) i.e., no instream works are proposed.

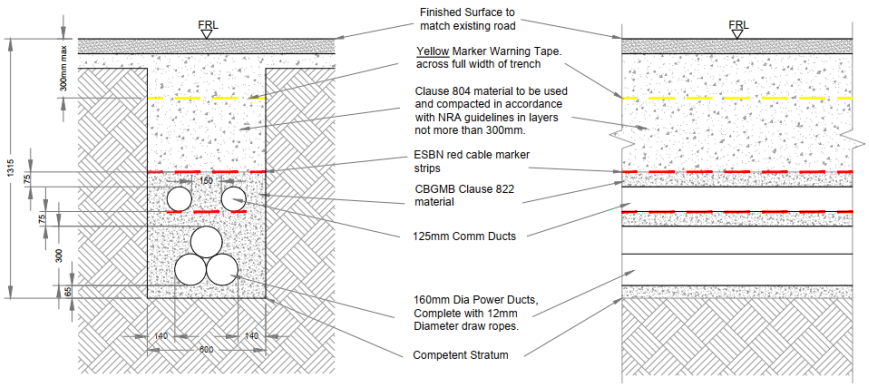
The underground electrical cabling will be laid beneath the surface of private road and the public road using the following methodology:

1. *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, Tipperary County Council etc. will be contacted and all up to date information for all existing services sought.*
2. *When the cable is located on public roads, a traffic management plan 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.*
3. *A tracked 360-degree excavator will then proceed to dig out the proposed trench, typically to a depth of 1300mm, within which the ducts will be laid.*
4. *The cable ducts will be concrete surrounded where they pass under the public road and under drains or culverts.*
5. *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.*
6. *Once the trench has been excavated, a base-layer will be laid and compacted, comprising Clause 804, or 15 Newton CBM4 concrete as required.*
7. *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.*
8. *Four pre-cast concrete joint bay chambers typically 2.5m x 6m x 1.75m will be installed below finished ground level, approximately 1000 metres apart or as otherwise required by ESB/Eirgrid and electrical requirements. Please see section 4.9.2.5 below for details.*
9. *As the works progress, the as-built location of the ducting will be recorded using a total station or GPS.*
10. *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.*
11. *Spacers will be used to ensure that the correct cover is achieved at both sides of the ducting.*
12. *The remainder of the trench will be backfilled in two compacted layers with approved engineer's specified material.*
13. *Yellow marker warning tape will be installed across the width of the trench, at 300mm depth,*

14. *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.*
15. *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.*

Plate 2-1 110Kv Cable Trench View

Figure 2-4 Standard 110kV Trench detail cross section



Standard 110kV Trench Detail
SCALE 1:20

2.3.21.1 Existing Underground Services

Any underground services encountered along the cable 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, as detailed in Appendix 4-5: Grid Connection Infrastructure.

2.3.21.2 Joint Bays

Joint bays are typically pre-cast concrete chambers where lengths of cable will be joined to form one continuous cable. They are typically 2.5m x 6m x 1.75m pre-cast concrete structures installed below finished ground level. Four joint bays, in groups of two are proposed along the proposed underground grid connection cable route, approximately 1000 metres apart or as otherwise required by ESB/Eirgrid and electrical requirements. Two joint bays are proposed to be located in a new track adjacent to the L7039-1 third class road northeast of the proposed 110kV substation. The two remaining joint bays are proposed to be located in a new track in an agricultural field. Therefore, public access/traffic will not be impacted during the placement or maintenance of the proposed joint bays.

During construction the joint bay locations will be completely fenced off once they have been constructed, they will be covered 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 jointing of the communication cabling. 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 electrical cabling, 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 proximity to Joint Bays. Earth Sheath Link Chambers and Communication Chambers will be pre-cast concrete structures with a steel access cover at finished surface level. The locations of the joint bays and chambers are shown on the Grid Connection Infrastructure drawings in Appendix 4-5. Please see Figure 4-31 above for a standard joint bay. 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.

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2.3.22 End Masts

The following section outlines the construction methodology for the new loop in tower structures which will be constructed underneath the existing 110kV Ikerrin to Thurles OHL:

1. *The Steel lattice tower sites are scanned for underground services such as cables etc.*
2. *A foundation c.4m x 4m area is excavated and the formation levels (depths) will be checked by the on-site foreman See Plates 2-2 and 2-3. The excavated material will be temporarily stored close to the excavation and excess material will be used as berms along the site access roads.*
3. *To aid construction, a concrete pipe is placed into each excavation to allow operatives level the mast at the bottom of the excavation. The frame of the reinforcing bars will be prepared and strapped to a concrete pipe with spacers as required. The reinforcing bars will be lifted into each excavated foundation using the excavator and chains/slings. The base and body section of each tower will then be assembled next to excavation.*
4. *Concrete trucks will pour concrete directly into each excavation in distinct stages.*
5. *A third pour for the leg of the tower 1m x 1m and will be 300mm over ground level.*
6. *Once the main concrete foundation pour is cured after circa five days, metal shuttering is installed to accommodate the placement of concrete around the tower legs. During each pour, the concrete will be vibrated thoroughly using a vibrating poker.*
7. *Once the concrete is set after the five days the shuttering is removed.*
8. The tower foundations will be backfilled one leg at a time with the material already excavated at the location. The backfill will be placed and compacted in layers. All dimensions will be checked following the backfilling process..
9. *The existing overhead line will be de-energised by ESB so work can commence on the construction of the towers.*
10. *An earth mat consisting of copper or aluminium wire will be laid circa 400mm below ground around the tower. This earth mat is a requirement for the electrical connection of the equipment on the tower structure.*
11. *Once the base section of each tower is completed and the concrete sufficiently cured, it is ready to receive the tower body. Temporary hardstands may be removed and disposed of off site where necessary. See Plate 3-4.*
12. *A hardstand area for the crane will be created by laying geogrid material on the ground surface and overlaying this geogrid with a suitable grade of aggregate.*
13. *A physical barrier (Heras Fence Site Boundary) will be put in place to restrict plant from coming too close to the OHL.*
14. *The towers will be constructed lying flat on the ground beside the recently installed tower base.*
15. *The conductor will be moved off centre using a stay wire and weights to anchor the stay wire to ground.*

16. *The tower section will be lifted into place using the crane and guide ropes.*
17. *The body sections will be bolted into position.*
18. *The conductor will be centred over the towers and held in place. Once the conductor is secured at both ends it is then cut and attached onto each tower. The small section of conductor in between the two towers will be removed and utilised as connector wire for the new towers.. Plate 2-4 for a constructed tower.*

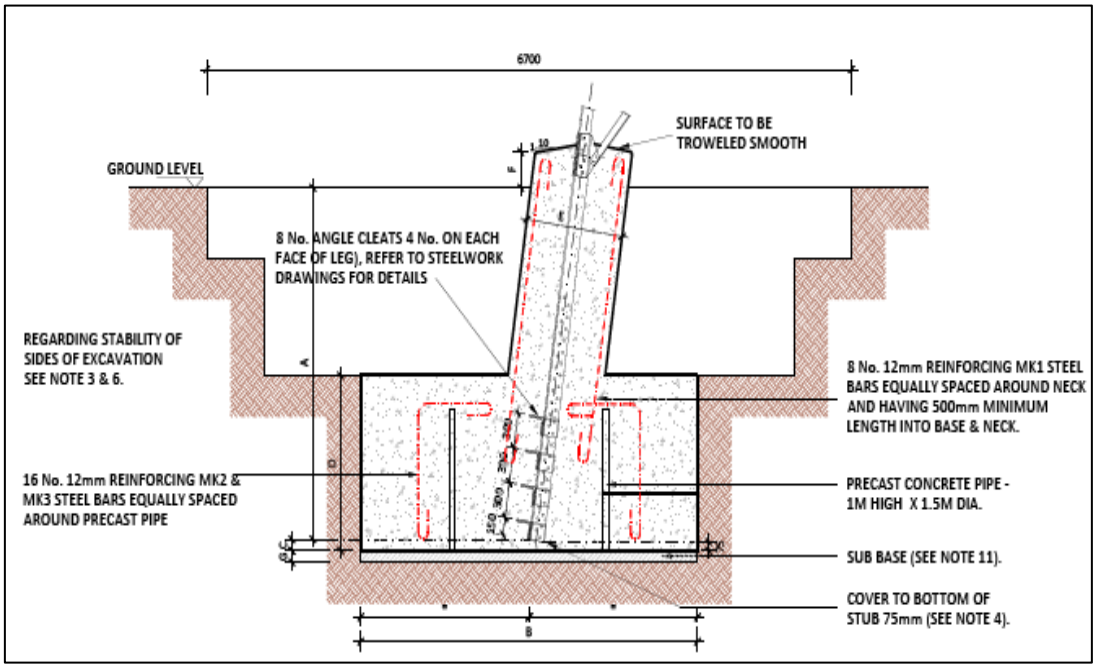

Plate 2-2 Steel lattice tower foundation

Plate 2-3 Steel lattice tower foundation complete (example image)

Plate 2-4 Completed End Mast Tower (example image)

2.3.23 Decommissioning

The proposed wind turbines are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the Wind Farm will be decommissioned fully.

Upon decommissioning of the Proposed Wind Farm, the wind turbines and the meteorological mast would be disassembled. All above ground turbine and mast components would be separated and removed off-site for recycling. Turbine and mast foundations would remain underground and would be covered with earth and allowed to revegetate. Leaving the 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 temporary environment nuisances such as noise, dust and/or vibration. Site roadways will be used during the operational phase by farm machinery and will provide a useful means of extracting the commercial forestry crop which exists on at the Site and therefore will be retained post decommissioning to facilitate these activities.

The underground electrical cabling connecting the turbines to the on-site substation will be removed from the cable ducts. The cabling will be pulled from the cable ducts using a mechanical winch which will extract the cable and re-roll it on to a cable drum. This will be undertaken at the original cable jointing pits which will be excavated using a mechanical excavator and will be fully re-instated once the cables are removed. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance. The cable materials will be transferred to a suitable recycling or recovery facility.

The Grid Connection infrastructure will remain in place as it will be part of the Electricity Grid under the ownership and control of the ESB and EirGrid.

A Decommissioning Plan has been prepared (Appendix 4-4). The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will agree with the competent authority at that time. The potential for effects during the decommissioning phase of the Proposed Wind Farm has been fully assessed in the EIAR.

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 Proposed 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".*

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, 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. Given that this site has an established drainage network and existing watercourse crossing points, there will be minimal impacts on watercourses.

3.2.2 Project Site Drainage Principles

The site drainage features have been outlined in Section 4.6 of the EIAR 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:

- 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;
- Department of Environment, Heritage and Local Government (2006): Wind Energy Development Guidelines for Planning Authorities;
- Forestry Commission (2011): Forests and Water UK Forestry Standard Guidelines, Fifth Edition. Publ. Forestry Commission, Edinburgh;
- Coillte Forest (2013): Operations and 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
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016);
- Scottish Natural Heritage (2019): Good Practice During Wind Farm Construction;
- 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, 2006).
- DoHPLG (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment
- European Union (2017) Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU),
- Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.

3.2.4 Project 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.

3.2.4.1 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 onsite 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 2 no. new watercourse crossing (one for the wind farm and one for the grid connection) and 16 culvert upgrades will be required to facilitate the Proposed Project infrastructure.

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.

3.2.4.2 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 4-1a 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 stilling ponds constructed to eliminate any suspended solids within surface water running off the site. Drainage infrastructure will include:

- 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 can be re-distributed over the ground by means of a level spreader.
- 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/roadside drains will be maintained to intercept and collect runoff from access roads and hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to stilling ponds for sediment settling;
- Piped slope drains will be used to convey surface runoff from diversion drains safely down slopes to flat areas without causing erosion. Once the runoff reaches the flat areas it will be reconverted to diffuse sheet flow. Level spreaders will only be established on slopes of less than 6% in grade. Piped slope drains will be used to transfer water away from areas where slopes are too steep to use level spreaders;
- 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;
- Siltbusters 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. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. They are specifically designed for use on construction sites.
- Silt bags, silt fences and sedimats will also be utilised where required. These devices capture silt and remove it from the water stream..
- Check dams will be maintained at regular intervals along interceptor drains and swales/roadside drains in order to reduce flow velocities and therefore minimise erosion within the system during storm rainfall events; and,
- Stilling ponds/settlement ponds, emplaced downstream of swales and roadside drains, 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. The stilling ponds will be sized according to the size of the area they will be receiving water from but will be sufficiently large to accommodate peak flows storm events.

Inspection and maintenance of all settlement ponds will be ongoing through the construction period.

Proposed Mitigation Measures for watercourse crossings are detailed below as detailed in Section 9.5 of the EIAR and are briefly summarised as follows:

- A constraint/buffer zone will be maintained for all crossing locations where possible. In addition, measures which are outlined below will be implemented to ensure that silt laden or contaminated surface water runoff from the excavation work does not discharge directly to the watercourse.

Setbacks from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures (discussed below) 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;
- 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 Site drainage into the existing site drainage network where possible. 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 upgradient of where construction works / tree felling is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area;
- Buffered outfalls which will be numerous over the site which 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. Velocity and silt control measures such as check dams, sandbags, 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.

All of the above 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 suggests 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 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 8 below, 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.

Best practice and practical experience on other similar projects suggests 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 are outlined within Section 4.6 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 8 below, and to ensure protection of all watercourses.

3.2.4.3 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 (Appendix4-4) and fully agreed with the local authority prior to any decommissioning works.

3.2.4.4 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.

3.2.4.5 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.

3.2.4.6 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.

3.2.4.7 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 Templemore, Co. Tipperary.

https://www.yr.no/en/forecast/daily-table/2-2961237/Ireland/Munster/County%20Tipperary/Templemore

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. The 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.

3.2.4.8 Cable Trench Drainage

Cable trenches are typically developed in short 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 upgradient side of the trench. Should any rainfall cause runoff from the excavated material, the material is 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 Site, would be used for landscaping and reinstatements of other areas elsewhere on site. The same control measures would apply during the excavation for cabling on the Proposed Wind Farm and the Proposed Grid Connection route.

On steeper slopes, silt fences, as detailed in Section 4.6 of the EIAR 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.

3.2.5 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. Other refuelling will be carried out using mobile double skinned fuel bowser. The fuel bowser will be parked on a level area on-site when not in use. 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.

Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays, spill kits and fuel absorbent mats will be available if necessary, during all refuelling operations. The following mitigation measures are proposed to avoid release of hydrocarbons at the site:

- Road-going vehicles will be refuelled off site wherever possible;
- Fuels volumes stored on site should be minimised. Any fuel storage areas 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 electrical substation 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;
- Oils or fuels stored in turbines will be placed within an appropriately sized bunded unit to prevent leakage to groundwater or surface water;
- The plant used 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 developed (refer to Section 6 of this Plan) Spill kits will be available to deal with and accidental spillage in and outside the refuelling area.
- A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the construction phase.

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-cement products will occur on the Site/along the underground electrical cabling route works or near other ancillary construction activities.
- 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;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- Where concrete is delivered on Site, only the chute will need to be cleaned, using the smallest volume of water possible. 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 is to be directed into a dedicated concrete wash out pit. Decommissioning of this pit will

occur at the end of the construction phase and water and solids will be tanked and removed from the site to a suitable, non-polluting, discharge location;
- All concrete will be paced in shuttering and will not be in contact with soils or groundwater until after it has set;
- Use weather forecasting to plan dry days for pouring concrete; and,
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event.
- 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.

The 50 m wide watercourse buffer zone will be in place for the duration of the construction phase. No construction activity will occur within the buffer zone with the exception of clear span crossing construction. The buffer zone will:

- Prevent any cement-based products accidentally entrained in the construction phase drainage system entering directly into watercourses, achieved in part by ending drain discharge outside the 50 m buffer zone and allowing percolation across the vegetation of the buffer zone;
- Provide a buffer against accidental direct pollution of surface waters by any pollutants, or by pollutants entrained in surface water run-off.

Plate 3-1 Typical concrete wash out areas

3.2.7 Tree Felling Drainage Measures

As discussed in section 2.3.9 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. Please see Appendix 4-2 Harvest Management Plan for details. Tree stumps will only be removed in areas around the Proposed Project footprint. 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 tree felling for 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 onsite 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 onsite, 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.

- All relevant measures, best practice methods and requirements set out Section 9.5.2.1 in Chapter 9 of the EIAR will be adhered to including Forestry & Water Quality Guidelines, Forest Harvesting & the Environment Guidelines and the Forest Protection Guidelines.
- 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.
- 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.
- All new collector drains will taper out before entering the aquatic buffer zone to ensures 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 is to be laid out at harvesting stage to prevent soil disturbance by machine movement.
- Brash which has not been pushed into the soil may 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.
- Harvested timber will be stacked in dry areas, and outside any 50-metre watercourse buffer zone. Straw bales and check dams to 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.

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.

One redundant recorded monument is located within the Site (TN029-030), described as '*Non-archaeological. Natural hillock'.* This redundant non archaeological record is located over 120m away from the Proposed Project footprint.

A previously unrecorded rectangular crop mark was noted within the Site during a review of the available aerial photography for the area. It comprises a rectangular area measuring situated in pasture c. 315m north-west of T1 and c. 20m north-east of the proposed temporary borrow pit. A 20m buffer will be established around an unrecorded crop mark. It will be closed off with fencing and signage for the duration of the construction phase.

There are no National Monuments, Record of Protected Structures or recorded National inventory of Architectural Heritage assets within or near the Proposed Grid Infrastructure, or within or near the minor temporary accommodating works at exit 22 off the M7. The following measures will be implemented during the construction phase:

- A buffer zone of 20m should be established around the outer extent of the crop mark, as visible on aerial photography, prior to the commencement of any construction works. The buffer should comprise fencing with keep out signage capable of lasting the duration of the construction phase of the Proposed Project. No ground works, storage of topsoil or movement of machinery will take place within the buffer.
- Pre-development archaeological testing of the Proposed Project infrastructure in previously undisturbed greenfield areas of the Site under licence from the National Monuments Service. This is in order to identify any archaeological features at the earliest stage possible in the project to allow time to deal with any requirements such as preservation in situ (redesign / avoidance) or preservation by record (archaeological excavation). Testing deemed necessary within forested areas may only be possible once clear-felling has taken place.
- A report on the testing will be compiled on completion of the work and submitted to the NMS and the Planning Authority.
- Further mitigation such as preservation in situ (avoidance), preservation by record (excavation), buffer zones may be required depending on the results of the testing.
- Archaeological monitoring of all groundworks during the construction stage of the Proposed Project by a licensed archaeologist.
- A report on the monitoring will be compiled on completion of the work and submitted to the NMS and the Planning Authority.
- Further mitigation such as preservation in situ (avoidance), preservation by record (excavation), buffer zones may be required depending on the results of the monitoring.

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

Dublin Port is the proposed point of arrival for the large turbine components for the Proposed Project. The port is a well-established point of arrival for wind turbine components of similar scale into the State on a regular basis, as is the road network between the port and the national road network. It is proposed that the abnormal loads will be transported from Dublin Port northwards on the M50 before circulating Dublin. The route then exits the M50 at junction 9 onto the N7. The route then travels southwest on the N7 / M7 to junction 22 located to the south of Roscrea. The extent of the Turbine Delivery Route from Dublin Port is shown in Figure 4-33.

M7 junction 22 left slip / N62 junction

The swept path analysis undertaken for this junction is shown for the blade and tower transporters in Figures 15-6 and 15-7 respectively. The swept path for the blade transporter shows that as the vehicle turns left off the M7, in order to minimise the impact on the eastern corner of the M7 / slip road junction, the blade tip will be required to over-sail into the eastbound carriageway of the M7. This will require to be managed in consultation with TII and will require a short term closure of the eastbound arm of the motorway during the delivery of the turbine blades.

To facilitate the transportation of turbine components off the M7 and onto the N62 which runs along the western boundary of the Site, minor accommodating works are required at junction 22 off the M7 which involves the temporary stoning up of the verges. All works are minor, temporary and contained within the road carriage. Once the abnormal loads have been delivered, these areas will be reseeded.

N62 / L-3248 / site access junction

The proposed temporary access for the abnormally sized loads is shown in Figure 15-8. The temporary access for the abnormally sized loads is located on the southern side of the L-3248 directly into the junction with the N62. For this reason, this access will be opened temporarily only on the nights that the abnormally sized vehicle convoys deliver to the Site, with Site access at this location managed by An Garda Siochana and staff provided by the haulage company. At all other times during the construction period this access will be closed by means of a gate/ traffic barrier. On the completion of the construction phase this location will be fenced off and re-instated to its original state and will be opened only for the purpose of replacing large turbine component parts.

All deliveries of turbine components and other construction materials to the site will only be via the proposed transport routes outlined in Figure 15-1a and Figure 15-1b of Chapter 15 Material Assets.

All deliveries will access the site via these route for the duration of construction as per the programme outlined in Section 9 below. All deliveries of construction materials to the site will take place within the defined working hours of 7am – 7pm. It may be necessary on occasion, to commence works before 7am where concrete pours will be required to start earlier due to the volume of concrete required and the location of the concrete pour relative to the concrete supplier's batching plant. Main pours will be planned days and weeks in advance and will ensure disruption to work and school related traffic is avoided. The locations of all turbine foundations where large concrete pours will take place are off the public road and will be accessed by the internal site roads and will therefore eliminate the potential for queuing of trucks on the adjoining public road network. The typical vehicle type for delivery of construction materials to site with the exception of the wind turbines will be with standard heavy goods vehicles (HGV).

A detailed traffic and transport management plan for turbine delivery will be prepared by the haulage company, when appointed and will be submitted to the relevant Planning Authority for approval. The plan will include:

- A delivery schedule.
- A schedule of control measures for exceptional wide and heavy loads.
- A dry run of the route using vehicles with similar dimensions.

The deliveries of turbine components to the Site may be made in convoys of three to four 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. All deliveries comprising abnormally large loads where required will be made outside the normal peak traffic periods, usually at night, to avoid disruption to work and school-related traffic.

Prior to the Traffic Management Plan being finalised, a full dry run of the transport operation along the potential routes 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 for agreement with the relevant Authorities. All turbine deliveries will be provided for in a Traffic Management Plan which will be finalised in advance of oversized load deliveries, when the exact transport arrangements are known, delivery dates confirmed and escort proposals in place. Such a traffic management plan is typically submitted to the relevant Authorities 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.

The roads and bridges along the haul route will be subject to a condition survey by a suitably qualified engineer both before and after construction as appropriate. Protection measures for such infrastructure as specified by the appointed engineers report will be implemented in full prior to construction.

Where any temporary accommodation works are required along turbine haul route these areas will be reinstated to original condition after deliveries have been completed. In the event of construction damage arising on any roads or bridges along the haul route it will be rectified immediately by the developer under consultation with the relevant roads engineer.

Prior to the delivery of oversized loads, the developer will engage with the local community to provided information on the scale, time and duration of such deliveries. This information will be informed by pre-delivery surveys which will be completed by the suppliers. This information along with any other information relevant to the Proposed Project will be relayed to the local community by information leaflet and a website if deemed necessary. In addition, complaints will be documented in the site complaints log and the Environmental Manager/ECoW (See Section 4.1 of this CEMP) will arrange to meet with those affected. The situation will be acted upon immediately and reviewed by the Project Manager.

3.4.1.2 Proposed Grid Connection

A description of the Grid Connection is provided in Section 4.3.2 of the EIAR. It is proposed that the 110kV onsite electrical substation in the townland of Clonmore is connected by means of an underground 110kV electricity cable to the existing 110kV Ikerrin to Thurles overhead line located in the townland of Strogue, Co. Tipperary. The proposed underground electrical cabling route is approximately 2km long and runs through a mix of local road and agricultural lands. Please see Appendix 4-5 section and plan detail.

Deliveries of materials for the construction of the Proposed Grid Connection infrastructure and underground electrical cabling route will be via the public road network along the identified route. The proposed works will be rolling in nature; approx. 100m will be constructed along the L-7039 at any one time. As the proposed underground grid route connection is just 2km long, with c. 870m of this in the local road network, it is estimated that a total of 20.5 days will be required to complete the laying of the underground grid connection cable in the local road and undertake the directional drilling works at the Clonmore Stream.

With respect to the traffic volumes that will be generated during the construction of the underground electrical cabling route, it is estimated that there will be approximately 14 daily return trips made by a truck transporting materials and construction staff to and from the Site. By its nature the impacts of these additional trips will therefore be temporary and slight.

The construction methodology of providing a Grid Connection underground electrical cabling route under and along local road networks is well established and accepted nationwide. There are in excess of 300 wind farms currently operational in Ireland and the majority of these are connected to the national grid via underground cable connections predominantly along the public road networks.

3.4.2 Traffic Mitigation Measures During the Construction Stage

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 to minimise the effects of the additional traffic generated by the Proposed Project. The range of measures will include the following which are also set out in Chapter 15 of the EIAR.

A detailed **Traffic Management Plan (TMP),** incorporating all the mitigation measures set out within this CEMP along with Chapter 15 of the EIAR, will be finalised and detailed provisions in respect of traffic management agreed with the roads authority and An Garda Síochána prior to construction works commencing on Site. The detailed TMP will include the following:

Traffic Management Coordinator – 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.

Delivery Programme – a programme of deliveries will be submitted to Tipperary County Council and other relevant authorities in advance of deliveries of turbine components to the Site.

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 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.

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.

Liaison with the relevant local authorities - 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.

Implementation of temporary alterations to road network at critical junctions – At locations where required highlighted in Section 15.2.9 of the EIAR and 3.4.1 of this CEMP.

Identification of delivery routes – These routes will be agreed and adhered to by all contractors.

Travel plan for construction workers to 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.

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 junctions on the L-3248 and L-7039 and L-7039-1. 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). A member of construction staff (flagman) will be present at key junctions during peak delivery times.

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.

Additional measures - Various additional measures will be put in place in order to minimise the effects of the project traffic on the surrounding road network including sweeping / cleaning of local roads as required.

Re-instatement works - All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers.

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, 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 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.

Proposed measures to control dust include:

- Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions;
- The designated public roads outside the site and along the main transport routes to the site will be regularly inspected by the ECoW for cleanliness, and cleaned as necessary;
- Material handling systems and material storage areas will be designed and laid out to minimise exposure to wind;

- Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods;
- Water misting or bowsers will operate on-site as required to mitigate dust in dry weather conditions;
- All construction related traffic will have speed restrictions on un-surfaced roads to 15 kph;
- Daily inspection of construction sites to examine dust measures and their effectiveness.
- The site access roads will be checked weekly for damage/potholes and repaired as necessary.

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.

3.6 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. Proposed measures to control noise include:

- Diesel generators will be enclosed in sound proofed containers to minimise the potential for noise impacts;
- Plant and machinery with low inherent potential for generation of noise and/or vibration will be selected. All construction plant and equipment to be used on-site will be modern equipment and will comply with the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations;
- Regular maintenance of plant will be carried out in order to minimise noise emissions. Particular attention will be paid to the lubrication of bearings and the integrity of silencers;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works;
- Compressors will be of the “sound reduced” models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Machines, which are used intermittently, will be shut down during those periods when they are not in use;
- Training will be provided by the ECoW to drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation; and,
- Local areas of the haul route will be condition monitored and maintained, if necessary.

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 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;
- Machines will be shut down between work periods (or when not in use) or throttled down to a minimum;

- Regularly maintain all equipment used on site, 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.

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 site 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.

3.7 Invasive Species Management

A baseline invasive species survey will be 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. If the presence of such species is found at or adjacent to the site, 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.

3.7.1 Site Management

Careful preparation of the site and planning of the works is crucial to successful treatment of invasive species. The following list of guidelines, which is not exhaustive, shall be followed by all on-site personnel. Only those who have been inducted into biosecurity measures on-site may enter the contaminated zones within the works areas. Should any risk of contaminated material escaping be observed by the site supervisor, the management plan for the site must be amended by an appropriately qualified person to mitigate against the risk.

3.7.2 Establishing Good Site Hygiene

- A risk assessment and method statement must be provided by the Contractor prior to commencing works.
- Fences will be erected around areas of infestation, as confirmed by test pits, and warning signs shall be erected.
- A designated wash-down area will be created, where power-washed material from machinery can be contained, collected and disposed of with other contaminated material. This area will contain a washable membrane or hard surface.
- Stockpile areas will be chosen to minimise movement of contaminated soil.
- Stockpiles will be marked and isolated.
- Contaminated areas which will not be excavated will be protected by a root barrier membrane if they are likely to be disturbed by machinery. Root barrier membranes will be protected by a layer of sand above and below and topped with a layer of hardcore.

- The use of vehicles with caterpillar tracks within contaminated areas will be avoided to minimise the risk of spreading contaminated material.
- An ECoW/suitably qualified ecologist will be on site to monitor and oversee the implementation of invasive species management plans.

Plant and equipment which is operated within an area for the management of materials in contaminated areas should be decontaminated prior to relocating to a different works area. The decontamination procedures should take account of the following:

- Personnel may only clean down if they are familiar with the plant and rhizome material and can readily identify it.
- Decontamination will only occur within designated wash-down areas.
- Vehicles will be cleaned using stiff-haired brush and pressure washers, paying special attention to any areas that might retain rhizomes e.g. wheel treads and arches.
- All run-off will be isolated and treated as contaminated material. This will be disposed of in already contaminated areas.

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 Proposed 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.

3.8.1.1 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' (2021).* 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 Proposed 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 and Demolition 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: 9 no. turbines and associated foundations and hard-standing areas, meteorological mast, access roads, temporary construction compound, underground cabling, spoil management, site drainage, tree felling, river restoration, temporary borrow pit and all ancillary works and apparatus.
- Proposed Grid Connection: temporary construction compound, permanent 110kV onsite substation, and associated underground 110kV electrical cabling connecting to the existing Ikerrin to Thurles 110kV overhead line.

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 onsite 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 onsite borrow pit, with some material sourced from local quarries.

The onsite 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	LOW Code
Cables	Electrical wiring	17 04 11

Material Type	Example	LOW Code
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 that contamination does not occur.

3.8.3.2 Waste Arisings and Proposals for Minimisation, Reuse 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 should be taken to ensure excess waste is not generated during construction, including:

- Ordering of materials should 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 Site. Therefore, all waste 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 excavated from the borrow pit or sourced from 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.

3.8.4 Waste Arising from Decommissioning

The design life of the wind farm is 30 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. If 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 decommissioning are outlined in Table 3-3 below.

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

Material Type	Example	LOW 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

Material Type	Example	LOW Code
Lubricating Oils/Fluids	Oils used within wind turbines	13 02 04

3.8.4.1 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.
- Excavated peat can be reused for reinstatement of the areas around turbine foundations and adjacent to site roads.

3.8.4.2 Recycling

If a certain type of construction material cannot be reused onsite, 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.

3.8.4.3 Implementation

3.8.4.3.1 *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 Proposed Project adheres to the management plan.

3.8.4.3.2 *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.

3.8.4.3.3 *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

3.8.4.4 Waste Management Plan Conclusion

The WMP will be properly adhered to by all staff involved in the project which will be outlined within the induction process for all site personnel. The waste hierarchy should 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

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.

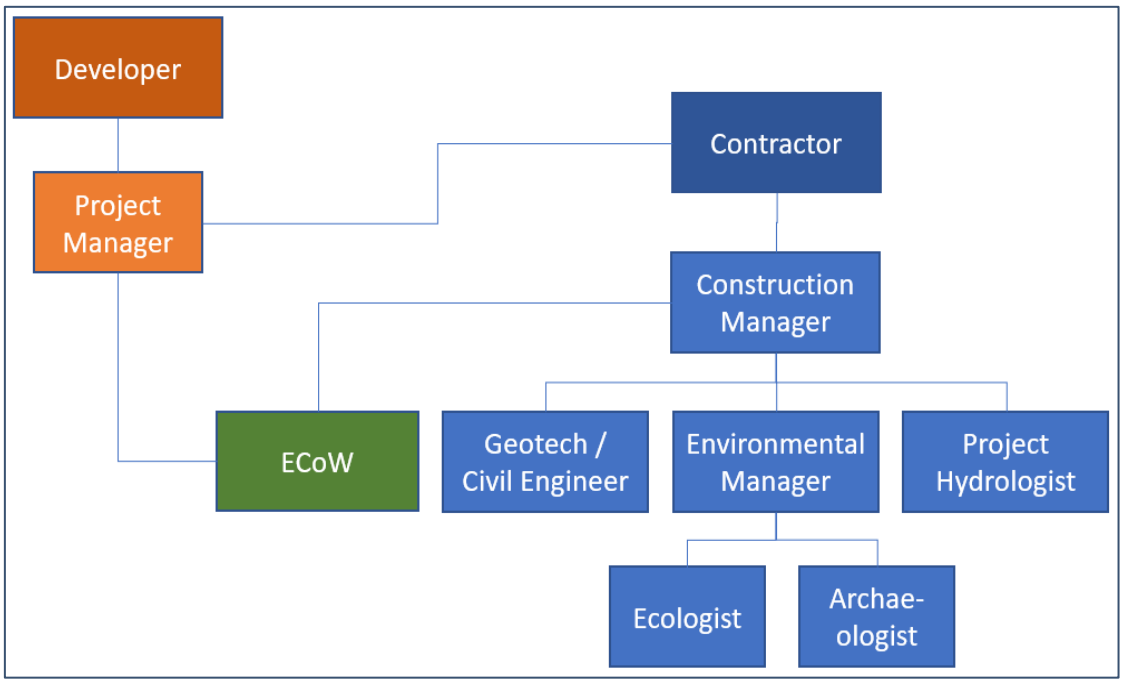

Figure 4-1 Proposed Project Organogram

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 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 Ecologist/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 onsite.
- 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 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 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 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.

Analysis will be for a range of parameters with relevant regulatory limits along with Environmental Quality Standards (EQSs) and sampling will be undertaken at designated locations as outlined in Figure 9-3 of the EIAR.

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. Inspections will also be undertaken after tree felling. 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, 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 watercourses 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.

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, and specifically following heavy rainfall events (i.e. weekly, monthly and event based).

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 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
- Materials and waste procedures

Site meetings would be held on a regular basis involving all site personnel. The objectives of site meetings is 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 non-compliance reoccurring.

During construction of the Proposed Project, all staff will be made aware of and adhere to the Health & Safety Authority's 'G*uidelines 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 under the 38kV overhead line 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 Sites 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 Grid Connection underground cabling will be in phases along the proposed grid route. Prior to commencing grid connection works in the agricultural fields in the

townland of Strogue, goal posts will be established under the 110k overhead line for the remainder of the grid connection of the construction phase. 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 them 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 5-1. 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 5-1. This will be updated throughout the various stages of the Proposed Project.

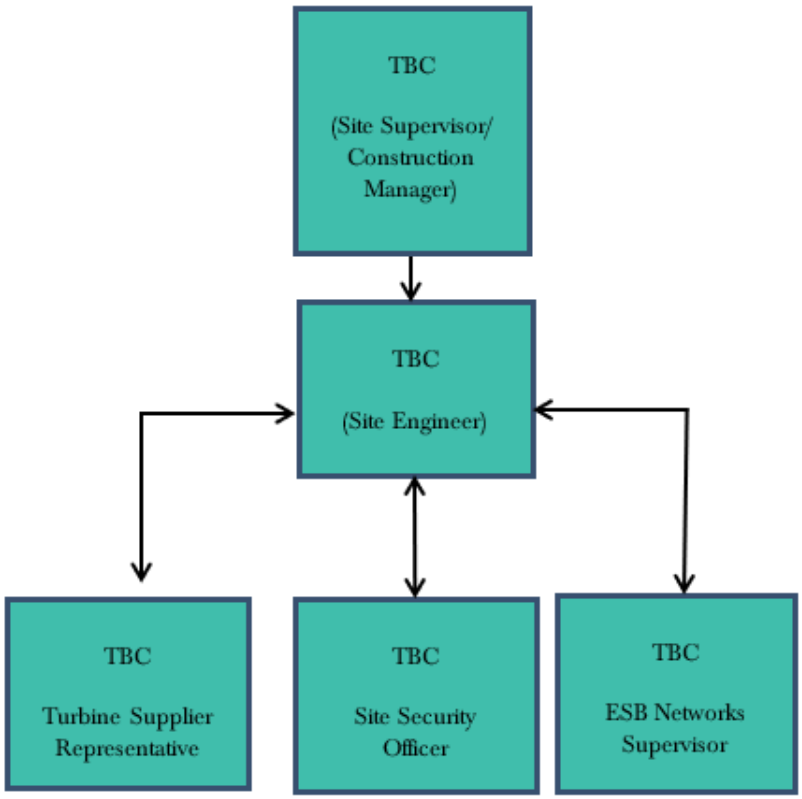

Figure 5-1 *Emergency Response Procedure Chain of Command*

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 5-1 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 Tipperary 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 Tipperary 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 Contact the Emergency Services

6.2.1 Emergency Communications Procedure

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

Stay calm. It's 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 don't 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's 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 don't 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 5-2. 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 – Templemore Medical Centre	0504 53133
Hospital – Tipperary University Hospital - Clonmel	052 6177000
ESB Emergency Services	1850 372 999
Gardaí – Templemore Garda Station	0504 25116
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: Buiríos Ltd.	021 7336034

6.3.1 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.

6.4 Induction Checklist

Table 5-3 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 Bord Pleanála.

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.

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 Schedule of Mitigation

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
EIAR Chapter 4 – Description of the Proposed Project					
Pre-Commencement Phase					
MM1	Environmental Management	EIAR Chapter 4	> All proposed activities on the site of the Proposed Project will be provided for in a Construction and Environmental Management Plan (CEMP), prepared prior to the commencement of any operations onsite. The CEMP will set out all measures necessary to ensure works are carried out in accordance with the mitigation measures set out in the EIAR and will set out the monitoring and inspections procedures and frequencies.		
MM2	Environmental Management	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 onsite. > The Environmental Clerk of Works (ECoW) will be nominated by the Project Developer to oversee the Project Contractor's effective implementation of the Proposed Developments environmental requirements and obligations, as captured in the Construction Environmental Management Plan (CEMP) and provide on-site advice on the mitigation measures necessary as necessary to ensure the project proceeds as intended. > 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.		
MM3	Surface Water Quality	CEMP Section 4	> Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of felling and construction at the site.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> Analysis will be for a range of parameters with relevant regulatory limits along with Environmental Quality Standards (EQSs) and sampling will be undertaken at designated locations as outlined in Figure 9-5 of the EIAR. > 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.		
MM4	Concrete Deliveries	EIAR Chapter 4 CEMP Section 3	> 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. >		
MM5	Site Drainage Plan	CEMP Section 4	> 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. > 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 4 of the CEMP.		
MM6	Waste Management	EIAR Chapter 4 CEMP Section 3	> 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 Waste Management Plan, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to		
MM7	Preparative Site Drainage Management	EIAR Chapter 4	> 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		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 4	with micro-siting of proposed drainage controls as outlined in Section 4.6 of the EIAR. > 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.		
MM8	Drainage Inspection	EIAR Chapter 4 CEMP Section 4	> 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 a catchment-by-catchment basis as the construction works develop across the site, as works in all areas will not commence simultaneously.		
MM9	Watercourse Inspection	EIAR Chapter 4 CEMP Section 4	> Confirmatory inspections of the proposed new watercourse crossing location will be carried out by the Project Civil/Structural Engineer and the Project Hydrologist prior to the construction of the crossing.		
MM10	Drainage Maintenance	EIAR Chapter 4 CEMP Section 4	> An inspection and maintenance plan for the drainage system onsite will be prepared in advance of commencement of any works. Regular inspections of installed drainage features will be necessary, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water within the system where it is not intended. The inspection of the drainage system will be the responsibility of the environmental clerk of works or the supervising hydrologist		
MM11	Earthworks	CEMP Section 4	> Drainage and associated pollution control measures will be implemented onsite 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.		
MM12	Felling	EIAR Chapter 4 CEMP Section 2	> Before the commencement of any felling works, an Environmental Clerk of Works (ECoW) shall be appointed to oversee the works.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> Pre-construction surveys will be undertaken prior to the initiation of works at the Site. If winter roosting 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 first winter or breeding season of the construction phase. If it is found to be active during the construction phase, no works shall be undertaken within a disturbance buffer in line with industry best practice (e.g. Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007). No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied. > Prior to the commencement of felling works, review and agreement of the positioning by the Operator of the required Aquatic Buffer Zones (ABZs), silt traps, silt fencing, water crossings and onsite storage facilities for fuel, oil and chemicals will be carried out by the ECoW.		
MM13	Felling Drainage Management	EIAR Chapter 4 CEMP Section 3	Prior to the commencement of tree felling for 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.		
MM14	Felling Licence	EIAR Chapter 4	> Felling will be carried out under the terms of a licence application to the Forest Service, as per the Forest Service's policy on granting felling licenses for wind farm developments.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM15	Traffic Management	EIAR Chapter 4, 15 CEMP Section 3	› Prior to the Traffic Management Plan being finalised, a full dry run of the transport operation along the potential route will be completed using vehicles with attachments to simulate the dimensions of the wind turbine transportation vehicles. › When the Grid Connection underground cabling route is located on public roads, a Traffic Management Plan 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		
MM16	Spoil Management	EIAR Chapter 4 CEMP Section 2	› Prior to the use of areas for spoil management an interceptor drain will first be excavated upslope in order to intercept existing overland flow and divert it around the spoil management area prior to discharge via a buffer zone on the downslope side. › Silt fences and double silt-fences will be emplaced down-gradient of spoil management areas and will remain in place throughout the entire construction phase, or until reseeding has been established to a sufficient level. › All the recommendations/best practice guidelines for the placement of spoil in identified spoil management areas and alongside access roads will be confirmed by the Geotechnical Engineer prior to construction		
MM17	River Restoration	EIAR Chapter 4 CEMP Section 2	› Survey of control points shall be required to establish accurate riffle installation within the tolerance specified by the designer.		
MM18	Borrow Pit	EIAR Chapter 4, Chapter 13 CEMP Section 2	› The area to be used for the borrow pit will be marked out at the corners using ranging rods or timber posts. › An unrecorded crop mark located approx. 20 m northeast of the borrow pit location will be closed off with fencing and signage for the duration of the construction phase.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM19	Grid Connection underground cabling route works	EIAR Chapter 4	> Before works commence, updated surveying will take place along the proposed cable route, with all existing culverts identified. All relevant bodies i.e. ESB, Tipperary County Council etc. will be contacted and all up to date drawings for all existing services sought.		
			Construction Phase		
MM20	Refuelling	EIAR Chapter 4 CEMP Section 3	> Road-going vehicles will be refuelled off site wherever possible; > Fuels volumes stored on site should be minimised. Any fuel storage areas 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 electrical substation 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; > Oils or fuels stored in turbines will be placed within an appropriately sized bunded unit to prevent leakage to groundwater or surface water; > An emergency plan for the construction phase to deal with accidental spillages will be developed (refer to Section 5 6 of this Plan) Spill kits will be available to deal with and accidental spillage in and outside the refuelling area. > A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the construction phase. The following mitigation measures are proposed to avoid release of hydrocarbons at the Site: > 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. Other refuelling will be carried out using mobile double skinned fuel bowser. The fuel bowser will be parked on a level area on-site when not in use. > All refuelling will be carried out outside designated watercourse buffer zones.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> 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.		
MM21	Concrete Deliveries and Management	EIAR Chapter 4 CEMP Section 3	> No batching of wet-cement 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; > No washing out of any plant used in concrete transport or concreting operations will be allowed on-site; > Where concrete is delivered on Site, only the chute will need to be cleaned, using the smallest volume of water possible. 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 is to be directed into a dedicated concrete wash out pit. Decommissioning of this pit will occur at the end of the construction phase and water and solids will be tanked and removed from the site to a suitable, non-polluting, discharge location; > All concrete will be paced in shuttering and will not be in contact with soils or groundwater until after it has set; > Use weather forecasting to plan dry days for pouring concrete; and, > Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event. > 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. The 50 m wide watercourse buffer zone will be in place for the duration of the construction phase. No construction activity will occur within the buffer zone with the exception of clear span crossing construction. The buffer zone will: > Prevent any cement-based products accidentally entrained in the construction phase drainage system entering directly into watercourses, achieved in part by ending drain discharge outside the 50 m buffer zone and allowing percolation across the vegetation of the buffer zone; > Provide a buffer against accidental direct pollution of surface waters by any pollutants, or by pollutants entrained in surface water run-off.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM22	Road Cleanliness	EIAR Chapter 4 CEMP Section 3	> 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. > When necessary, sections of the haul route will be swept using a truck mounted vacuum sweeper.		
MM23	Watercourse Buffers	EIAR Chapter 4. CEMP Section 4	> 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. Buffer zones around the existing natural drainage features have been used to inform the layout of the Proposed Project. Buffered outfalls which will be numerous over the site which 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		
MM24	Water Discharge	EIAR Chapter 4. CEMP Section 4	> 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. > 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 Site drainage into the existing site drainage network where possible. 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 upgradient of where construction works / tree felling is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area		
MM25	Wastewater Management	EIAR Chapter 4	> The construction compound will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors. Temporary port-a-loo toilets and toilets		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 2	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 wastewaters being tankered off site by permitted waste collector to wastewater treatment plants. There will also be a water supply on site for hygiene purposes, by way of a temporary storage tank.		
MM26	Drainage Swales	EIAR Chapter 4 CEMP Section 4	> 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.		
MM27	Interceptor Drains	EIAR Chapter 4 CEMP Section 4	> 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 can be re-distributed over the ground by means of a level spreader.		
MM28	Check Dams	EIAR Chapter 4 CEMP Section 4	> Check dams will be maintained at regular intervals along interceptor drains and swales/roadside drains in order to reduce flow velocities and therefore minimise erosion within the system during storm rainfall events;		
MM29	Level Spreaders	EIAR Chapter 4 CEMP Section 4	> 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 are not likely to contribute further to water ingress to construction areas of the site.		
MM30	Piped Slope Drains	EIAR Chapter 4	> Piped slope drains will be used to convey surface runoff from diversion drains safely down slopes to flat areas without causing erosion. Once the runoff reaches the flat areas it will be reconverted to diffuse sheet flow. Level spreaders will only be		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 4	established on slopes of less than 6% in grade. Piped slope drains will be used to transfer water away from areas where slopes are too steep to use level spreaders;		
MM31	Vegetation Filters	EIAR Chapter 4 CEMP Section 4	> 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;		
MM32	Settlement Ponds	EIAR Chapter 4 CEMP Section 4	> Stilling ponds/settlement ponds, emplaced downstream of swales and roadside drains, 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. The stilling ponds will be sized according to the size of the area they will be receiving water from but will be sufficiently large to accommodate peak flows storm events. Inspection and maintenance of all settlement ponds will be ongoing through the construction period.		
MM33	Dewatering Silt Bag	EIAR Chapter 4 CEMP Section 4	> Dewatering silt bags allow the flow of water through them while trapping any silt or sediment suspended in the water. The silt bags provide a passive non-mechanical method of removing any remaining silt contained in the potentially silt-laden water collected from works areas within the Site. > 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.		
MM34	Siltbuster	EIAR Chapter 4	> Siltbusters 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		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 4	ponds or swales. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. They are specifically designed for use on construction sites.		
MM35	New Culverts/ Culvert Upgrades	EIAR Chapter 4	> 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 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 does not occur above or below the culvert and water can continue to flow as necessary.		
MM36	New Watercourse Crossing	EIAR Chapter 4 CEMP Section 2	> 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 pre-cast concrete slab across the watercourse to provide temporary access for the excavator. Plant and equipment will not be permitted to track across the watercourse.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> 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. > 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.		
MM37	Directional Drilling	EIAR Chapter 4, chapter 9 CEMP Section 3	> 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); > Where works are necessary inside the 50m buffer double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase		
MM38	Silt Fences	EIAR Chapter 4 CEMP Section 3	> 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 stream. These areas include around existing culverts, around the headwaters of watercourses, and the proposed locations are indicated on the drainage design drawings included in Appendix 4-3. > 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 Construction Industry Research and Information Association (CIRIA, No. C648, 1996). Up to three silt fences may be deployed in series.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> All silt fencing will be formed using Terrastop Premium or equivalent silt fence product. Silt fences will be inspected regularly to ensure water is continuing to flow through the fabric, and the fence is not coming under strain from water backing up behind it.		
MM39	Sedimats	EIAR Chapter 4	> 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		
MM40	Oil Interceptors	EIAR Chapter 4 CEMP Section 4	> The limited amount of fuel to be stored on the Site will be in appropriately bunded containers and a bunded area for oil storage will be constructed within the temporary construction compounds.		
MM41	Grid Connection underground cabling route	EIAR Chapter 4 CEMP Section 2	> Any underground services encountered along the cable 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. > 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 > The precise siting of all Joint Bays, Earth Sheath Link Chambers and Communication Chambers within the corridor assessed is subject to approval by ESBN and Eirgrid.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> The crossing methodologies employed at the culvert and manmade drain crossings along the underground cabling route , will be selected from the suite of watercourse crossing options , as appropriate, depending on culvert type, depth, size and local ground conditions. > 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 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. > Inland Fisheries Ireland have published guidelines relating to construction works along water bodies entitled "Requirements for the Protection of Fisheries Habitats during Construction and Development Works at River Sites", and these guidelines will be adhered to during the construction of the Proposed Project.		
MM42	Oversized Swales	EIAR Chapter 4 CEMP Section 3	> 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.		
MM43	Water Discharge	EIAR Chapter 4	> All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses. Buffer zones around the existing natural drainage features have been used to inform the layout of the Proposed Project.		
MM44	Wastewater Management	EIAR Chapter 4.	> Temporary toilets will be used during the construction phase as part of the welfare facilities for site staff and visitors. Wastewater from toilets will be directed to a		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 3	sealed storage tank, with all wastewaters tankered off site by an appropriately consented waste collector to wastewater treatment plants.		
MM45	Collector Drains	EIAR Chapter 4. EIAR Chapter 9	> Swales will be used to intercept and collect run off from construction areas of the site during the construction phase, and channel it to settlement ponds for sediment attenuation as per the drainage design.		
MM46	Interceptor Drains	CEMP Section 3 EIAR Chapter 9	> Interceptor drains will be installed up-gradient of any works areas to collect surface flow runoff and prevent it reaching excavations and construction areas of the site. It will then be directed to areas where it can be re-distributed over the ground as sheet flow as per the drainage design.		
MM47	Level Spreaders	CEMP Section 3 EIAR Chapter 4, 9	> 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 are not likely to contribute further to water ingress to construction areas of the site.		
MM48	Stilling Ponds	CEMP Section 3 EIAR Chapter 4, 9	> Stilling ponds/settlement ponds, emplaced downstream of swales and roadside drains, 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. The stilling ponds will be sized according to the size of the area they will be receiving water from but will be sufficiently large to accommodate peak flows storm events. Inspection and maintenance of all settlement ponds will be ongoing through the construction period.		
MM49	Silt Bag	CEMP Section 3.	> Silt bags allow the flow of water through them while trapping any silt or sediment suspended in the water. The silt bags provide a passive non-mechanical method of		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		EIAR Chapter 4, 9	removing any remaining silt contained in the potentially silt-laden water collected from works areas within the site.		
MM50	Siltbuster	CEMP Section 3. EIAR Chapter 4, 9	> Siltbuster type concrete unit. 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. > The siltbuster system comprises an electronic in-line dosing system which provides an accurate means of adding reagents, so overdosing cannot occur; > 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).		
MM51	Culvert Upgrades	CEMP Section 3. EIAR Chapter 4, 9	> All new proposed culverts and proposed culvert upgrades will be suitably sized for the expected peak flows in the watercourse. > All proposed new stream crossings will be bottomless or clear span culverts 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;		
MM52	Silt Fences	CEMP Section 3. EIAR Chapter 4, 9	> Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids such as those present in the subsoils/sandstone tills that overlie the Site. 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		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			the entire construction phase. Double silt fences will be placed within drains down-gradient of all construction areas inside the 50m buffer zones. > Silt fences will be placed within drains down-gradient of all construction areas. > They will remain in place throughout the entire construction phase. > 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. > All silt fencing will be formed using Terrastop Premium or equivalent silt fence product. > Silt fences will be inspected regularly to ensure water is continuing to flow through the fabric, and the fence is not coming under strain from water backing up behind it		
MM53	Excavations	EIAR Chapter 4 CEMP Section 4	> 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 turbine; > 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 turbine 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 turbine foundation;		
MM54	Spoil Management	EIAR Chapter 4 CEMP Section 4	> The spoil management areas and placement of spoil alongside access roads have been selected based on the locations of spoil generation, areas suitable for spoil management and environmentally constrained areas such as identified site-specific flood modelled zones as detailed in Chapter 9: Water.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> Placement of spoil alongside access roads will consist of a 3m wide berm on either side of the road as appropriate. Spoil placement alongside access roads will take place outside of watercourse buffers and of the site-specific flood modelled zone within the Site. > At the identified spoil management areas, the vegetative top-soil layer will be removed to allow for spoil to be placed and upon reaching the recommended height, the vegetative topsoil layer will be reinstated. > The identified spoil management areas will be developed in a phased approach, with the topsoil removed and temporarily stockpiled within the defined area while the spoil it being placed. The stockpiled topsoil will then be reinstated over the placed spoil, and the exercise will continue within the same spoil management area until the area is full. > In the case of T06 where spoil management areas will be within areas of felled forestry, no topsoil will be excavated. The tree stumps will be left in-situ, and the spoil will be placed on top of the existing ground and finished with a layer of topsoil from within the site. > The placement of spoil will be restricted to a maximum height of 1.0m, subject to confirmation by the Geotechnical Engineer. > Where practical, it will be ensured that the surface of the placed spoil is shaped to allow efficient run-off of surface water. Where possible, shaping of the surface of the spoil will be carried out as placement of spoil within the area progresses. This will reduce the likelihood of debris run-off and ensure stability of the placed spoil. > Finished/shaped side slopes of the placed spoil will be not greater than 1 (v): 2 (h) in the dedicated spoil management zones and not greater than 1 (v): 1 (h) alongside access tracks. > Inspections of the spoil management areas will be made by a Geotechnical Engineer through regular monitoring of the works. The appointed contractor will review work practices at spoil management areas when periods of heavy rainfall are expected so as to prevent excessive dirty water runoff from being generated. > An interceptor drain will be installed upslope of the identified spoil management areas to divert any surface water away from these areas. > Silt fences and double silt-fences will be emplaced down-gradient of spoil management areas and will remain in place throughout the entire construction phase, or until reseeding has been established to a sufficient level.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> The surface of the deposited spoil will be profiled to a gradient to be agreed with the Geotechnical Engineer and vegetated or allowed to vegetate naturally as indicated by the Project Ecologist. > All the above-mentioned general guidelines and requirements will be confirmed by the Geotechnical Engineer prior to construction. > Inspections of the spoil management areas will be made by a geotechnical engineer through regular monitoring of the works. The appointed contractor will review work practices at spoil management areas when periods of heavy rainfall are expected so as to prevent excessive surface water runoff from being generated. > The surface of the spoil management area will be profiled to a gradient to be agreed with the Geotechnical Engineer and vegetated or allowed to vegetate naturally as indicated by the Project Ecologist. Where there is a risk of inadvertent access into spoil management areas fencing will be provided.		
MM55	Archaeological Conservation	EIAR Chapter 4, 13	A 20m buffer will be established around an unrecorded crop mark located approx. 20 m northeast of the borrow pit location. It will be closed off with fencing and signage for the duration of the construction phase		
MM56	Borrow Pit	EIAR Chapter 4, CEMP Section 2	The borrow pit will be excavated and backfilled as follows: > 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 selected spoil management areas, see Figure 4-21 for details; > 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 4.9.7.1.1 and 4.9.7.1.2 above) 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;		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> 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 access track through the borrow pit providing access to T1 will be completed; and, > The extraction area of the borrow pit will be permanently secured and a stock-proof fence with appropriate health and safety signage will be erected around any unsafe areas of the borrow pit to prevent access to these areas. Two extraction methods have been assessed for breaking out the useful rock, rock breaking and blasting. As the predicted construction noise levels for both breaking and blasting are well within the construction noise criterion outlined in Table 12 1 of Chapter 12, no specific mitigation measures are required. However, should blasting be required: > 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. > 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 onsite 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.		
MM57	River Restoration	EIAR Chapter 4 CEMP Section 2	> All stream work to be performed "in the dry" either by pump-around or stream diversion with silt curtain. > Impervious dikes or sandbags are to be used to isolate work from stream flow. > The contractor shall not disturb more area than can be stabilised the same working day.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		Appendix 6-4	> Maintenance of stream flow operation shall be incidental to the work. This includes pumps and hoses. > Pumps and hoses shall be of sufficient size to dewater the work area. > Graded stream banks shall be stabilised, with matting, prior to predicted rain fall events. > Silt bags and stilling basins shall be used to collect silt and sediment from work area dewatering. > Work area to be stabilised at the end of each day.		
Operational Phase					
MM58	Wastewater Management	EIAR Chapter 4 CEMP Section 3	> The wastewater storage tank alarm will be part of a continuous stream of data from the Site's turbines, wind measurement devices and electricity 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.		
MM59	Electrical Substation	EIAR Chapter 4, CEMP Section 7	> The electrical substation 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; > Lightning poles will be erected at appropriate locations adjacent to the substation. All lightning poles will be appropriately earthed. > Perimeter fencing will be erected around the substation and control buildings compound area.		
MM60	Surface water Flooding	EIAR Chapter 4, Chapter 9	> Turbine bases T3, T4, T7, T8 and T9 will have finished floor levels +500mm above the 1000-year flood level.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Decommissioning Phase		
MM61	Decommissioning	EIAR Chapter 4	Prior to the end of the operational period the Decommissioning Plan (Appendix 4-4 of the EIAR) will be updated in line with decommissioning methodologies that may exist at the time and will agree with the competent authority at that time.		
MM62	Decommissioning	EIAR Chapter 4 DP Section 2	> Upon decommissioning of the Site, all above ground turbine components will be separated and removed off-site for recycling. Turbine foundations will remain in place underground and will be covered with earth and reseeded as appropriate. > On removal of turbines, the covering of the foundation will be completed using locally sourced material imported to site as the required quantity of material does not currently exist at the site. The imported soil will be spread and graded over the foundation using a tracked excavator and revegetation enhanced by spreading of an appropriate seed mix to assist in revegetation. > The underground cabling route connecting the turbines to the on-site substation will be removed from the cable ducts. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance. The cable materials will be transferred to a suitable recycling or recovery facility.		
MM63	Decommissioning	EIAR Chapter 4 DP Section 3	The following mitigation measures are proposed to avoid release of hydrocarbons at the Site: > 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. > Other refuelling will be carried out using mobile double skinned fuel bowser. The fuel bowser will be parked on a level area on-site when not in use. > All refuelling will be carried out outside designated watercourse buffer zones.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> 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 > A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the decommissioning phase.		
Chapter 5: Population and Human Health					
Pre-Construction Phase					
MM64	Human Health	EIAR Chapter 5	Prior to commencement of any works, the occupants of dwellings in the vicinity of the proposed works will be contacted and the scheduling of works will be identified in line with the engagement plan. Local access to properties will also be maintained throughout any construction works and local residents will also be supplied with the number of the works supervisor in order to ensure that disruption will be kept to a minimum.		
Construction Phase					
MM65	Human Health	EIAR Chapter 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. 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). > A Health and Safety Plan covering all aspects of the construction process will address the Health and Safety requirements in detail.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> Fencing will be erected in areas of the Site where uncontrolled access is not permitted. Appropriate health and safety signage will also be erected on this fencing and at locations around the Site. > Health and safety guidelines for working within and around electrical substations and overhead lines will be adhered to on site. > 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 under the 38kV overhead line 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 Sites 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. > 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.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> 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 construction of the Grid Connection will be in phases along the proposed underground cabling route. Prior to commencing grid connection works in the agricultural fields in the townland of Strogue, goal posts will be established under the 110k overhead line for the remainder of the Grid Connection of the construction phase. The goal posts will not exceed a height of 4.2 metres, unless specifically agreed with ESB Networks. > 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 end mast 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. > 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		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM66	Human Health	EIAR Chapter 5, 12	> 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; > Ensure that any extraordinary site work occurring outside of the core working hours (for example, crane operations lifting components onto the tower) will be programmed, when appropriate, so that haulage vehicles would not arrive at or leave the site between 19:00 and 05:00, with the exception of abnormal loads that would be scheduled to avoid anticipated periods of high traffic flows; > 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 would be 'sound reduced' models fitted with properly lined and sealed acoustic covers, which would 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 on site, 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. > Where the BS5228 threshold levels are anticipated to be exceeded due to directional drilling activities along the underground 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 site between the drilling rig and the closest residential receptors. > Examples of appropriate products include Echo Noise Defender and Soundex DeciBloc.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM67	Human Health	EIAR Chapter 5, 10	> 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. > Turbines and construction vehicles will be transported to the Site on specified haul routes only. > The majority of construction materials for the Proposed Wind Farm will be sources at the onsite borrow pit. The remaining construction materials for the Proposed Wind Farm and Proposed Grid Connection will be sourced locally from licenced quarries and transported on specified haul routes only. > 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. > 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.		
			Operational Phase		
MM68	Human Health	EIAR Chapter 5	> The build-up of ice on turbines is unlikely to present problems. The wind turbines will be fitted with anti-vibration sensors, which will detect any imbalance caused by icing of the blades. The sensors will cause the turbine to wait until the blades have been de-iced prior to beginning operation. > Lightning conduction cables, encased in protection conduits, will follow the electrical cable run, from the nacelle to the base of the turbine. The conduction cables will be earthed adjacent to the turbine base. The earthing system will be installed during the construction of the turbine foundations.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> Access to the turbines is through a door at the base of the structure, which will be locked at all times outside maintenance visits. > Safety Signate will be erected around the Site: These signs include: o Buried cable route markers at 50m (maximum) intervals and change of cable route direction; o Directions to relevant turbines at junctions; o "No access to Unauthorised Personnel" at appropriate locations; o Speed limits signs at site entrance and junctions; o "Warning these Premises are alarmed" at appropriate locations; o "Danger HV" at appropriate locations; o "Warning – Keep clear of structures during electrical storms, high winds or ice conditions" at site entrance; o "No unauthorised vehicles beyond this point" at specific site entrances; and o Other operational signage required as per site-specific hazards. > 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 and providing for access for emergency services at all times.		
MM69	Shadow Flicker	EIAR Chapter 5	Where daily or annual shadow flicker exceedances are predicted at any inhabitable dwelling, a site visit will be undertaken firstly to determine the existing screening and window orientation. This will determine if the receptor has an actual line of sight to any turbine. Once this is completed and all of the potential receptors identified, the following measures will be employed; **Screening Measures** 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;		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> 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. **Wind Turbine Control Measures** If it is not possible to mitigate any identified shadow flicker limit exceedance locally using the measures detailed above, wind turbine control measures will be implemented. Wind turbines can 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. A shadow flicker control unit allows a wind turbine to be programmed and controlled using the wind farm's SCADA control system to change a particular turbine's operating mode during certain conditions or times, or even turn the turbine off if necessary.		
Chapter 6: Biodiversity					
Pre-Construction Phase					
MM70	Invasive Species Management	EIAR Chapter 6 CEMP Section 3	A baseline invasive species survey will be 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. If the presence of such species is found at or adjacent to the site, 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.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM71	Fauna	EIAR Chapter 6	**Otter:** > As otter are known to occur within watercourses within the Site, a pre-commencement otter survey will be undertaken upstream and downstream of all proposed watercourse crossings/culvert upgrades within the Site and in accordance with standard best practice guidance prior to the commencement of site works. In the unlikely event that an otter holt is identified within or immediately adjacent to the Proposed Project footprint, consultation will be undertaken with the National Parks and Wildlife Service and a derogation licence applied for. > All conditions of a derogation licence will be implemented in full. > No works should be undertaken within 150m of any holts at which breeding females or cubs are present. > No wheeled or tracked vehicles (of any kind) should be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance should also not take place within 15m of such holts, except under licence (TII, 2006[4]). **Badger:** > A pre-construction badger survey will be carried out in order to assess activity levels at setts and to identify any additional sett entrances that may have been excavated in the intervening period. > Any active setts recorded within 50m of the Proposed Project footprint will subsequently be monitored for a minimum period of 2 weeks using remote cameras in order to ascertain use by badgers and levels of activity, and to assess the requirement for specific mitigation measures to limit disturbance. All badger survey work will be undertaken in line with current best practice guidance[5]. > Should any setts within 50m of the Proposed Project be found to be in active use by badgers during the pre-construction badger monitoring, it would be necessary to ensure that the risk of disturbance to badgers is mitigated appropriately. Any badger mitigation required would be undertaken following published best practice guidelines for the treatment of badgers (NRW, 2009) and in consultation with		

[4] *NRA, 2006. Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. Dublin: Transport Infrastructure Ireland. Available at: www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Otters-prior-to-the-Construction-of-National-Road-Schemes.pdf*

[5] *National Roads Authority (2006) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes.*

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			NPWS. Any setts that could potentially be subject to direct impacts would be excluded and closed in consultation with NPWS, and wherever possible subsequently re-opened following completion of construction to allow badgers to recolonise them. If any works within 50m of an active sett are to take place during the badger breeding season (i.e. July 1st – November 30th) temporary exclusion of these setts during the construction phase would be required prior to the breeding season commencing. The setts would be excluded and closed in consultation with NPWS, and subsequently re-opened following completion of construction to allow badgers to recolonise them. > Taking a precautionary approach, the following measures will be undertaken for the avoidance of disturbance/displacement and will be implemented during the construction phase of the Proposed Project to avoid heavy machinery access or materials storage in close proximity to the identified badger sett within the forestry that occurs within 30 metres of the proposed forestry felling: > Exclusion zone fencing and appropriate signage will be put in place to prevent any activity that could directly impact the sett. **Pine Marten:** > A pre-construction mammal survey will be carried out in order to assess activity levels at the den location used by the species during 2020, and to identify any additional dens within the Site that may have been created or become occupied in the intervening period. Any active dens recorded within 100m of the Proposed Project will subsequently be monitored for a minimum period of 2 weeks using remote cameras in order to ascertain use by pine marten and levels of activity, and to assess the requirement for additional mitigation measures. All survey work will be undertaken in line with current best practice guidance[6]. > Should any active pine marten dens within 30m of the Proposed Project footprint (or breeding dens within 100m), including felling buffers, be found to be in active use by the animals during the pre-construction monitoring, it would be necessary to ensure that the risk of direct mortality and disturbance to pine marten is mitigated appropriately. Any pine marten mitigation required would be undertaken following published best practice guidelines and in consultation, and where required under		

[6] *National Roads Authority (2006) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes.*

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			licence from, NPWS. Where any breeding is found to be occurring at dens that could potentially be directly or indirectly affected, no works within 100m will be carried during the breeding season (March – June inclusive), and monitoring with camera traps will be required to ensure until all animals have left the den following breeding prior to any commencement of works within 100m of a breeding den. A derogation licence would be required for any works that could potentially cause disturbance to an occupied pine marten den.		
MM72	Bats	EIAR Chapter 6 Appendix 6-2	NatureScot recommends that a distance of 50m between turbine blade tip and nearest woodland (or other key habitat features) is adequate mitigation. This 50m buffer will be implemented from the outset and monitored as per the post construction monitoring. As such, the trees with potential roosting features have been considered as a "roost resource" and compensation will be provided to cover for the loss of the resource. The following procedures are proposed prior to felling trees with PRFs: › A bat derogation licence will be obtained from the NPWS for the loss of the roost resource, prior to felling, and the felling activity will be supervised by a qualified ecologist. › Tree-felling of mature deciduous trees will be carried out according to the following standard mitigating procedures: ○ Trees with suitable potential roost features proposed for felling will be checked for bats by a suitably qualified arborist at the time of felling. ○ Trees will be nudged two or three times prior to limb removal, with a pause of 30 seconds in between, to allow bats to wake and move. ○ Rigged felling shall be used to lower the limbs and trunk carefully to ground level and cavities searched by a qualified ecologist. ○ Felled trees will be left in-situ for a minimum of 24 hours prior to sawing or mulching, to allow any bats present to escape (National Roads Authority, 2006). ○ Any tree felling will be undertaken outside the bat maternity season (May-August) and the hibernation period (December-February) (Marnell, Kelleher and Mullen, 2022).		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Where the potential for indirect effects (i.e. disturbance) on bats potentially roosting within watercourse, drain and culvert crossing infrastructure has been identified, the following mitigating procedures are proposed: ○ An inspection survey will be carried out prior to the commencement of the works to ensure no bats are roosting within the infrastructure. ○ If the inspection survey cannot provide sufficient data to exclude the presence of a roost (i.e. due to lack of access), an activity survey will also be conducted prior to commencement. ○ Where evidence of bats is identified during the above pre-commencement surveys, a Derogation Licence will be required from NPWS for the continuation of the works. ○ The works will be carried out outside the maternity (May-August) and hibernation (November-March) seasons to avoid the potential for disturbance on bats during sensitive periods of their lifecycle.		
MM73	Amphibians	EIAR Chapter 6	> A pre-commencement Common Frog survey will be undertaken in accordance with standard best practice guidance prior to the commencement of works for Turbine 6. Any amphibians found will be translocated to suitable habitat within the Site, outside of construction areas, under licence from the National Parks and Wildlife Service. > All conditions of a derogation licence will be implemented in full. > All of the above works will be undertaken or supervised by an appropriately qualified ecologist.		
Construction Phase					
MM74	Flora & Fauna	EIAR Chapter 6	<u>Noise Restriction</u> > 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).		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		Appendix 6-2	Lighting Restriction Exterior lighting, during construction and post construction, shall be designed to minimize light spillage, thus reducing the effect on areas outside the Proposed Project, and consequently on bats i.e. Lighting will be directed away from mature trees/treelines around the periphery of the site boundary to minimize disturbance to bats. Directional accessories can be used to direct light away from these features, e.g. through the use of light shields (Stone, 2013). The luminaries will be of the type that prevent upward spillage of light and minimize horizontal spillage away from the intended lands. The proposed lighting around the site shall be designed in accordance with the Institute of Lighting Professionals Guidance Note 08/18 Bats and artificial lighting in the UK. In addition, the applicant commits to the use of lights during construction (such that they are necessary) in line with the following guidance that is provided in the Dark Sky Ireland Lighting Recommendations: > Every light needs to be justifiable, > Limit the use of light to when it is needed, > Direct the light to where it is needed, > Reduce the light intensity to the minimum needed, > Use light spectra adapted to the environment, When using white light, use sources with a "warm" colour temperature (less than 3000K).		
MM75	Aquatic Habitats and Fauna	EIAR Chapter 6, Chapter 9 CEMP Section 3	> Inland Fisheries Ireland (IFI) will be consulted a minimum of four weeks in advance of watercourse crossing works. The Inland Fisheries Ireland (2016): *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*; and the Scottish Natural Heritage (SNH) *Good Practice During Wind Farm Construction* (SNH, 2019, 4th Edition) will also be adhered to. 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). > With the implantation of the drainage design, surface water quality will be protected during the construction phase.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM76	Woodlands and Linear vegetation	EIAR Chapter 6	It is proposed that approximately 5.17 linear kilometres of new replacement treeline/ hedgerow planting and existing hedgerow/ treeline bolstering will be carried out throughout the Site. This will result in a net gain in this habitat within the site. Tree/shrub species planted in these locations will be of a similar composition to those occurring onsite, will be native and of local provenance. Planting of 1.8ha of woodland native species along the Eastwood river will be carried out by hand as prescribed in the Forestry Schemes Manual and will be done with Forest Service Technical Approval		
MM77	Invasive Species	EIAR Chapter 6 CEMP Section 3	> The following measures are proposed to establish good site hygiene to ensure the control of any potential spread of invasive species during construction works, if they are identified prior to the commencement of the construction phase: > A risk assessment and method statement must be provided by the Contractor prior to commencing works. > Fences will be erected around areas of infestation, as confirmed by test pits, and warning signs shall be erected. > A designated wash-down area will be created, where power-washed material from machinery can be contained, collected and disposed of with other contaminated material. This area will contain a washable membrane or hard surface. > Stockpile areas will be chosen to minimise movement of contaminated soil. > Stockpiles will be marked and isolated. > Contaminated areas which will not be excavated will be protected by a root barrier membrane if they are likely to be disturbed by machinery. Root barrier membranes will be protected by a layer of sand above and below and topped with a layer of hardcore. > The use of vehicles with caterpillar tracks within contaminated areas will be avoided to minimise the risk of spreading contaminated material. > An ECoW/suitably qualified ecologist will be on site to monitor and oversee the implementation of invasive species management plans. > Plant and equipment which is operated within an area for the management of materials in contaminated areas should be decontaminated prior to relocating to a different works area. The decontamination procedures should take account of the following: > Personnel may only clean down if they are familiar with the plant and rhizome material and can readily identify it.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> Decontamination will only occur within designated wash-down areas. > Vehicles will be cleaned using stiff-haired brush and pressure washers, paying special attention to any areas that might retain rhizomes e.g. wheel treads and arches. > All run-off will be isolated and treated as contaminated material. This will be disposed of in already contaminated areas.		
MM78	Wood Bitter-vetch	EIAR Chapter 6	> An Ecologist will fence off a 10m buffer of the Treeline habitat east of Turbine 1 where the wood-bitter vetch was recorded to ensure that no works happen within 10m of the Treeline where the species was recorded growing. > No machinery or site works will be allowed within this 10m buffer of recorded plants/ hedgerow habitat. > Follow up surveys of the buffer area will be conducted post erection of the fence and during the construction phase to ensure that wood bitter-vetch distribution has not been impacted on. > After completion of the construction phase of the Proposed Project, fencing will be removed.		
Operational Phase					
MM79	Bats	EIAR Chapter 6 Appendix 6-2	In accordance with NatureScot Guidance, a minimum 50m buffer to all habitat features used by bats (e.g., hedgerows, treelines etc.) will be applied to the siting of all wind turbines. **Lighting Restrictions** Where lighting is required, directional lighting will be used to prevent overspill on to woodland/forestry edges. Exterior lighting, during construction and post construction, shall be designed to minimize light spillage, thus reducing the effect on areas outside the Site, and consequently on bats i.e. Lighting will be directed away from mature trees/treelines around the periphery of the site boundary to minimize disturbance to bats. Directional accessories can be used to direct light away from these features, e.g. through the use of light shields (Stone, 2013).		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			The luminaries will be of the type that prevent upward spillage of light and minimize horizontal spillage away from the intended lands. The proposed lighting around the Site shall be designed in accordance with the Institute of Lighting Professionals Guidance Note 08/23 Bats and artificial lighting at night. In addition, the applicant commits to the use of lights during construction, operation and decommissioning (such that they are necessary) in line with the following guidance that is provided in the Dark Sky Ireland Lighting Recommendations: › Every light needs to be justifiable, › Limit the use of light to when it is needed, › Direct the light to where it is needed, › Reduce the light intensity to the minimum needed, › Use light spectra adapted to the environment. › When using white light, use sources with a "warm" colour temperature (less than 3000K). **Blade Feathering** All wind turbines are subject to 'feathering' of turbine blades when wind speeds are below the cut-in speed of the proposed turbine. This means that the turbine blades are pitched at 90 degrees or parallel to the wind to reduce their rotation speed to below two revolutions per minute while idling. This measure has been shown to significantly reduce bat fatalities (by up to 50%) in some studies (NIEA, 2021). In accordance with NIEA Guidelines, blade feathering will be implemented as a standard across all proposed turbines when wind speeds are below the cut-in speed of the turbine.		
Decommissioning Phase					
MM80	Decommissioning	EIAR Chapter 6	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. An outline decommissioning plan is contained in the CEMP, Appendix 4-3 of the EIAR. The		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		Appendix 4-3	CEMP for the project provides the details of the mitigation and best practice that will be employed to avoid any potential for significant residual effects on biodiversity during decommissioning of the proposed wind farm.		
Chapter 7 Birds (Appendix 7-1)					
Pre- Construction Phase					
MM81	Birds	EIAR Chapter 7 Appendix 7-7	> Pre-construction surveys will be undertaken prior to the initiation of works at the Site. The survey will include a thorough walkover survey to a 500m radius of the Proposed Project footprint and all works areas, where access allows. If winter roosting 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 first winter or breeding season of the construction phase.		
MM82	Birds	EIAR Chapter 7 Appendix 7-7	Prior to implementing the Bird mitigation programme: > A meeting will be held with individual landowners to outline the general aims, objectives and requirements of the Bird Mitigation Plan. > A Growing Schedule will be provided to the landowner for each individual field based on the current agricultural management practices, stocking rates and habitat conditions. The Growing Schedule will comprise a list of actions to be undertaken and an action date for when they should be undertaken. > A bird control kite (including tether and pole) will be provided for each individual field. Instructions on deployment of the kite will be included in the Growing Schedule		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Construction Phase					
MM83	Birds	EIAR Chapter 7	> If winter roosting 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 first winter or breeding season of the construction phase. If it is found to be active during the construction phase, no works shall be undertaken within a disturbance buffer in line with industry best practice (e.g. Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007). No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied.		
MM84	Birds	EIAR Chapter 4	> Works will commence outside the bird nesting season (1st of March to 31st of August inclusive). Any requirement for construction works to run into the subsequent breeding season following commencement will be informed by pre-construction bird surveys. > The removal of woody vegetation will be undertaken in full compliance with Section 40 of the Wildlife Acts 1976 – 2022. Where sections of woody vegetation are removed for the purposes of the junction and road upgrades, these will be replaced with suitable hedge/tree species which are common in the local context. > During the construction phase, noise limits, noise control measures, hours of operation (i.e. dusk and dawn is high faunal activity time) and selection of plant items will be considered in relation to disturbance of birds. All plant and equipment for use will comply with the European Communities (Noise Emission By Equipment For Use Outdoors) Regulations, 2001, as amended (SI 632/2001). Plant machinery will also be turned off when not in use. > Silt fences will be installed as an additional water protection measure around existing watercourses. > If bird breeding activity of species of conservation concern are identified during the works, the nest sites will be located, and no works shall be undertaken within 500m buffer in line with industry best practice. > An Environmental Clerk of Works and Project Ecologist will be appointed. Duties will include:		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			○ Organise the undertaking of a pre-construction walkover bird survey to ensure that significant effects on birds will be avoided. ○ Inform and educate on-site personnel of the ornithological and ecological sensitivities within the Site. ○ Oversee management of ornithological 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 onsite. Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress as necessary.		
Operational Phase					
MM85	Birds	EIAR Chapter 7	A Bird Mitigation Plan (Appendix 7-7) has been prepared for the Proposed Project to mitigate the potential effects of collision risk for lapwing and golden plover during the operational phase of the Proposed Wind Farm. > Grass sward length throughout the field will exceed 15cm between 1st October and 31st March inclusive each winter; > A bird control kite will be erected near the centre of the field between 1st October and 31st March inclusive each winter inclusive. > Grazing livestock will be removed from the field before the action date to allow the grass time to regrow; > Fertiliser will be applied to the field before the action date to allow the grass time to grow; > Any farming activities that will reduce the sward height cannot begin until after the 31st of March. > Bird control kites will be imitations of raptor birds (e.g. hawks, falcons) and attached to a tether approximately 8m in length, in turn attached to a pole approximately 10m in length, that is secured to the ground near the centre of the field to maximise		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			the effect. This will create weaving and hovering movements akin to hunting raptor birds c. 2-18m above the ground and will be suitable for a range of wind speeds (O'Shea et al., 2020). This representation of a hunting predator will provide additional deterrents to lapwing and golden plover landing in the field. Bird control kites are widely used to deter birds from crops and gardens and have been shown to reduce the number of birds present in agricultural fields and airfields (O'Shea et al., 2020). > If the agricultural management practices, stocking rates and habitat conditions in any mitigation field change, the Growing Schedule will be revised accordingly by the overseeing environmental scientist, ornithologist or ecologist. > If bird control kites become damaged or no longer function, they will be replaced by the wind farm operator in a timely manner. > During each year of the operational phase, the Growing Schedule actions will be undertaken by each landowner. > During each year of the operational phase, the overseeing environmental scientist, ornithologist or ecologist will monitor and evaluate the mitigation fields. Full details of the monitoring and evaluation are outlined in the following Section 3.		
Decommissioning Phase					
MM86	Birds	EIAR Chapter 7	During the decommissioning phase, disturbance limitation measures will be as per the construction phase described.		
EIAR Chapter 8 Land Soils & Geology					
Construction Phase					
MM87	Earthworks	EIAR Chapter 8	> The soils and subsoil which will be removed during the construction of turbine hardstands will be localised to the turbine locations. The soil/subsoil will be		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			placed/spread locally alongside the excavations or stored within the spoil management areas; > 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 will 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 will be deposited, in layers of 0.50m and will not exceed a total thickness of 1m; > No turbines or related infrastructure will be constructed in any designated sites such as NHAs or SACs; > Soil/subsoil excavated along the underground cabling route, will only be stored in low mounds (~0.5m high) directly adjacent to the excavated trench, and will be stored for no more than 24 hours before being backfilled where possible. The soil/subsoil will be covered or sealed with excavator bucket in the event of heavy rainfall which would suspend further construction works along the underground cabling route . Only tar from the underground cabling route works will be disposed at an offsite licenced facility.		
MM88	Contamination of Soils	EIAR Chapter 8	> Where possible maintenance of construction vehicles or plant will take place off-site. This applies to the construction activities for both the Proposed Wind Farm and the Proposed Grid Connection. Minimal maintenance of construction vehicles or plant will take place on-site; > 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. > Other refuelling will be carried out using mobile double skinned fuel bowser. The fuel bowser will be parked on a level area on-site when not in use. > 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.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			• 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 electrical control building at the onsite 110kV substation will be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage of any associated chemicals and to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor; > All waste tar and chip material arising from the chipping and resurfacing of the roads during construction of the underground cabling route will be removed off-site and taken to an appropriately licenced facility; > 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 contained within the Construction Environmental Management Plan (CEMP) Appendix 4-3 of this EIAR. Spill kits will be available to deal with accidental spillage in and outside of re-fuelling areas.		
MM89	Erosion of soils	EIAR Chapter 8	> Soil/subsoil removed from the turbine locations and associated access roads will be used for landscaping or placed/spread locally alongside the excavation (no excavated material will be placed/spread inside the modelled fluvial flood zones). > Site drainage systems will be installed to limit runoff impacts during the construction phase, see Chapter 9 for proposed drainage measures. > In forestry areas (near T9) brash mats will be used to support vehicles on soft ground, reducing soil 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. > Soils removed from the cable trenching within the Site will be used to reinstate the trench where possible, reinstatement/landscaping works or removed to one of the designated spoil management areas or to an appropriately licenced facility as necessary.		
Operational Phase					

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM90	Soils and Geology	EIAR Chapter 8	> The substation transformer and oil interceptor will be on a bunded concrete plinth capable of holding 110% of the stored oil volume. Turbine transformers are located within the turbines, so any leaks would be contained within the turbine. These mitigation measures are considered sufficient to eliminate potential risks to ground/peat/soils and subsoils, and groundwater and surface water quality. > 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.		
Decommissioning Phase					
MM91	Decommissioning Phase	EIAR Chapter 8	Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant. Some of the effects associated with reinstatement of the Site (excavation of turbine bases, access tracks etc.) will be avoided by leaving these in place. The bases will be rehabilitated by covering with local topsoil 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.		
EIAR Chapter 9 Hydrology					
Pre- Construction Phase					
MM92	Earthworks	EIAR Chapter 9	**Mitigation by Avoidance:** The key mitigation measure during the construction phase is the avoidance of sensitive aquatic areas where possible, by application of suitable buffer zones (i.e. 50m to main watercourses). 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 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,		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> 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; **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. **Pre-commencement Temporary Drainage Works** Prior to the commencement of road upgrades (or new road/hardstand or turbine base installs) the following key temporary drainage measures will be installed: • All existing dry land drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using check dams/silt traps; • Clean water interceptor drains will be installed upgradient of the works areas; • Check dams/silt fence arrangements (silt traps) will be placed in all land drains that have surface water flows and also along existing farm track 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. • An inspection and maintenance plan for the on-site construction drainage system will be prepared in advance of commencement of any works		
			Construction Phase		
MM93	Earthworks	EIAR Chapter 9	**Proposed Mitigation by Avoidance:**		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			• Avoid physical damage (river/stream banks and river/stream beds) 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. **Mitigation by Design:** Source controls: > Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sandbags, 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. In-Line controls: > Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sandbags, oyster bags, straw bales, 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.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			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 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 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, sandbags, 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. **Silt Fences:** Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids such as those present in the subsoils/sandstone tills that overlie the Site. 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		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			throughout the entire construction phase. Double silt fences will be placed within drains down-gradient of all construction areas inside the 50m 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 Pond Design:** During the initial construction of roads, silt fences, straw bales and biodegradable geogrids will be used to control surface water runoff from works areas. **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 no intended to be a primary treatment component for development surface water runoff. They are not standalone but occur as part of treatment train of systems that will reduce the velocity of runoff prior to being released at the level spreader. In the absence of levelspreaders, the potential for ground erosion is significantly greater than not using them. Vegetation filters are end of line polishing filter that are located at the end 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.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Water Treatment Train: 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.		
MM94	Tree Felling	EIAR Chapter 9	**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. Minimum buffer zone widths recommended in the Forest Service (2000) guidance document "Forestry and Water Quality Guidelines". **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 will be chosen which are most suitable for ground conditions at the time of felling, 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 (~0.3%-3% gradient), to minimise flow velocities; > 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 spoil management		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			areas. Where possible, all new silt traps will be constructed on even ground and not on sloping ground; > In areas particularly sensitive to erosion, it may be necessary to install double or triple sediment traps. This measure will be reviewed on site during construction; > All drainage channels will taper out before entering the aquatic 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 mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal should take place when they become heavily used and worn. Provision should 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 should be suspended during periods of high rainfall; > Timber will be stacked in dry areas, and outside a local 50m 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; > Any diesel or fuel oils stored at the temporary site compounds will be bunded. The bund capacity will be sufficient to contain 110% of the storage tank's maximum capacity; > Refuelling or maintenance of machinery will not occur within 100m of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required; and,		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> 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. **Drain Inspection and Maintenance:** The following items shall be carried out during inspection pre-felling 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; > Inspection of all areas reported as having unusual ground conditions; > Inspection of main drainage ditches and outfalls. During pre-felling inspection, 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 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.		
MM95	Impacts on Groundwater Levels during Excavation Works	EIAR Chapter 9	**Mitigation by Best Practice** > Environmental management guidelines from the EPA quarry 2006 guidance document – *"Environmental Management in the Extractive Industry"* in relation to groundwater issues will be implemented during the construction phase. In order to avoid excavation and dewatering of alluvial deposits, it is proposed that a piled foundation design will be considered at turbine locations T1, T2, T3 and T8. Ground conditions		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			at proposed turbine location T9 will be determined by additional site investigations at the detailed design phase. If deep, groundwater saturated alluvial deposits are present at T9, the piled turbine base option will also be considered. Piling of Turbine T9. Proposed mitigation measures relative to piling works will comprise: • Strict QA/QC procedures for piling works will be followed; • Piles will be kept vertical during piling works; • Good workmanship will be employed during all piling works; and, Where required use bentonite seal to prevent upward/downward movement of surface water/groundwater		
MM96	Earthworks Works at Watercourse Crossings		> No stock-piling of construction materials at the crossing locations; > 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; > All machinery operations will take place away from the stream and ditch banks, apart from where crossings occur. Although no instream works are proposed or will occur; > Any excess construction material will be immediately removed from the area and placed in dedicated spoil management areas ; > 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; > The area around the Clear Bore™ (or similar alternative) batching, pumping and recycling plants will be bunded using terram and sandbags in order to contain any spillages; > Accidental spillage of fluids will 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.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM97	Directional Drilling at watercourse crossings	EIAR Chapter 4, CEMP Section 2	> 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); > The area around the Clear Bore™ (or similar alternative) batching, pumping and recycling plants will be bunded using terram and sandbags in order to contain any spillages; > Accidental spillage of fluids will 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.		
MM98	Site Drainage Management	EIAR Chapter 9 CEMP Section 3	**Pre-emptive Site Drainage Management:** The works programme for the entire construction stage of the development will also take account of weather forecasts and predicted rainfall in particular. Large excavations and movements of soil/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;		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> 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 provide a 24-hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of interest. > 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 provide a 24-hour telephone consultancy service. The forecaster will provide 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. 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: > All active excavations will be secured and sealed off; > Temporary or emergency drainage will be installed to prevent back-up of surface runoff; and,		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> No works will be completed during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded.		
MM99	Excavation Pumping/Drainage and Potential Impacts on Surface Water Quality		> 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; > 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 Siltbuster unit or silt bag; > The borrow pit settlement ponds have been designed to allow a 24hr retention time as per EPA guidance (2006) which is highest level of protection recommended by the EPA with regard to retention time; > 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 the Environmental Clerk of Works will occur during the construction phase. If high levels of seepage inflow occur, excavation work will immediately be stopped and a geotechnical assessment undertaken; and, > A mobile 'Siltbuster' or similar equivalent specialist treatment system will be available on-site 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.		
MM100	Groundwater and Surface Water Contamination from wastewater disposal	EIAR Chapter 9	> During the construction phase, a self-contained port-a-loo with an integrated waste holding tank will be used at each of the site construction compounds, maintained by the providing contractor, and removed from site on completion of the construction works; > Water supply for the site office and other sanitation will be brought to site and removed after use from the Site to be discharged at a suitable off-site treatment location; and,		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> No water or wastewater for sanitation will be sourced on the Site, nor discharged to the Site.		
MM101	Potential Release of Hydrocarbons	EIAR Chapter 9 CEMP Section 3	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 > A permit to fuel system will be put in place; > Taps, nozzles or valves associated with refuelling equipment will be fitted with a lock system; > All fuel storage areas will be bunded appropriately for the duration of the construction phase. All bunded areas will be fitted with a storm drainage system and an appropriate oil interceptor. Ancillary equipment such as hoses, pipes will be contained within the bunded area; > Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage; > The electrical control building (at the substation) will be bunded appropriately to 110% of the volume of oils that will be stored, and to prevent leakage of any associated oils to groundwater or surface water. The bunded area will be 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 is included within the Construction and Environmental Management Plan (Appendix 4-3). Spill kits will be available to deal with any accidental spillage in and outside the re-fuelling area.		
MM102	Release of Cement-Based Products	EIAR Chapter 9	• No batching of wet-concrete 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;		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			• 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 concrete washout ponds; • 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 sudden rainfall event.		
MM103	Morphological Changes to Surface Watercourses and Drainage Patterns	EIAR Chapter 9	> All proposed new watercourse crossings will be bottomless or clear span culverts 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; > All proposed drain crossing culverts will be minimum 900mm in diameter; > New access roads in mapped flood zones will be placed close to ground level to maintain the hydrology of the Site. Culverts will be placed along access roads accordingly (i.e. low points and depressions) to facilitate drainage of flood waters; > All guidance / mitigation measures proposed by the OPW or the Inland Fisheries Ireland[7] 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); > Where works are necessary inside the 50m buffer double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase; and,		

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

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> 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. Mitigation Measures relating to the use of a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ and water for directional drilling include: > The area around the Clear Bore™ batching, pumping and recycling plants will be bunded using terram and sandbags in order to contain any spillages; > One or more lines of silt fences will be placed between the works area and adjacent rivers and streams on both banks; > Accidental spillage of fluids will 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.		
	River Restoration	EIAR Chapter 4, Chapter 9, Appendix 6-4	> All stream work to be performed "in the dry" either by pump-around or stream diversion with silt curtain; > Impervious dikes or sandbags are to be used to isolate work from stream flow; > The contractor shall not disturb more area than can be stabilised the same working day; > Maintenance of stream flow operation shall be incidental to the work. This includes pumps and hoses; > Pumps and hoses shall be of sufficient size to dewater the work area; > Graded stream banks shall be stabilised, with matting, prior to predicted rain fall events; > Silt bags and stilling basins shall be used to collect silt and sediment from work area dewatering; > coir fibre matting shall be installed on the outside of all meander bends where shear stress is likely to be highest, and in other locations where erosion control may be necessary; > Live willow cuttings (live stakes) shall be installed through the coir fibre matting along both sides of the stream channel following the installation of coir fibre matting to provide bank stability through the establishment of fast-growing native willows; and,		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> Installation of cross vanes to prevent erosion of the riverbanks.		
MM104	WFD Water Body Status	EIAR Chapter 9	**Proposed Mitigation Measures (By Avoidance)** > A self-imposed 50m buffer will be maintained where possible for all streams with the exception of existing road crossings and proposed stream crossings; > No felling is required inside 50m buffer zone; > The large separation distance between the proposed felling areas and sensitive aquatic zones means that potential poor runoff can be adequately managed and attenuated prior to reaching sensitive watercourses; > Works will be completed during periods of no or low rainfall. **Proposed Mitigation Measures (By Design)** > Machine combinations will be chosen to minimise soil disturbance; > Crossing of streams will not be permitted; > Removing soil from roads during wet periods and dust suppression during dry periods; > Ditches draining from the proposed felling area towards existing watercourses will be blocked and temporary silt traps constructed i.e. no direct discharge to surface watercourses will occur. > Double silt traps will be installed where felling is inside the 50m aquatic buffer zone; > Discharge channels will taper out before entering 50m buffer zone allowing for further sediment filtration by ground vegetation'. > All drains and sediment traps will be maintained during the felling works; > Brash mats will be used to support vehicles on soft ground; > Timber will be stacked in dry areas outside of the buffer zone with straw bales and check dams' places downstream of these storage areas; > Trees will be cut manually from along streams and using machinery to extract the tree; > Travel will only be permitted perpendicular to and away from a watercourse; and, > Using small working areas; > Covering stockpiles; and, > Timber will be stacked in dry areas outside of the buffer zone with straw bales and check dams' places downstream of these storage areas		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM105	Hydrologically Connected Designated Sites	EIAR Chapter 9, Chapter 6	• The proposed mitigation measures which will include 50m buffer zones for avoidance of sensitive hydrological features; • Pre-construction drainage control measures; • Robust drainage control measures (i.e. interceptor drains, swales, settlement ponds) will ensure that the quality of runoff from Proposed Project areas will be very high; and, • Best practice measures with regard use of oils, fuels and cement-based compounds		
Operational Phase					
MM106	Progressive Replacement of Natural Surface with Lower Permeability Surfaces	EIAR Chapter 9	**Mitigation by Design:** The operational phase drainage system will be *in place from the construction stage. Drainage from the operational site will comprise:* > Interceptor drains will be installed 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 can be re-distributed over the ground by means of a level spreader; > Swales/roadside 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; > 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; > Regular culverts will be placed along access roads in areas prone to flooding; and, > Settlement ponds have been designed in consideration of the greenfield runoff rate.		
MM107	Flood Risk		Measures to reduce flood risk with regard the Proposed Project include: • Turbine bases T3, T4, T7, T8 and T9 will have finished floor levels +500mm above the 1000-year flood level;		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			• Proposed new roads in flood zones will be kept close to existing ground level to avoid alteration of surface water flows For the proposed new Eastwood River Crossing and upgrade of the existing crossing on the River Suir a Section 50 consent will be sought under Section 50 of the Arterial Drainage Act, 1945 to install a new culvert/bridge with the hydraulic capacity to accommodate a 100-year flood flows while maintaining at least a 300mm freeboard above the flood level.		
MM108	WFD Water Body Status	EIAR Chapter 9	There is no direct discharge from the Proposed Project site to downstream receiving waters. Mitigation for the protection of surface water during the operational phase of the Proposed Project will ensure the qualitative status of the receiving waters will not be altered by the Proposed Project		
Decommissioning Phase					
MM109	Decommissioning	EIAR Chapter 9	There is no direct discharge from the Proposed Project site to downstream receiving waters. Mitigation for the protection of surface water during the decommissioning phase of the Proposed Project will ensure the qualitative status of the receiving waters will not be altered by the Proposed Project.		
Chapter 10 Air Quality					
Construction Phase					
MM110	Exhaust Emissions	EIAR Chapter 10	> 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 produce and follow a site inspection and machinery checklist which will be followed and updated if/when required. > All plant and materials vehicles shall be stored in dedicated areas (on-site). Machinery will be switched off when not in use. > 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. > All plant and materials vehicles shall be stored in dedicated areas (on-site).		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction. > The expected waste volumes generated onsite are unlikely to be large enough to warrant source segregation at the Site. Therefore, all wastes streams generated onsite will be deposited into a single waste skip which will be covered. This 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 emissions associated with vehicle movements. There are several licenced waste treatment facilities located outside of Thurles, approximately 18km to the south of the Site. > Aggregate materials for the construction of the Proposed Wind Farm infrastructure will be predominantly sourced onsite. > Aggregate materials for the construction of site access tracks and all associated infrastructure will all be locally sourced, where possible, which will further reduce potential emissions. > Turbines and construction materials will be transported to the site on specified haul routes only. > 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. > A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase		
MM111	Dust Emissions	EIAR Chapter 10	> 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.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> Turbines and construction traffic will be transported to the site on specified haul routes only. > The agreed haul route road 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 transportation of materials form the borrow pit around the 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 to the Site will be covered by tarpaulin where necessary. > If necessary, excavated material will be dampened prior to transport to the spoil management areas. > A CEMP will be in place throughout the construction phase. > Turbines and construction vehicles will be transported to the site on specified haul routes only. > 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 onsite borrow pit and to the Site for the Proposed Grid Connection 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		
Operational Phase					

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM111	Exhaust and Dust Emissions	EIAR Chapter 10	> Maintenance vehicles brought onsite during the operational phase will be maintained in good operational order, thereby minimising any dust emissions that arise. > Any vehicles or plant brought onsite 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. > 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 emissions associated with vehicle movements.		
Decommissioning Phase					
MM112	Decommissioning Phase	EIAR Chapter 10	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					
Construction Phase					
MM113	Greenhouse Gas Emissions	EIAR Chapter 11	Greenhouse Gas Emissions during construction of turbine and other infrastructure: > 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 produce and follow a site inspection and machinery checklist which will be followed and updated if/when required. > All plant and materials vehicles shall be stored in dedicated areas (on Site). Machinery will be switched off when not in use. > 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. > Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction. > The expected waste volumes generated onsite are unlikely to be large enough to warrant source segregation at the Site. Therefore, all wastes streams generated onsite		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			will be deposited into a single waste skip which will be covered. This 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 emissions associated with vehicle movements. There are several licenced waste treatment facilities located outside of Thurles, approximately 18km to the south of the Site. > A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-3). > Aggregate materials for the construction of site access tracks and all associated infrastructure will all be locally sourced, where possible, which will further reduce potential emissions. > Where applicable, low carbon intensive construction materials will be sourced and utilised onsite.		
Operational Phase					
MM114	Greenhouse Gas Emissions	EIAR Chapter 11 Appendix 6-4	> Any vehicles or plant brought onsite 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. > 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 emissions associated with vehicle movements. > As detailed in Appendix 6-4 a Biodiversity Enhancement Plan for the Proposed Project has identified enhancement activities such as the planting of native woodland and hedgerows		
Decommissioning Phase					
MM115	Decommissioning Phase	EIAR Chapter 11	The mitigation measures prescribed for the construction phase of the Proposed Project will be implemented during the decommissioning phase thereby minimising any potential impacts.		
EIAR Chapter 12 Noise					
Pre- Construction Phase					

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM116	Construction Noise	EIAR Chapter 12	Local residents will be kept informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern;		
Construction Phase					
MM117	Construction Noise	EIAR Chapter 12	Good site practices will be implemented to minimise the likely effects. Section 8 of BS5228-1:2009+A1:2014 recommends a number of simple control measures as summarised below that will be employed onsite: > Local residents will be kept informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern; > No plant used on site will be permitted to cause an on-going public nuisance due to noise. > The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations. > All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract. > Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers. > Machinery that is used intermittently will be shut down during periods when not in use. > Any plant, such as generators or pumps, which is required to operate close to NSL's outside of general construction hours will be surrounded by an acoustic enclosure or portable screen. > During the course of the construction programme, supervision of the works will include ensuring compliance with the limits detailed in Section 12.3.2.1 using methods outlined in British Standard BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Noise*. > The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 7:00hrs and 19:00hrs Monday to Saturday. However, to ensure that optimal use is made of good weather periods or at critical periods within the programme (i.e. concrete		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			pours, rotor/tower deliveries) it will be necessary on occasion to work outside of these hours. **Construction Noise along the Proposed Grid Connection underground cabling route:** > Monitoring typical levels of noise and vibration during critical periods and at sensitive locations; > Selection of plant with low inherent potential for generation of noise and/ or vibration, and; > Placing of noisy / vibratory plant as far away from sensitive properties as permitted by site constraints. **Blasting:** > 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 onsite 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.		
Operational Phase					
MM118	Operational Phase Noise	EIAR Chapter 12	Modern wind turbines can be programmed to run in reduced modes of operation (or low noise modes) to achieve the attenuation required in the specific wind conditions (i.e. wind speed and direction). Operating the turbines in reduced noise modes is referred to as curtailment, which typically results in a corresponding reduction in energy generation capacity for the turbine(s). Within 6 months of full commissioning of the Proposed Wind Farm, noise monitoring shall be carried out in accordance with any noise conditions applied Should predicted exceedances be confirmed at the commissioning stage of the Proposed Wind Farm, the prescribed turbine curtailment measures shall be implemented to reduce any identified exceedance of the permitted noise limits. If an exceedance of the noise criteria is identified as part of the commissioning assessment, the guidance outlined in the IOA GPG, specifically Supplementary Guidance Note 5: Post Completion Measurements (July 2014) will be followed, and relevant corrective actions taken. For example, implementation of noise reduced operational modes		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			resulting in curtailment of turbine operation can be implemented for specific turbines in specific wind conditions to ensure predicted noise levels are within the relevant noise criterion curves/planning conditions limits. Such curtailment can be applied using the wind farm SCADA system without undue effect on the wind turbine performance. Following implementation of these measures, noise surveys will be repeated to confirm compliance with the noise criteria.		
Decommissioning Phase					
MM119	Noise	EIAR Chapter 12	Activities that occur during the decommissioning of the Proposed Project are unlikely to produce higher noise levels than those produced during construction and many of the activities will be similar in nature. As such it is considered that if construction noise levels are predicted to be below the threshold levels, then decommissioning noise will also be within the threshold levels.		
EIAR Chapter 13 Cultural Heritage					
Pre-construction Phase					
MM120	Features of Local Cultural Heritage Merit	**EIAR Chapter 13**	No upstanding features of local cultural heritage merit were identified within the Site therefore no direct impacts to same are anticipated		
MM121	Sub Surface Archaeological Potential	EIAR Chapter 13	> Pre-development archaeological testing of the Proposed Project infrastructure in previously undisturbed greenfield areas of the Site will be carried under licence from the National Monuments Service. This is in order to identify any archaeological features at the earliest stage possible to allow time to deal with any requirements such as preservation in situ (redesign / avoidance) or preservation by record (archaeological excavation). > A report on the testing will be compiled on completion of the work and submitted to the relevant authorities. > Further mitigation such as preservation in situ (avoidance), preservation by record (excavation), buffer zones may be required depending on the results of the testing. > Archaeological Monitoring of all groundworks during construction by a licensed archaeologist. > A report on the monitoring will be compiled on completion of the work and submitted to the relevant authorities.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> Further mitigation such as preservation in situ (avoidance), preservation by record (excavation), buffer zones may be required depending on the results of the monitoring. A buffer zone of 20m should be established around the outer extent of the crop mark, as visible on aerial photography, prior to the commencement of any construction works. The buffer should comprise fencing with keep out signage capable of lasting the duration of the construction phase of the Proposed Project. Further mitigation such as preservation in situ (avoidance), preservation by record (excavation), buffer zones may be required depending on the results of the monitoring.		
Construction Phase					
MM122	Recorded Monuments and Protected Structures		> No ground works, storage of topsoil or movement of machinery will take place within the buffer. > Service. This is in order to identify any archaeological features at the earliest stage possible in the project to allow time to deal with any requirements such as preservation in situ (redesign / avoidance) or preservation by record (archaeological excavation). Testing deemed necessary within forested areas may only be possible once clear-felling has taken place. > A report on the testing will be compiled on completion of the work and submitted to the NMS and the Planning Authority. > Further mitigation such as preservation in situ (avoidance), preservation by record (excavation), buffer zones may be required depending on the results of the testing. > Archaeological monitoring of all groundworks during the construction stage of the Proposed Project by a licensed archaeologist. > A report on the monitoring will be compiled on completion of the work and submitted to the NMS and the Planning Authority.		
Chapter 14 Landscape and Visual					
Pre-Commencement, Construction and Operation					
MM123	Landscape Effects	EIAR Chapter 14	The following measures have been included in the Proposed Project design in order to avoid or reduce direct effects on landscape receptors of the Site: **Mitigation by Design:**		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Wind Farm: > Strategic siting of the proposed turbines on a flat site, reducing their visual prominence and visual effects in this relatively flat and heavily vegetated landscape. The proposed turbines are strategically sited within a modified working landscape where there is limited visibility from the wider study area and designated landscape and visual receptors of high sensitivity. > The turbine layout has been designed to create a coherent arrangement of turbines, contiguous and connected to each other visually and with consistent spacing in line with the guidance for design and sitting of wind farms within Hilly and Flat Farmland Landscape Types in the Wind Energy Development Guidelines for Planning Authorities (Department of the Environment, Heritage, and Local Government (DoEHLG), 2006, (hereafter referred to as the '2006 WEDGs'), and regard to the Draft Revised Wind Energy Development Guidelines (Department of Housing, Planning and Local Government (DoHPLG, 2019) (hereafter referred to as the '2019 draft WEDGs'). > Siting of proposed turbines adheres to the minimum 500m set back distance in the current 2006 WEDGs and also the recommended 4 times tip height set back distance to third party properties, explicitly set out for residential visual amenity, prescribed by the 2019 draft WEDGs. > The layout of the Proposed Project has been designed to ensure minimal loss of valuable landscape receptors and biodiversity corridors such as woodland and hedgerows along field boundaries, with the proposal to plant approximately 1.8 hectares of natural woodland within the Wind Farn Site along a segment of the Eastwood River. Please see Chapter 6 Biodiversity and Appendix 6-4 Biodiversity Management and Enhancement Plan for details. Ancillary Infrastructure – Proposed Grid Connection , Met Mast, and Access Roads: > Aside from two end masts, the intended connection to the national electricity grid is located underground, thereby eliminating the majority of potential landscape and visual effects during the operational phase. > The proposed 110 kV on site substation, along with other elements of the Proposed Grid Connection , including the lightening towers, are sited within an agricultural field, strategically sited over 100m from nearby receptors and will be further		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			screened by hedgerows bordering the field and roadside vegetation, as well as vegetation surrounding nearby properties. > The proposed end masts are located within a landscape of low sensitivity and appear only as additional towers within an existing electricity line. > The internal site road layout makes use of the existing roads wherever possible, to minimise the requirement for new tracks within the Site. > To minimise cut and fill activities required to construct the Proposed Project, the proposed access roads, and other infrastructure such as hardstands have been designed to align with the existing terrain within the landscape of the Site. > In all circumstances, excavation depths and volumes will be minimised, and excavated material will be re-used where possible. > During initial vegetation stripping, all topsoil material will be temporarily stored on the Site and used for 'dressing' the edges of the development infrastructure during reinstatement/regrading, including that of the spoil management areas and borrow pit. This will be particularly important in areas of cut and fill. The stripped topsoil will contain a natural seed source of local provenance and result in the re-establishment of baseline vegetation. > The layout and design of the Proposed Project has been designed to ensure minimal loss of valuable landscape receptors and biodiversity corridors such as woodland and hedgerows along field boundaries.		
Chapter 15 Material Assets - Traffic					
Chapter 15 – Traffic					
Pre-Construction, Construction and Operation					
MM124	Traffic	EIAR Chapter 15	**Mitigation by Design** The most appropriate delivery route to transport the wind turbine components to Site requiring the minimum remedial works to accommodate the vehicles was selected.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Delivery of abnormal sized loads A detailed **Traffic Management Plan (TMP)**, incorporating all the mitigation measures set out in the TMP submitted as part of the CEMP, included as Appendix 4-3 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. 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 to Tipperary County Council and other relevant authorities in advance of deliveries of turbine components to the Site. **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. **Liaison with the relevant local authorities** - 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. **Implementation of temporary alterations to road network at critical junctions** – At locations where required highlighted in Section 15.2.9.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Identification of delivery routes – These routes will be agreed and adhered to by all contractors. **Travel plan for construction workers to 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. **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 junctions on the L-3248 and L-7039 and L-7039-1. 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). A member of construction staff (flagman) will be present at key junctions during peak delivery times. **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. **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 sweeping / cleaning of local roads as required. **Re-instatement works** - All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers.		
Chapter 15 Other Material Assets					
Pre-Construction					
	Public Water Supply and Infrastructure	EIAR Chapter 15	Prior to Grid Connection works, confirmatory surveys of the proposed route to confirm the presence services such as water supply will be undertaken. If encountered, the utility provider will be contacted to determine the requirement for specific excavation or relocation methods		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			and to schedule a suitable time to carry out works. Any works undertaken will be carried out in accordance with the specifications of the relevant utility provider.		
Construction Phase					
MM125	Irish Rail	EIAR Chapter 15	> Cognisance of requirements for third parties as set out in 'CCE Department Technical Guidance Document CCE-TMS-310 Guidance on Third Party Works' and 'CCE Departmental and Multidisciplinary Standard I-DEP-0121 Third Party Works: Additional Details of Railway Safety Requirements' will be adhered to. > Contact will be made to IEDR 30 days prior to the works that will take place at a minimum of 20m northwest of CIE infrastructure.		
MM126	Overhead Lines	EIAR Chapter 15	> Goal posts will be established under the 38kV overhead line for the entirety of the construction phase of the Proposed Project. > The construction of the Proposed Grid Connection cable route will be in phases along the proposed grid route, to minimise the duration of outage whilst making the connection to the OHL. > Prior to commencing Grid Connection works in the agricultural fields in the townlands of Strogue and Clonmore, goal posts will be established under the 110k overhead line for the remainder of the Grid Connection of the construction phase. The goal posts will not exceed a height of 4.2 metres, unless specifically agreed with ESB Networks > 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 sites 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 end mast construction, a site-specific risk assessment will be undertaken prior to any works. The risk assessment must take into account the maximum potential height		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			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. > 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. > All health and safety measures as detailed in the Construction Environment Management Plan and Chapter 5 Population and Human Health will be adhered to during the construction, operation and decommissioning phases.		
MM127	Waste Management	EIAR Chapter 15	> The CEMP includes a Waste Management Plan (WMP) which outlines the best practice procedures during the construction and decommissioning phases of the project. > Waste management will be carried out in accordance with Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects (2021) produced by the EPA. 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. > 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 that contamination does not occur. Please see the CEMP for best practise measures to prevent the creation of waste materials. > All non-hazardous waste generated on-site by the Proposed Project 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 Site. Therefore, all waste streams generated on-site		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			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 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		
Operational Phase					
MM128	Irish Rail	EIAR Chapter 15	> There will be no operational impact on properties (residential or other uses) as the ICNIRP guidelines will not be exceeded at any distances even directly above the cables. > As illustrated in the ESB EMF booklet 2017 (section 15.3.5.2.2 below), EMF from 110kV underground cables diminishes quickly with distance from cable dropping from 4µT to 0.5µT at 10m away, reducing to almost 0µT at 20m.The proposed Grid Connection cable route will be sited at a minimum 20m from the railway track. > Engagement with Irish Rail will continue during the operational phase. The implementation of a retranmsitter may be implemented at the Site if required, in agreement with Irish Rail. The French Study states that 95% approximately cases are settled amicably with the installation of a rebroadcaster by the wind developer, should any interference be detected. The 2006 WEDGs also acknowledges that wind turbines produce electromagnetic radiation which can interfere with communications but that '*electromagnetic interference can be overcome'* by installation of deflectors or repeaters.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM129	Telecommunications	EIAR Chapter 15	> An Operator required buffer has been incorporated into the design for the link that passes through the Site, therefore no further mitigation measures during the operational phase are required. > A signed protocol agreement between 2rn and the Developer can be found in Appendix 15-2. The protocol document ensures that in the event of any interference occurring to television or radio reception due to operation of the wind farm, the required measures, as set out in the document, will be carried out by the Developer to rectify this. The Protocol Document ensures that the appropriate mitigation is carried out in the event of unanticipated broadcast interference arising to television or radio reception as a result of the proposed Wind Farm.		
MM130	Aviation	EIAR Chapter 15	> Notification will be given to the IAA Air Navigation Services Division(ANSD) of the intended crane erection at least thirty days in advance, as a crane operating at or above this height may constitute an obstacle to air navigation. The IAA ANSD can be contacted via airspace@iaa.ie. > Electronic terrain and obstacle data (eTOD) in accordance with International Civil Aviation Organisation (ICAO) Annex 15 requirements which shall be surveyed by Ordnance Survey Ireland (OSi). > The following will also be supplied: > The WGS84 coordinates (In degrees, minutes and seconds) for each turbine > Height above ground level (to blade tip) and elevation above mean sea level (to blade tip) > Verification it's a standalone wind farm and provision of any alternative names. > Horizontal extent (rotor diameter) of turbines and blade length where applicable > Lighting of the wind farm, which turbine(s) is/are lit, and type of lighting.		
MM131	Waste Management	EIAR Chapter 15	> General waste produced at welfare facilities will be removed from site by maintenance personnel for disposal at Eirgrid and Developer headquarters. > All hazardous wastes from the maintenance of the turbines and substation (including transformers) will be stored securely in bunded containers/areas before being collected by an authorised waste contractor and brought to an EPA licensed waste facility.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			> The wastewater holding tank at the substation will be emptied when required by a licenced contractor. > Operational personnel will be instructed at induction that under no circumstances can waste be disposed of on-site. It will also be made clear that the burning of waste material on-site is forbidden		
Decommissioning					
MM132	Decommissioning	EIAR Chapter 15	The measures outlined for the construction phase are considered the same for the decommissioning phase.		

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 Plan prepared as part of the planning application to An Bord Pleanála.

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.

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 Schedule of Monitoring

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
Pre-Construction Phase						
MX1	Drainage Maintenance	EIAR Chapter 4 CEMP Section 4	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. An inspection and maintenance plan for the drainage system on site will be prepared in advance of commencement of any works. Regular inspections of all installed drainage systems will be necessary, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water at parts of the systems where it is not intended. The inspection of the drainage system will be the responsibility of the site ECoW or the Project Hydrologist.	On going	Monthly	Project Hydrologist
MX2	Tree Felling	EIAR Chapter 9 CEMP Section 3	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, preferably in medium to high water flow conditions. The "during" sampling will be undertaken once a week passes, 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	Monthly	ECoW
MX3	Invasive Species	EIAR Chapter 6 CEMP Section 3	A pre-commencement invasive species survey shall be completed for the site.	Once	As required	Project Ecologist
MX4	Ornithology	EIAR Chapter 7	Pre-construction surveys will be undertaken prior to the initiation of works at the Site. If winter roosting 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 first winter or breeding season of the construction phase. If it is found to be active during the construction phase, no works shall be undertaken within a disturbance buffer in line with industry best practice (e.g. Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007). No works	Once	As required	Project Ornithologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied.			
Construction Phase						
MX5	Health and Safety	EIAR Chapter 5, CEMP 5	> The PSCS will 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. >	Daily	Daily	PSCS
MX6	Water Quality and Monitoring	EIAR Chapter 9 CEMP Section 4	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. 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.	Daily	As Necessary	ECoW
MX7	Water Quality and Monitoring	EIAR Chapter 9 CEMP Section 4	> Daily general visual inspections of site operations and inspections of all watercourses within the site and in the surrounding area by the ECoW or a suitably qualified and competent person as delegated by the ECoW; > Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff;	Daily	As Necessary	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			> 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			
MX8	Turbidity Monitoring	EIAR Chapter 9 CEMP Section 4	> 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			

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX9	Reactive Site Drainage Management	EIAR Chapter 9 CEMP Section 4	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 Environmental Clerk of Works (ECoW) or supervising hydrologist on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the 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.	Daily	Daily	ECoW
MX10	Water Quality and Monitoring	EIAR Chapter 9	Daily surface water monitoring forms will be utilised at every works site near any watercourse. These will be taken daily and kept on site for record and inspection.	Daily	As Necessary	ECoW
MX11	Surface Water Quality	EIAR Chapter 9 CEMP Section 4	Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of felling and construction at the site. The baseline monitoring programme will be subject to agreement with Tipperary County Council. Analysis will be for a range of parameters with relevant regulatory limits along with Environmental Quality Standards (EQSs) and	As Required	Monthly	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			sampling will be undertaken at designated locations as outlined in Figure 9-5 of the EIAR. Baseline sampling will be completed on at least two occasions, and these should 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. Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work should immediately be stopped, and a geotechnical assessment undertaken.			
MX12			Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work should immediately be stopped, and a geotechnical assessment undertaken.	Daily		ECoW/Hydrologist
MX13	Tree Felling	EIAR Chapter 9	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. Also, daily surface water monitoring forms (for visual inspections and field chemistry measurements) will also be utilised at every works site near any watercourse. These will be taken daily and kept on site for record and inspection.	As Required	Monthly	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX14	Plant and Equipment Inspections	EIAR Chapter 9 CEMP Section 4	The plant used will be regularly inspected for leaks and fitness for purpose.	As Required	Monthly	ECoW
MX15	Traffic and Transport	CEMP Section 3	The designated public roads outside the site and along the main transport routes to the site will be regularly inspected by the ECoW for cleanliness, and cleaned as necessary;	Daily	Monthly	ECoW
MX16	Biodiversity	CEMP Section 4	A Project Ecologist will be appointed. The responsibilities and duties of the Project Ecologist 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 Proposed Project area. > 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 onsite. > An Ecologist will monitor the one-way exclusion gates established at any badger sett discovered during pre-construction surveys that are within 50m of excavation works. The gates will be checked every 3 to 5 days during the 21-day period to ensure badgers do not succeed in re-entering the sett. > Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress.	As required	As required	Project Ecologist
MX17	Spoil Management	EIAR Chapter 4,	Inspections of the spoil management areas will be made by a Geotechnical Engineer through regular monitoring of the works. The appointed contractor will review work practices at spoil management	As required	As required	Geotechnical Engineer

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
		CEMP Section 2	areas when periods of heavy rainfall are expected so as to prevent excessive dirty water runoff from being generated.			
MX18	Archaeological Monitoring	EIAR Chapter 13	> Archaeological Monitoring of all groundworks during construction by a licensed archaeologist. > A report on the monitoring should be compiled on completion of the work and submitted to the relevant authorities. > Further mitigation such as preservation in situ (avoidance), preservation by record (excavation) may be required depending on the results of the monitoring. > 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.	As Required	As Required	Project Archaeologist
Operational Phase						
MX19	Surface Water Quality	CEMP Section 4	> Monthly water sampling and laboratory analysis will be undertaken for the first six months during the operational phase. > Quarterly site inspections by the Project Hydrologist/ ECoW after construction for a period of one year following the construction phase	Monthly	Monthly	ECoW
MX20	Drainage Inspections	CEMP Section 4	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.	Monthly	Monthly	ECoW
MX21	Bats	EIAR Chapter 6	At least 3 years of post-construction monitoring is proposed. Post-construction monitoring will include static detector surveys, walked survey transects and corpse searching to record any bat fatalities resulting from collision.	Years 1, 2, 3	Annually	Project Ecologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
		Appendix 6-2 Appendix 6-4 BMEP	Results of Year 1 surveys will assess whether adaptations to the monitoring plan are required, and further mitigations such as curtailment will be considered. See Appendix 6-2 for the Bat Monitoring Plan. **Bat Boxes** > A Licenced Ecologist will carry out a yearly Bat Box Monitoring protocol for the first three years of the operational life of the Proposed Wind Farm. The ecologist will confirm and flag Bat boxes in use by bats. Monitoring will be carried out a suitable time of year (i.e. Sept/Oct) to ensure no disturbance to any roosting bats, particularly in the case of a Maternity Roost. > Evidence or presence of nesting birds will be flagged and removed outside the bird nesting season. If a bird nest is found, a secondary bat roosting source must be erected to replace the bat roosting source lost. > The results of the first three years of monitoring will inform the need for and frequency of further monitoring and maintenance of the Bat Boxes, to be reviewed by the Project Ecologist and agreed with the wind farm operator. > Monitoring results will be reported after each monitoring instance with any criteria failures identified and corrective actions implemented.			
MX22	Biodiversity	EIAR Chapter 6 Appendix 6-4	The Biodiversity Management and Enhancement Plan will be maintained and monitored in partnership between the developer, the Project Ecologist and the Landowners. The proposed management actions will be conveyed to the developer and each of the landowners, and management alterations implemented as required to achieve the targets of the management plan.	As required.	As required.	Project Ecologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			Woodland Replanting: > To confirm that habitat creation and enhancement has been successful the above outlined woodland replanting scheme will be monitored by a qualified ecologist after 6 months of planting and then annually for the first 5 years. > The monitoring proposed requires the Project Ecologist to conduct inspections and relevés of the planting area at the above outlined temporal intervals following the main growing season (i.e. in September). > These inspections and relevés will be recorded and entered into a monitoring report. > Monitoring will be undertaken in partnership between the developer, the Project Ecologist and the Landowner. The proposed management actions will be conveyed to the developer and the relevant landowner, and management alterations implemented as required to achieve the targets of the management plan. > At the end of the 5-year monitoring plan, the Project Ecologist will assess the need for, and frequency of, further monitoring of the woodland replanting area in agreement with the wind farm operator.	6 months, Year 1-5	Annually	Project Ecologist
			Linear Habitat Replanting: > Hedgerows and replanted trees will be inspected following the main growing season (i.e. in September) for the first five years of growth, where the requirement for replacement planting will be assessed. If any shrubs are dead or damaged, these will be replaced using the same species within the next planting season. > Recommendations for ongoing or remedial management required will be specified within an Environmental and Ecological Report, produced by a suitably experienced	September of Year 1-5	Annually	Project Ecologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			ecologist, with any criteria failures identified and corrective actions implemented. > Monitoring results will be reported after each growing season. **Pine Marten Den Boxes** > Monitoring of den boxes will take place yearly after installation of the Pine Marten Den Boxes for the first three years of the operational Proposed Wind Farm. The results of the first three years of monitoring will inform the need for and frequency of further monitoring and maintenance of the Pine Marten Den Boxes, to be reviewed by the Project Ecologist and agreed with the wind farm operator. Monitoring should be carried out using non-invasive methods where possible. > Monitoring results will be reported after each monitoring instance. 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 **River Restoration** A minimum of two bankfull flow events will be documented during the 5-year monitoring period. If less than two bankfull events occur during the first 5 years, annual monitoring will continue until the second bankfull event is documented. The bankfull events must occur during separate monitoring years. Monitoring data collected will include the following: • reference photos (twice yearly – summer and winter)	Year 1-3	Annually	Project Ecologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			• plant survival analysis • channel stability analysis Yearly data will be collected during the same season. Photo documentation will be required twice a year, once in the summer and again in the winter. The monitoring events will be conducted at the same time of year during mid-growing season. The monitoring report will be prepared and will include photographs, vegetation survival counts, stream stability documentation, and a narrative describing current site conditions. Photographs will be taken from no fewer than four established monitoring positions. The exact locations will be determined, marked with a stake, and recorded with a GPS receiver in the field during the first monitoring event and used in each of the following monitoring events. Vegetation survival counts will be collected from established plots within each monitored area. The plot locations will be randomly determined in the office using GIS. The plots for stream restoration sites extend from the toe of bank to the furthest edge of the outside planting zone. The total area of plots is equal to 10% of the specific restoration site. The vegetation monitoring plots for the project will total 1,800 square metres, with 900 square metres on the left bank and 900 square metres on the right bank. Within these vegetation plots, all planted vegetation will be counted, identified to the species level, and survival rate will be calculated.			
MX23	Ornithology	EIAR Chapter 7 Appendix 7-8 Appendix 6-4 BMEP	The programme of works will monitor parameters associated with collision, displacement/barrier effects and habituation during the operational phase of the Proposed Project. Surveys will be scheduled to coincide with Years 1-5. At the end of this period, the results will be reviewed in consultation with the National Parks and Wildlife Service and future monitoring needs and gaps will be identified to determine the frequency of monitoring in subsequent years of the	Years 1-5 followed by a Review.	Monthly	Project Ornithologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
		Appendix 7-7	lifetime of the wind farm. Monitoring measures are broadly based on guidelines issued by SNH (2009). The following individual components are proposed: > Vantage point surveys to monitor flight activity in the vicinity of the turbines; > Breeding walkover surveys to monitor breeding bird activity at the Site; Collision monitoring, including carcass searches with trained dogs to monitor bird fatalities due to collision. These will include searcher efficiency and scavenger removal trails as a best practice measure. **Bird Mitigation Plan:** All of the mitigation fields will be monitored and evaluated each year. Monitoring will comprise: > A field inspection; > Monitoring adherence to the Growing Schedule; > Assessment of the Growing Schedule; > Reporting. The mitigation fields will be visited by the overseeing environmental scientist, ornithologist or ecologist each year of operation to assess the habitat for its suitability for and attractiveness to lapwing and golden plover. Four visits will be undertaken between October and March. The first visit will be in October to ensure that the sward is at an appropriate height at the beginning of the winter season. Please see Appendix 7-7 and 7-8 for details			
MX24	Noise and Vibration	Chapter 12	An operational noise survey will be undertaken to ensure compliance with any noise conditions applied to the development. It is common practice to commence surveys within six months of the Proposed Wind Farm being commissioned. If an exceedance of the noise criteria is identified as part of the commissioning assessment, the guidance outlined in the IOA GPG, specifically Supplementary	Once within six months	As required	Noise Consultant

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			Guidance Note 5: Post Completion Measurements (July 2014) will be followed, and relevant corrective actions taken. For example, implementation of noise reduced operational modes resulting in curtailment of turbine operation can be implemented for specific turbines in specific wind conditions to ensure predicted noise levels are within the relevant noise criterion curves/planning conditions limits. Such curtailment can be applied using the wind farm SCADA system without undue effect on the wind turbine performance. Following implementation of these measures, noise surveys will be repeated to confirm compliance with the noise criteria.			
Decommissioning Phase						
	Decommissioning	DP Section 1	In accordance with SNH guidance, "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". A Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will agree with the competent authority at that time	End of operational life	As required	Developer/ Appointed Contractor
MX25	Decommissioning	DP Section 3	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.	As required	As required	Site Manager
MX26	Decommissioning	DP Section 3	Prior to decommissioning, a suitably qualified ecologist will complete an invasive species survey of any material proposed for use as part of foundation backfilling.	As required	As required	Project Ecologist
MX27	Decommissioning	DP Section 7	Decommissioning monitoring surveys will be undertaken prior to works associated with decommissioning at the wind farm. The survey will include a thorough walkover survey to a 500m radius of the Proposed Project footprint and all works areas, where access allows. If winter roosting 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 first winter or	As required	As required	Project Ornithologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			breeding season of the decommissioning phase. If it is found to be active during the decommissioning phase, no works shall be undertaken within a disturbance buffer (Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007) in line with industry best practice. No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied.			

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 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 8-1 below.

Figure 8.1 Indicative Construction Schedule

			Year 1				Year 2			
ID	Task Name	Task Description	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Site Health and Safty		■	■	■	■	■	■	■	■
2	Grid Connection	Construct grid connection to Athlone 110kV substation	■	■	■	■	■	■		
3	Site Compounds	Site Compounds, site access, fencing, gates	■							
4	Site Roads	Construction/upgrade of roads, construct underpasses install drainage measures, install water protection measures	■	■	■	■	■			
5	Substation and Electrical Works	Constuction substation, underground cabling between turbines		■	■	■	■	■		
6	Turbine Hardstands	Excavate/pile for turbine bases where required		■	■	■	■	■		
7	Turbine Foundations	Fix reinforcing steel and anchorage system, erect shuttering, concrete pour				■	■	■		
8	Backfilling and Landscaping						■	■	■	■
9	Turbine Delivery and Erection						■	■	■	
10	Substation Commissoning									■
11	Turbine Commisioning									■

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 Tipperary 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.