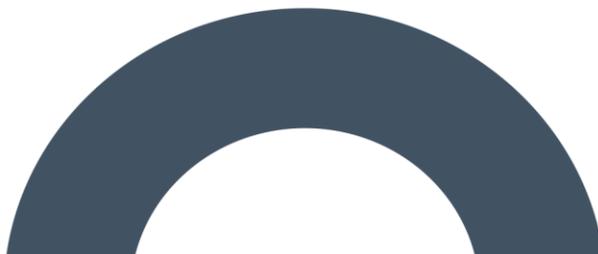


Construction and Environmental Management Plan

Curraglass Renewable Energy
Development, Co. Cork





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1. INTRODUCTION

This Construction and Environmental Management Plan (CEMP) has been developed by MKO on behalf of Wingleaf Ltd. who intend to apply to Cork County Council for planning permission to construct a renewable energy development on the site of the original wind farm located in the townlands of Cappaboy Beg, Derreendonee and Curraglass, Co. Cork.

The CEMP has been prepared in conjunction with the Environmental Impact Assessment Report (EIAR) which will accompany the planning application for the Proposed Development to be submitted to the competent authorities. Should the project secure planning permission, the CEMP will be updated, in line with all conditions and obligations which apply to any grant of permission. The CEMP should be read in conjunction with the EIAR 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 Development.

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 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 report provides the environmental management framework to be adhered to during the pre-commencement, construction and operational phases of the Proposed Development and it incorporates the mitigating principles to ensure that the work is carried out in a way that minimises the potential for any environmental impacts to occur.

This report is intended as a single, amalgamated document that can be used during the future phases of the project, as a single consolidated point of reference relating to all construction, environmental and drainage requirements for the Planning Authority, developer and contractors alike.

1.1 Scope of the Construction and Environmental Management Plan

This report is presented as a guidance document for the construction of the proposed Curraglass Renewable Energy Development including connection to the national grid. Where the term 'site' is used in the CEMP it refers to all works associated with the Proposed Development enabling works. 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.

The report 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 Project details, detailing the targets and objectives of this plan along with providing an overview of construction methodologies that will be adopted throughout the project.

Section 3 sets out details of the environmental controls to be implemented on site. Site drainage measures, peat stability monitoring measures 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 Emergency Response Procedure to be adopted in the event of an emergency in terms of site health and safety and environmental protection.

Section 6 consists of a summary table of all mitigation proposals to be adhered to during the project, categorised into three separate headings, 1) pre-commencement measures; 2) construction-phase measures and 3) operational-phase measures.

Section 7 consists of a summary table of all monitoring requirements and proposals to be adhered to during the project, categorised into three separate headings, 1) pre-commencement measures; 2) construction-phase measures and 3) operational-phase measures.

Section 8 sets out a programme for the timing of the works.

Section 9 outlines the proposals for reviewing compliance with the provisions of this report.

2. SITE AND PROJECT DETAILS

2.1 Site Location and Description

The site of the Proposed Development is located on the site of the original wind farm located in the townlands of Cappaboy Beg, Derreendonee and Curraglass, Co. Cork.

The Proposed Development site is located approximately 5.6km northeast of Kealkill and 5.5km southwest of the village of Ballingearry, with proposed works taking place within the townlands of Derreendonee and Curraglass.

The previous wind turbines at the site were granted planning permission in 2002 and the site was constructed and became operational in 2006. The turbines were removed in June 2018 as they had reached the end of their productive lifespan. The previous development consisted of 10 turbines, with a hub height of 50m and a total tip height of 75m.

Wingleaf Ltd. is now seeking to optimise the site with a renewable energy development comprising 7 turbines with a tip height of up to 178.5 metres.

This application includes for connection to the national grid, with this EIAR assessing a connection via a new proposed 38kV Electricity Substation connecting via underground cabling to an existing 38kV overhead line within the EIAR Site Boundary, located in the townland of Curraglass, Co. Cork.

2.1.1 Description of the Development

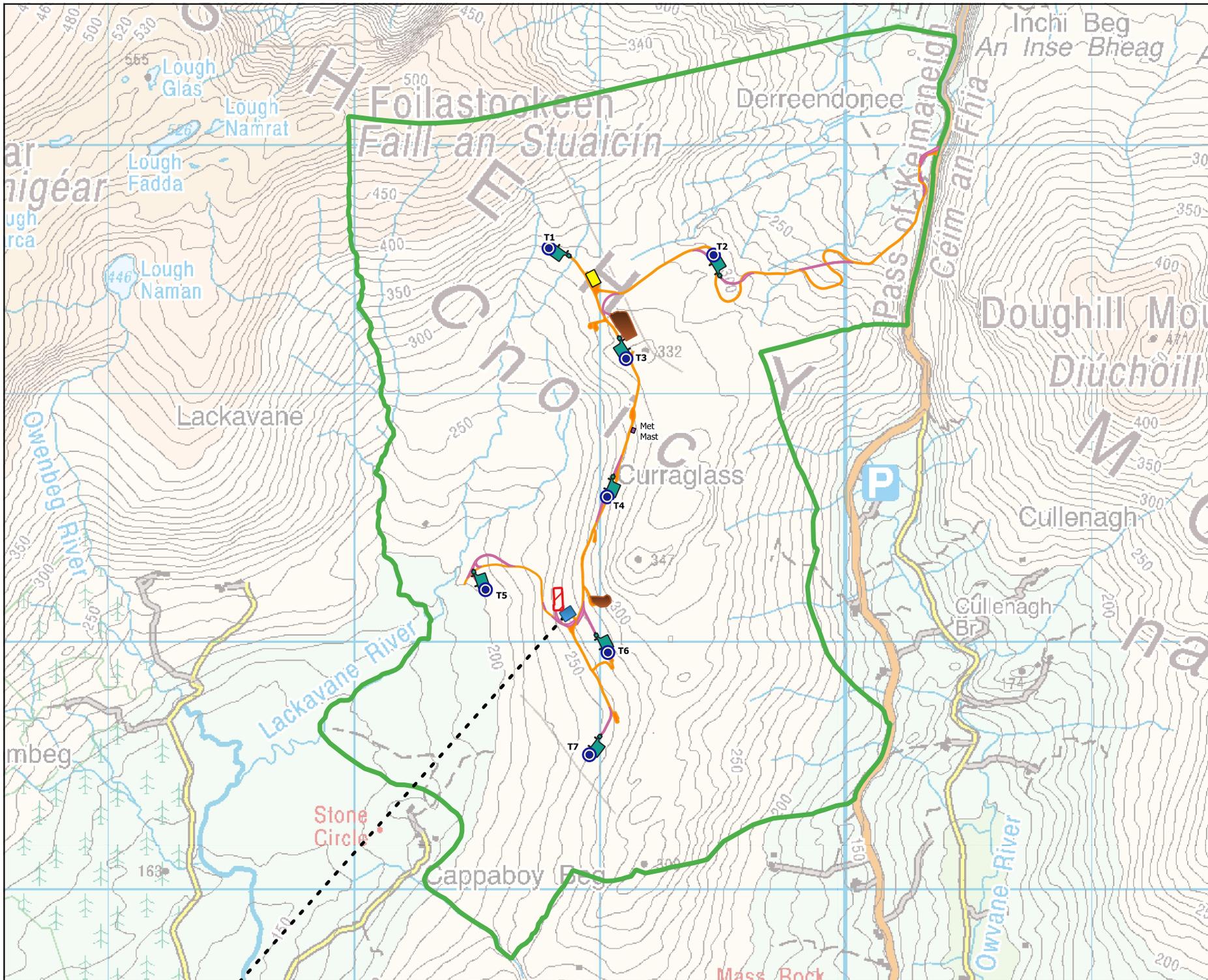
The planning application for the Proposed Development includes connection to the national electricity grid. All elements of the Proposed Development, including grid connection and any works required on public roads to accommodate turbine delivery, have been considered.

This application seeks a ten-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.

The key components of the Proposed Development include the following:

1. *Up to 7 no. wind turbines with an overall blade tip height of up to 178.5 metres and all associated foundations and hard-standing areas;*
2. *2 No. borrow pits;*
3. *1 No. permanent meteorological mast with a maximum height of up to 112 metres;*
4. *Upgrade of existing and provision of new site access roads;*
5. *Upgrade to existing access junction;*
6. *A 38kV electricity substation, including 4 no. battery storage containers, 1 no. control building with welfare facilities, associated electrical plant and equipment, security fencing, wastewater holding tank ,*
7. *Forestry Felling;*
8. *A temporary construction compound;*
9. *Site Drainage;*
10. *All associated internal underground cabling, including underground grid connection cabling to the existing overhead line; and*
11. *All associated site development and ancillary works.*

The proposed site layout showing individual elements of the development is shown in Figure 2-1 and in the Site Layout Drawings included with the application.



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Existing Roads - Upgrade
- Proposed New Site Roads
- Current Substation Location
- Existing Overhead Line to Ballylickey
- Proposed Temporary Construction Compound
- Proposed Hardstanding
- Proposed Substation
- Proposed Borrow Pits
- Proposed Met Mast Location



Drawing Title

Site Layout

Project Title	
Curraglass Renewable Energy Development, Co. Cork	
Drawn By	Checked By
Orla Murphy	Michael Watson
Project No.	Drawing No.
190301	2-1
Scale	Date
1:20000	19.06.2020



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2.2 Targets and Objectives

In so far as they have been completed to date, or are to be further completed in future, the construction phase works are designed to approved standards, which include specified materials, standards, specifications and codes of practice. The design of the project has considered environmental issues and this is enhanced by the works proposals.

The key site targets are as follows;

- 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 all planning documents 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;
- Adopt a sustainable approach to construction; and,
- Provide adequate environmental training and awareness for all project personnel.

The key site objectives are as follows;

- Using recycled materials if possible, e.g. excavated stone, overburden and peat material;
- Ensure sustainable sources for materials supply where possible;
- Avoidance of any pollution incident or near miss as a result of working around or close to existing watercourses and having emergency measures in place;
- Avoidance of vandalism;
- Keeping all watercourses free from obstruction and debris;
- Correct implementation of the sustainable drainage system (SuDS) drainage design principles;
- Keep impact of construction to a minimum on the local environment, watercourses, and wildlife;
- Correct fuel storage and refuelling procedures to be followed;
- Good waste management and house-keeping to be implemented;
- Air and noise pollution prevention to be implemented;
- Monitoring of the works and any adverse effects that it may have on the environment. Construction Methods and designs will be altered where it is found there is an adverse effect on the environment;
- Comply with all relevant water quality legislation listed throughout this document; and,
- Ensure a properly designed, constructed and maintained drainage system appropriate to the requirements of the site is kept in place at all times.

2.3 Construction Methodology Overview

2.3.1 Introduction

An experienced main contractor will be appointed for the civil works for the construction phase of the Proposed Development. The main contractors will comply with this CEMP and any revisions made to this document throughout the construction phase. An overview of the anticipated Construction Methodologies is provided below.

2.3.2 Overview of Proposed Construction Methodology

The proposed anticipated construction methodology is summarised under the following main headings:

- > Temporary Construction Compound;
- > Borrow Pits;
- > Tree Felling;
- > Site Drainage System;
- > Proposed New Site Access Roads;
- > Upgrade of Existing Roads
- > Turbine Foundations and Anemometry Mast Foundations;
- > Crane Hardstands;
- > Electricity Substation and Control Buildings;
- > Battery Storage Compound
- > Site Underground Cabling
- > Grid Connection
- > Culvert Crossings
- > Transport Route Accommodation Works
- > Decommissioning

2.3.2.1 Temporary Construction Compound

There is one temporary construction compound proposed for the site. The location of the compound is shown in Figure 2-1. The compound will typically be constructed as follows:

- > 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 (refer to Section 3.2.2 below) will be installed around the perimeter;
- > The compound will be established using a similar technique as the construction of the excavated site roads as discussed above;
- > Where required, a layer of geogrid will be installed 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;
- > Areas within the compound will be constructed as site roads and used as vehicle hardstandings during deliveries and for parking;
- > A bunded containment area will be provided within the compound for the storage of lubricants, oils and site generators etc.;
- > If necessary, the compound will be fenced and secured with locked gates, although fencing would only be utilised where significant risk of danger to third parties or vandalism is envisaged; and,
- > Upon completion of the project the compound will be decommissioned by backfilling the area with the material arising during excavation, landscaping with peat material as required.
- > During the construction phase, a self-contained port-a-loo with an integrated waste holding tank will be used on site for toilet facilities. This will be maintained by the service contractor as required and will be removed from the site on completion of the construction phase.
- > The water supply to the site will be from a temporary water storage tank which will be filled using a mobile water tank which will source water locally as required.

2.3.2.2 Borrow Pits

It is proposed to develop two on-site borrow pits, to be located approximately 70 metres northeast of Turbine No. 3 and approximately 180 metres north of Turbine No. 6, as shown in Figure 2-1. The borrow pits will typically be excavated and backfilled as follows:

- > The area to be used for the both borrow pit will be marked out at the corners using ranging rods or timber posts. Drainage runs, and associated settlement ponds will be installed around the perimeter;
- > The initial borrow pit excavation will involve removal of peat (if present) and mineral soil to the top of bedrock. These materials will be stored temporarily or placed around the borrow pit to form berms to prevent surface water inflow to the borrow pit excavation;

- Interceptor drainage ditches will be excavated on all sides of the borrow pit to catch surface water runoff, and direct it to downstream re-distribution locations;
- The bedrock material will be extracted 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 base formations;
- Temporary stockpiling of aggregates will be required to accommodate the cut and fill operations within the borrow pit, and the progression of access roads and turbine excavations;
- As the borrow pit excavation 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;
- When extraction ceases within the borrow pit, the uphill face of the rock will be stepped, and deposits of soil will be placed which will assist in the re-vegetation of the rock face; and,
- 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.

2.3.2.3 Tree Felling

The proposed development site currently partially comprises a commercial coniferous forestry plantation, with 53 percent of the site under forestry. As part of the proposed development, tree felling will be required within and around the development footprint to allow the construction of turbine bases, access roads and the other ancillary infrastructure. Along sections of access road in forested areas, an area of approximately three times the width of the access road will be felled. Turbulence felling may also occur in the vicinity of turbine locations, the purpose of which is to avoid turbulence that can be created by the forest canopy and which can affect the performance and efficiency of the turbines.

The tree felling activities required as part of the proposed development will be the subject of two Limited Felling Licence (LFL) applications to the Forest Service, as per the Forest Service's policy on granting felling licenses for wind farm developments. The policy requires that a copy of the planning permission for the wind farm be submitted with the felling licence applications; therefore the felling licenses cannot be applied for until such time as planning permission is obtained for the proposed development.

Details of the appropriate mitigation and drainage measures are included in Section 3.5 below.

2.3.2.4 Site Drainage System

The early establishment of temporary drainage facilities 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. The development of the site will need to be phased accordingly. The construction of the drainage will start from the downstream sections and progress upstream, connecting conveyance systems with other drainage features as each development phase progresses. They will therefore need to be designed with sufficient flexibility to respond to an early phase incoming flow during the construction phase.

Detailed measures to address surface water management based upon the design criteria and philosophy will be implemented. The drainage system will be excavated and constructed in conjunction with the road and hard standing construction. Drains will be excavated, and settlement ponds constructed to eliminate any suspended solids within surface water running off the site. Surface water management and drainage design is dealt with in Section 3.2 below and Section 4.6 of the EIAR.

2.3.2.5 New Site Access Roads

New roadway will be required in areas where existing roads are not already present, or where existing sections are too steep or otherwise unsuitable for the required purpose in the case of the proposed development. Maximum use has been made of the existing machine tracks and fire breaks within areas of forestry to ensure that the felling area required to make way for proposed new site roads is kept to a

minimum. There are approximately 2.5km of new access roads to be installed at the site. In some areas across the site, floating roads may be required. The new access roads will be constructed as follows using both a floating road and excavated site road methodology both of which are summarised below.

- Establish alignment of the new site roads from the construction drawings and mark out the centrelines with ranging rods or timber posts;
- The road layout has been designed to avoid crossings of natural watercourses where possible;
- Where existing culverts are to be upgraded or extended, the works will be carried out to follow a method statement to be prepared in consultation with Inland Fisheries Ireland.
- ☐The access tracks will be of single-track design with an overall width of 6m. There will be some local widening on the bends, junctions and around turbine bases for the safe passage of large vehicles;
- ☐Any excavated road section's will, where it is considered beneficial have turf stripped over the area of the excavation and stored growing side up for reuse. This area will be oversized to facilitate the excavated subsoil material. The subsoil material will subsequently be capped with topsoil to form an earth bund around the excavated material;
- ☐Where the Geotechnical Engineer confirms it is more suitable, a non-excavated ground bearing road will be employed. In this case a reinforced sub-base will be placed directly on the existing ground using geotextile separation layer and layers of geogrid reinforcing as designed by the Geotechnical Engineer to achieve the bearing capacity required for the road running surface.
- ☐All peat excavated will be used as part of the borrow pit restoration or in reinstatement areas. Topsoil will be temporarily stockpiled locally for reuse for landscaping the backfill placed above the foundations.
- ☐The subsoil will be excavated down to a suitable formation layer of either firm clay or bedrock;
- ☐Where floating roads are to be constructed, the subsoil will not be excavated but a layer of geo-grid or layers of brash and lumber will be laid directly on to the peat surface.
- ☐For both excavated and floating roads, the road will be constructed using well-graded granular fill, 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;
- ☐All new roadways will be constructed with a camber to aid drainage of surface water;
- ☐For excavations in overburden and peat, side slopes shall not generally be greater than 1(V): 2 or 3(H), respectively. Slacker slopes may be required if localised areas of weaker peat are encountered Design slopes will be informed by the Geotechnical Engineer;
- ☐At bends or steep inclines from the roads, 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 site road.
- ☐The granular fill use to complete the final running surface of the roads on site will be tested to BS812-111:1990 "Ten percent fines value".

2.3.2.6 Upgrade of Existing Site Access Roads

It is proposed to utilise the existing road network at the site as much as possible (approximately 5km will be used). These roads will require upgrading which will comprise widening of the roadway to a total running width of approximately six metres, with wider sections at corners and on the approaches to turbine locations and the laying of a new surface dressing on the existing section of roadway where necessary. The road widening will be undertaken as follows:

- ☐If it is considered that the current road formation level is adequate to support required bearing, then no upgrade or widening works will be completed;
- ☐Otherwise, where required, the subsoil in the existing road verge will be excavated down to a suitable formation layer and the spoil used for the restoration of borrow pits or in reinstatement areas;
- ☐Well-graded imported granular fill will be spread and compacted in layers up to 200mm to provide a homogeneous running surface. The thickness of layers and amount of

- compaction required will be decided by the Construction Manager based on the characteristics of the material and the compaction plant to be used. These layers of granular fill will be brought to the same level as the top of the existing road surface;
- A layer of geogrid will be installed directly onto the top of the granular fill layer and the existing road surface where required; and,
 - A layer of finer well graded stone for the running surface will be laid on the geogrid and compacted.
 - 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
 - Where road widening is required in an area where the peat depth is greater than c2.0m, it will be necessary to complete the road upgrade using a floating road methodology as summarised in the section above.

2.3.2.7 Turbine and Anemometry Mast Foundations

The wind turbines and anemometry mast foundations will be a reinforced concrete base designed to the appropriate standards (BS EN 1992-1-1:2004+A1:2014 Eurocode 2: Design of Concrete Structures). Foundation loads will be provided by the wind turbine and mast suppliers, and factors of safety will be applied to these in accordance with European design regulations. The turbine will be anchored to the foundation using a bolt assembly which shall be cast into the concrete. The anemometry mast is a free-standing structure which is also anchored to the reinforced concrete foundation. It is anticipated that the foundations for both the turbines and the anemometry mast will be either piled or ground bearing foundations and that the formation level of the turbine foundations will be on the lower mineral subsoil or bedrock. Bases for the turbines will measure up to 21 metres in diameter with the final design to be determined by the turbine supplier. They will likely be formed one metre below the base of the peat layer on stiff subsoil material or bedrock, or at a suitable level directed by the Geotechnical Engineer/Designer. The foundations will be constructed as follows:

- The extent of the excavation will be marked out and will include an allowance for trimming the sides of the excavation to provide a safe working area and slope batter;
- Where practical, the peat 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 and storage areas will be stripped of vegetation prior to stockpiling in line with best working practices;
- 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 and,
- 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.
- A layer of concrete 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;
- High tensile steel reinforcement will be fixed 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;
- Ductwork will be installed as required, and formwork erected around the steel cage and propped from the backside as required;
- 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;
- Concrete will be placed using a concrete pump and compacted when in the forms using vibrating poker 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;

- Steel shutters will be used to pour the circular chimney section;
- Earth wires will be placed around the base; and,
- The foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation and landscaped using the vegetable soil set aside during the excavation.
- Soil, rock and other materials excavated during construction shall be managed in line with the recommendations/ best practice guidelines outlined in Section 4.3.12 of the EIAR.

2.3.2.8 Crane Hardstands

All crane pads 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 and will measure approximately to the turbine manufacturer's requirements. The position of the crane pads varies between turbine locations depending on topography, position of the site access road, and the turbine position.

2.3.2.9 Electricity Substation and Control Buildings

The electricity substation and control buildings will be constructed within the site, as shown in Figure 2-1. The dimensions of the substation area will be set to meet the requirements and specifications of ESB Networks and the necessary equipment to safely and efficiently operate the Proposed Development.

The substation will be constructed by the following methodology:

- The area of the substation will be marked out using ranging rods or wooden posts.;
- The wind farm control buildings will also be built within the substation compound;
- The foundations will be excavated down to the level indicated by the project engineer. The foundations will be shuttered and poured with reinforced concrete. An anti-bleeding admixture will be included in the concrete mix;
- The substation will be constructed with masonry blockwork. The block work walls will be built up from the footings to DPC level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors;
- The block work will then be raised to wall plate level and the gables and internal partition walls formed. Scaffold will be erected around the outside of the building for this operation;
- Concrete roof slabs will be lifted into position using an adequately sized mobile crane;
- The timber roof trusses will then be lifted into position using a telescopic load all or mobile crane depending on site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather.
- The electrical equipment will be installed and commissioned.
- Steel palisade fencing will be erected around the substation and control building compound area.
- All wastewater from the staff welfare facilities in the control buildings will pass to a sealed storage tank. 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).
- The construction and components of the substation will be to Eirgrid specifications.

2.3.2.9.1 Battery Storage Compound

The proposed battery storage compound will be located adjacent to the proposed electricity substation compound. The compound will consist of up to four metal containers (similar in appearance to shipping containers). The containers will typically measure up to 13.3m(L) x 2.4m(W) x 4.5m (H). Each of the containers will house a modular array of battery units, control systems and other electrical components. Additionally, each container will have a transformer and ancillary grid infrastructure for connection to the

proposed substation. The compound will also have an entrance gate, security fencing and lighting. The location of the battery storage compound is shown on Figure 2-1.

The battery storage compound will operate continuously, linked to the on-site substation. It will be monitored in tandem with the overall development and there will be sporadic maintenance visits as required.

2.3.2.10 Cable Trenching

The transformer in each turbine is connected to the substation through a network of buried electrical cables. Fibre-optic cables will also connect each wind turbine to the wind farm control building in the substation compound. The ground is trenched typically using a mechanical excavator. The top layer of soil is removed and saved so that it is replaced on completion. The cables are bedded with suitable material unless the ground conditions are such that no bedding is required. The depth of the cables are to meet all national and international requirements and will generally be up to 1.3 m below ground level, depending on the ground conditions that are encountered. A suitable marking tape is installed between the cables and the surface. On completion the ground will be reinstated as per its original condition as outlined in Figure 4-10 of the EIAR. The route of the cables will generally follow the access tracks to each turbine location.

Clay plugs 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. While the majority of the cable trenches will be backfilled with native material, clay subsoils of low permeability will be used to prevent conduit flow in the backfilled trenches. Backfill material will be imported onto the site should sufficient volumes not be encountered during the excavation phase of roadway and turbine foundation construction.

2.3.2.11 Grid Connection

A connection between the proposed substation and the national electricity grid will be necessary to export the electricity generated by the Proposed Development.

The Proposed Development will connect to the existing 38kV overhead line within the site. This overhead line connects into Ballylickey Substation, located approximately 12 kilometres southwest of the site. The connection will comprise of an internal underground cable, approximately 120m in length, which will connect the proposed substation to the existing overhead line infrastructure within the site.

As there is no road or off-road grid connection required, the same methodology for grid connection cabling will be used as outlined for the internal cabling as outlined in the section above.

2.3.2.12 Watercourse Crossings

There are no crossings required over any watercourses within the site however there is a crossing required over an artificial drain with forestry on the access road track to Turbine no. 6. This crossing of this drain will be completed using a box culvert system. A number of smaller crossings of artificial drains may also be required throughout the course of construction all of which will be undertaken using a piped culvert system. The methodologies for the installation of these crossings are summarised in this section.

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

All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance. Any watercourse crossings required will be installed during a

permitted period in accordance and with Inland Fisheries Ireland best practice (IFI, 2016). This will ensure no potential impacts on spawning habitat.

All new crossings and upgrades to existing crossings will be completed as follows:

- The access road on the approach watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the watercourse crossing.
- The installation of the culvert will take place in low flow conditions.
- Where a flow exists, the water running through the watercourse channel will be pumped around the water crossing location and back into the watercourse channel downstream of the works area.
- Where over pumping is required, measures will be taken to ensure that the pumped water discharge does not disturb the channel bed with the force of water from the discharge. A steel plate to reduce the force of the flow will be used where appropriate.
- The project engineer will determine the required gradient of the culvert. The culvert must be laid at a gradient that will ensure water is contained within the culvert at all times. Where necessary a rock armour dam will be installed within the channel to reduce flow and ensure an acceptable depth of water remains within the culvert. Where a gradient of 1 - 1.5% is identified, the use of a baffle has been recommended.
- The bed of the watercourse channel will be excavated, if necessary, to achieve the correct line and to allow the culvert to be embedded 300mm into the base of the existing drain.
- 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.
- The culvert will be lowered into place using an excavator with a lifting mechanism.
- 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.
- Smaller 50mm stone sourced on site will be placed upon the sub-base to construct the road over the water crossing.

The works will be undertaken in line with NRA *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*.

All of the above works will be supervised by the Environmental Clerk of Works and the project hydrologist.

2.3.2.13 Transport Route Accommodation Works

Turbine delivery route accommodation works are required at various locations as outlined in Section 14 of the EIAR. Required works along the transport route are minor and are all located within the existing road corridor. The construction methodology of the turbine delivery accommodation works is outlined as follows:

- 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.
- Any excess excavated overburden will be removed from the works area to the on-site peat management areas or a licensed tip or, if suitable, stockpiled and reused for backfilling where appropriate.
- A layer of geogrid/geotextile may be required at the surface of the competent stratum to provide further structural formation, if required.
- The competent stratum will be overlain with granular fill sourced from the on-site borrow pit or local quarries.
- 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.
- 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.

- 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.
- Upon completion of the turbine delivery phase of the proposed wind farm the granular surface of the accommodation works location will remain in place. All kerbing, barriers and boundary fencing will be reinstated.

Leaving the granular fill and final surface running layer in place within the accommodation areas will 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 the boundary treatments will again be temporarily removed and managed as set out above.

2.3.3 Decommissioning

The wind turbines proposed as part of the Proposed Development are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Development may be decommissioned fully. The onsite substation will remain in place as it will be under the ownership of EirGrid.

Upon decommissioning of the Proposed Development, the wind turbines would be disassembled in reverse order to how they were erected. All above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in significant environment nuisances such as noise, dust and/or vibration. Site roadways will be in use as amenity and recreational pathways, and therefore will not be removed during decommissioning. If it were to be confirmed that the roads were not required in the future for any other useful purpose, they could be removed where required. Underground cables, including grid connection, will be removed and the ducting left in place. A decommissioning plan will be agreed with Cork County Council three months prior to decommissioning the proposed development.

3. ENVIRONMENTAL MANAGEMENT

3.1 Introduction

This CEMP has been prepared and presented as a standalone document and includes all best practice measures required to construct the wind farm. 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, dust and noise control measures and a waste management plan for the site.

3.2 Protecting Water Quality

3.2.1 Environmental Management in the Construction Phase

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 Site Drainage Principles

The site drainage features have been outlined in Section 4.6 of the EIAR in addition to the drainage design and management for the proposed development. 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 development. The proposed development's drainage design has therefore been proposed specifically with the intention of having no negative impact on the water quality of the site and its associated rivers and lakes, and consequently no impact on downstream catchments and ecological ecosystems.

No routes of any natural drainage features will be altered as part of the Proposed Development. Turbine locations and associated new roadways were originally selected to avoid natural watercourses, and existing roads are to be used wherever possible. 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 Development.

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 has been prepared based on experience of the project team of other renewable energy sites in peat-dominated 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.

- 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*;
- Institute of Geologists Ireland (2013): *Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements*;
- Forestry Commission (2004): *Forests and Water Guidelines*, Fourth Edition. Publ. Forestry Commission, Edinburgh;
- Coillte (2009): *Forest Operations & Water Protection Guidelines*;
- Forest Services (Draft) *Forestry and Freshwater Pearl Mussel Requirements - Site Assessment and Mitigation Measures*;
- Forest Service (2000): *Forestry and Water Quality Guidelines*. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford;
- COFORD (2004): *Forest Road Manual - Guidelines for the Design, Construction and Management of Forest Roads*;
- *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters* (Inland Fisheries Ireland, 2016);
- Inland Fisheries Ireland (2016): *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*;
- Scottish Natural Heritage (2010): *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).
- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (DoHPLG, 2018); and,
- *Guidance on the preparation of the EIA Report* (Directive 2011/92/EU as amended by 2014/52/EU), (European Union, 2017).

3.2.4 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 detailed 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. The drainage proposals will be developed further prior to the commencement of construction. The following sections give an outline of drainage management arrangements in terms of pre-construction, construction and operational phases of the Proposed Development.

3.2.4.1 Pre-Construction Drainage

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.

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.

3.2.4.2 Construction Phase Drainage

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 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 stalling 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.
- 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 stalling ponds for sediment settling;
- 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 stalling 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.

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 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 6 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.

3.2.4.4 Preparative Site Drainage Management

All materials and equipment necessary to implement the drainage measures outlined above 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 drainage design measures as necessary. The drainage measures outlined in the above 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 project will also take account of weather forecasts, and predicted rainfall. The site Construction Manager/Site Supervisor 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

The final drainage design prepared for the site has provided 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 Environmental Clerk of Works (ECoW) 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 at 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.

3.3 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 proposed development, would be used for landscaping and reinstatements of other areas elsewhere on site.

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.

3.4 Refuelling, Fuel and Hazardous Materials Storage

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

- Road-going will be refuelled off site wherever possible;
- On-site refuelling will take carried out at designated refuelling areas at various locations throughout the site. Machinery will be refuelled directly by a fuel truck that came to site as required
- All other refuelling was carried out using a mobile double skinned fuel bowser which will be parked on a level area in the construction compound when not in use;
- 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 be used during all refuelling operations.

- 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;
- 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 5) 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.

3.5

Tree Felling

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 in Section 9 of the EIAR. A Harvest Management Plan is included in Appendix A. The water protection measures to be adopted during felling operations are set out as follows:

- Machine combinations will be chosen which are most suitable for ground conditions at the time of felling and to minimise soils disturbance;
- Use of buffer zones for aquatic zones (see Table 3-1 below);
- Checking and maintenance of roads and culverts will be on-going through any felling operation. No tracking of vehicles 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 should 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. Main drains to take the discharge from collector drains will include water drops and rock armour, as required, where there are steep gradients and should avoid being placed at right angles to the contour;
- Sediment traps will be sited outside of buffer zones and will have no direct outflow into the aquatic zone. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of away from all aquatic zones. Where 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 minimised and controlled;
- Brash mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal 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 should be stacked in dry areas and outside a local 50m stream buffer zone. Straw bales and check dams to be emplaced on the down gradient side of timber storage/processing sites;
- Works should be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water run-off;
- Checking and maintenance of roads and culverts will be on-going through the felling operation;
- Refuelling or maintenance of machinery will not occur within 50m of an aquatic zone.
- 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.

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

3.6

Cement Based Products Control Measures

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

- No batching of wet-cement products will occur on site;
- Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place. Where possible pre-cast elements for culverts and concrete works will be used;
- 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 chute cleaning will be permitted, 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.
- Use weather forecasting to plan dry days for pouring concrete;
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event;
- The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a concrete washout area, typically built using straw bales and lined with an impermeable membrane. below. The areas are generally covered when not in use to prevent rainwater collecting. In periods of dry weather, the areas can be uncovered to allow much of the water to be lost to evaporation. At the end of the concrete pours, any of the remaining liquid contents is tankered off-site. Any solid contents that will have been cleaned down from the chute will have solidified and can be broken up and disposed of along with other construction waste.

The 50 m wide river buffer zone and 20 m existing artificial drainage buffer will be emplaced for the duration of the construction phase. No construction activity will occur within the buffer zone with the exception of bridge and culvert 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

3.7 Peat Stability Management

Peat instability or failure refers to a significant mass movement of a body of peat that would have an adverse impact on wind farm development and the surrounding environment. Peat failure excludes localised movement of peat that could occur below an access road, creep movement or erosion type events. In the absence of appropriate mitigation, the consequence of peat failure at the study area may result in:

- Death or injury to site personnel;
- Damage to machinery;
- Damage or loss of access tracks;
- Drainage disrupted;
- Site works damaged or unstable;
- Contamination of watercourses, water supplies by sediment particulates; and,
- Degradation of the environment.

3.7.1 General Recommendations for Good Construction Practice

The Peat Stability Risk Assessment indicates that the site has an acceptable margin of safety and is suitable for the proposed wind farm development (GDG, 2020). The following recommendations are made in the Peat Management Plan (GDG, 2020) and should be considered when preparing Construction Method Statements for the development:

- Avoidance of uncontrolled concentrated water discharge onto peat slopes identified as being unsuitable for such discharge.
- All excavation shall be suitably supported to prevent collapse and development of tension cracks.
- Installation and regular monitoring of geotechnical instrumentation, as appropriate, during construction in areas of possible poor ground, such as deeper peat deposits
- Site reporting procedures to ensure that working practices are suitable for the encountered ground conditions.
- Regular briefing of all site staff (e.g. toolbox talks) to provide feedback on construction and ground performance and to promote reporting of any observed change in ground conditions.
- Routine inspection of wind farm site by the contractor to include an assessment of ground stability conditions (e.g. cracking, excessive floating road settlement, disrupted surface, closed-up drains) and drainage conditions (e.g. blocked drains, absence of water in previously flowing drains, springs, etc.)

3.8 Dust Control

Construction dust can be generated from many on-site activities such as excavation and backfilling. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the

dust, i.e. soil, sand, peat, etc. and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Construction traffic movements also have the potential to generate dust as they travel along the haul route.

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;
- The transport of soils or other material, which has significant potential to generate dust, will be undertaken in tarpaulin-covered vehicles where necessary;
- All construction related traffic will have speed restrictions on un-surfaced roads to 20 kph;
- Daily inspection of construction sites to examine dust measures and their effectiveness.
- When necessary, sections of the haul route will be swept using a truck mounted vacuum sweeper; and,
- All vehicles leaving the construction areas of the site will pass through a wheel washing area prior to entering the local road network.

3.9 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.

3.10 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.

3.10.1 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.

3.10.2 Establish Good Site Hygiene

The following measures are proposed to establish good site hygiene to ensure the control of any potential spread of invasive species during construction works:

- 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.

3.11 Waste Management

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

3.11.1 Legislation

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

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

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

3.11.2 Waste Management Hierarchy

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

Prevention and Minimisation:

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

Reuse of Waste:

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

Recycling of Waste:

There are a number of established markets available for the beneficial use of Construction 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.

3.11.3 Construction Phase Waste Management

3.11.3.1 Description of the Works

The construction of the development will involve the construction of 7 no. turbines, new and upgrade of site access roads, internal cabling and grid connection, substation, battery storage and control buildings and all associated infrastructure.

The turbines will be manufactured off site and delivered to site where on site erection will occur.

The turbine foundations will consist of stone from the local quarries 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 construction of the substation will comprise of a concrete foundation with concrete masonry blocks and a timber roof structure with 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 site roads will be constructed with rock won from local quarries

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

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

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

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 banded containers/areas before being collected by an authorised waste contractor and brought to an EPA licensed waste facility. As mentioned above, hazardous wastes will be kept separate from non-hazardous wastes so that contamination does not occur.

3.11.3.2 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.

3.11.3.3 Waste Arising from Construction Activities

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

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

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

It is not envisaged that there will be any waste material arising from the materials used to construct the site roads as only the quantity of stone necessary will be sourced from 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.

3.11.4 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 the decommissioning of the development are outlined in Table 3-3 below.

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

Material Type	Example	EWC Code
Cables	Electrical wiring	17 04 11
Metals	Copper, aluminium, lead, iron and rebar	17 04 07
Inert materials	Crushed stone, concrete	17 01 07

3.11.4.1 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 material can be reused for reinstatement of the areas around turbine foundations and adjacent to site roads.

3.11.4.2 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.

3.11.4.3 Implementation

3.11.4.3.1 Roles and Responsibilities

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

3.11.4.3.2 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.

3.11.4.3.3 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

3.11.4.4 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 Development.

4. ENVIRONMENTAL MANAGEMENT IMPLEMENTATION

4.1 Roles and Responsibilities

The Site Supervisor/Construction Manager and/or Environmental Clerk of Works (ECoW) are the project focal point relating to construction-related environmental issues.

In general, the ECoW will maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. The ECoW will act as the regulatory interface on environmental matters by reporting to and liaising with Cork County Council and other statutory bodies as required.

The ECoW will report directly to the Site Supervisor/Construction Manager. An ECoW or Project Ecologist, Project Hydrologist, Project Archaeologist and Project Geotechnical engineer will visit the site regularly and report to the Site Environmental Office. This structure provides a “triple lock” review/interaction by external specialists. An organogram structure for the construction stage is as follows:

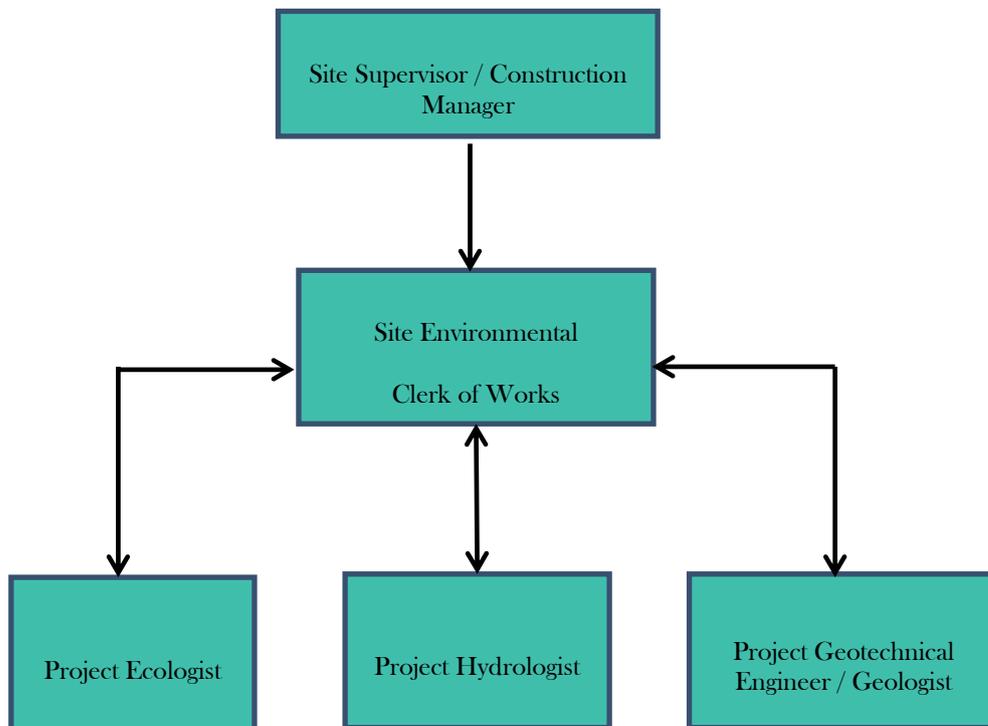


Figure 4-1 Site Management Chain of Command

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, including site stability, shall certify the said works, will be adhered to. Such an engineer will be appointed to oversee and supervise the construction phase of the project.

4.1.1 Wind Farm Construction Manager / Site Supervisor

The Construction Manager / Site Supervisor will have overall responsibility for the organisation and execution of all related environmental activities as appropriate, in accordance with regulatory and project environmental requirements. The duties and responsibilities of the Site Supervisor/Construction Manager will include:

- Ensure that all works are completed safely and with minimal environmental risk;
- Approve and implement the Project CEMP and supporting environmental documentation, and ensure that all environmental standards are achieved during the construction phase of the project;
- Take advice from the ECoW on legislation, codes of practice, guidance notes and good environmental working practice relevant to their work;
- Ensure compliance through audits and management site visits;
- Ensure timely notification of environmental incidents; and,
- Ensure that all construction activities are planned and performed such that minimal risk to the environment is introduced.

4.1.1.1 Site Engineer

The main contractor will engage a qualified site engineer who will have input into the environmental management of the site. The proposed engineer has extensive experience in the construction of wind farms in Ireland and has fulfilled an environmental management role as part of those projects.

The Site Engineer will report to the Construction Manager and liaise with the ECoW. The responsibilities and duties of the Site Engineer will include the following:

- Undertake inspections, including visual inspections at watercourse crossings, and reviews to ensure the works are carried out in compliance with the CEMP;
- Advise site management/contractor/sub-contractors regarding:
 - Prevention of environmental pollution and improvement to existing working methods;
 - Suitability and use of plant, equipment and materials to prevent pollution;
 - Environmentally sound methods of working and systems to identify environmental hazards;

4.1.2 Site Environmental Clerk of Works

The main contractor 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, and to monitor all site works and to ensure that methodologies and mitigation are followed throughout construction to avoid negatively impacting on the receiving environment.

The ECoW will report to the Site Supervisor/Construction Manager. The responsibilities and duties of the ECoW will include the following:

- Preparation and update of the CEMP as required, and supporting environmental documentation and review/approval of contractor method statements;
- Undertake inspections and reviews to ensure the works are carried out in compliance with the CEMP;
- Monitor the implementation of the CEMP, particularly all proposed/required Environmental Monitoring;
- Generate environmental reports as required to show environmental data trends and incidents 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;

- Ensure the specified mitigation measures are initiated and adhered to during the construction phase;
- Liaise with Project Ecologist, Project Hydrologist and Project Geotechnical Engineer to ensure regular site visits and audits/inspections are completed;
- Ensure adequate arrangements are in place for site personnel to identify potential environmental incidents;
- Ensure that details of environmental incidents are communicated in a timely manner to the relevant regulatory authorities, initially by phone and followed up as soon as is practicable by e-mail;
- 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; and,
- Identify environmental training requirements and arrange relevant training for all levels of site based staff/workers.

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 project.

4.1.3 Project Ecologist

The Project Ecologist will report to the ECoW and is responsible for the protection of sensitive habitats and species encountered during the construction phase of the wind farm. The Project Ecologist will not be full time on site but will visit the site at least once a month during construction.

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

- Review and input to the final construction phase CEMP in respect of ecological matters;
- In liaison with Environmental Clerk of Works, oversee and provide advice on all relevant ecology mitigation measures set out in the EIAR and planning permission conditions;
- Regular inspection and monitoring of the development, through all phases of construction/operation and provide ecological advice as required;
- Carry out ecological monitoring and survey work as may be required by the planning authority.

4.1.4 Project Hydrologist

The Project Hydrologist will report to the ECoW and is responsible for inspection and review of drainage and water quality aspects associated with construction of the wind farm. The Project Hydrologist will not be full time on site but will visit the site at least once a month during construction and on a weekly basis during site preparation/groundworks.

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

- Assist in compiling a detailed drainage design before construction commences and attend the site to set out and assist with micro siting of drainage controls. This will be completed over several site visits at the start of the construction phase;
- Review and input to the final construction phase CEMP in respect of drainage and water quality management;
- Following the initial stage of drainage construction regular site visits will be required, at least once a month, to complete hydrological and water quality audits and reviews and report any issues noted to the Site Supervisor/Construction Manager; and,
- Complete ongoing inspection and monitoring of the development, particularly in areas of drainage control, through all phases of construction (including pre, during and post construction) and ensure construction is carried out as specified in the EIAR, and in relevant planning conditions.

4.1.5 Project Geotechnical Engineer/Geologist

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

The responsibilities and duties of the Geotechnical Engineer or Geologist 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 Site Supervisor/Construction Manager;
- Ensuring that identified hazards are listed in the Construction Risk Register and that these are subject to ongoing monitoring; and,
- Ongoing inspection and monitoring of the development, particularly in areas of peatland and the 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, and in relevant planning conditions.

4.2 Environmental Awareness and Training

4.2.1 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.

4.2.2 Toolbox Talks

Toolbox talks would be held by the ECoW or Site Supervisor/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 development, all staff will be made aware of and adhere to the Health & Safety Authority's '*Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006*'. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan.

5. EMERGENCY RESPONSE PLAN

An 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 in terms of site health and safety and environmental protection.

5.1 Emergency Response Procedure

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.

5.1.1 Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Site Supervisor/Construction Manager will lead the emergency response which makes him responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response are presented in Figure 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 project.

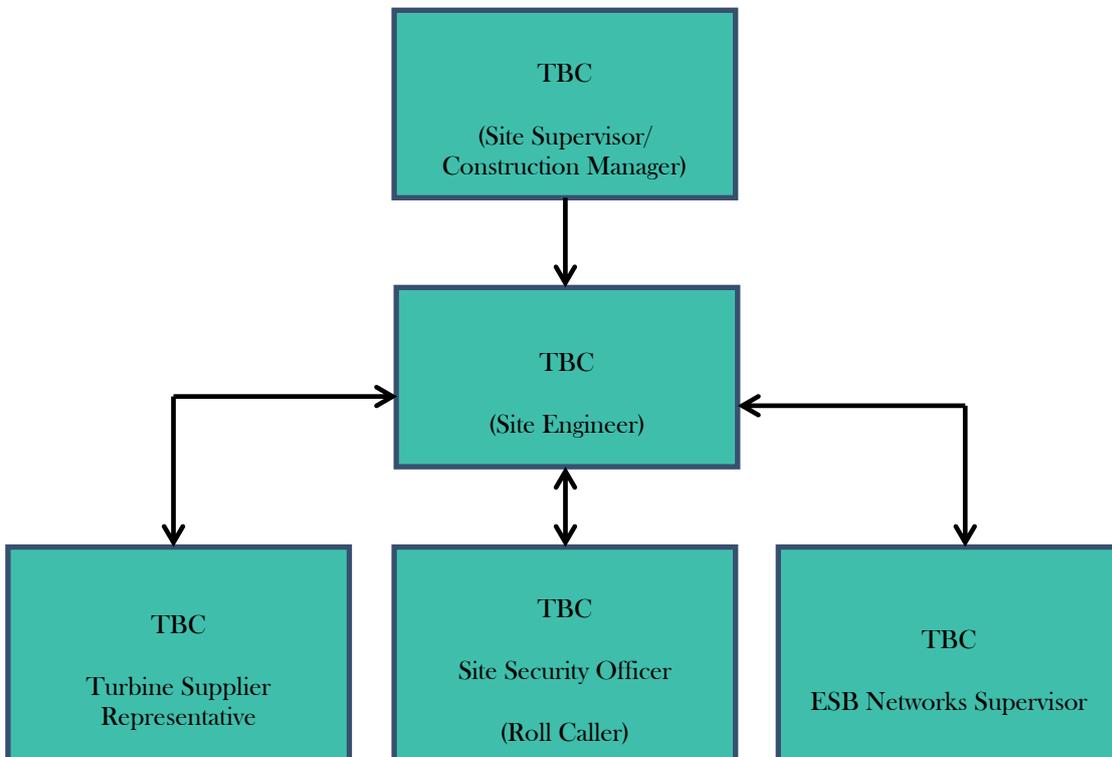


Figure 5-1 Emergency Response Procedure Chain of Command

5.1.2 Initial Steps

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 5-1 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

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/fog-horn 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 5.1.3.
- 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 5.3 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 5.4.
- Contact the next of kin of any injured personnel where appropriate.

5.1.3 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 fog-horn 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.

5.1.4 Excessive Peat Movement

Where there is excessive peat movement or continuing peat movement recorded at a monitoring location, or identified at any location within the site, but no apparent signs of distress to the peat (e.g. cracking, surface rippling) then the following shall be carried out.

- All construction activities shall cease within the affected area.
- Increased monitoring at the location shall be carried out. The area will be monitored, as appropriate, until such time as movements have ceased.
- Re-commencement of limited construction activity shall only start following a cessation of movement and the completion of a geotechnical risk assessment by a geotechnical engineer.

5.1.5 Onset of Peat Slide

Where there is the onset or actual detachment of peat (e.g. cracking, surface rippling) then the following shall be carried out.

- On alert of a peat slide incident, all construction activities will cease and all available resources will be diverted to assist in the required mitigation procedures.
- Where considered possible action will be taken to prevent a peat slide reaching any watercourse. This will take the form of the construction of check barrages on land. Due to the terrain, the possible short run-out length to watercourses, speed of movement and the inability to predict locations it may not be possible to implement any on-land prevention measures, in this case a watercourse check barrage will be implemented.
- For localised peat slides that do not represent a risk to a watercourse and have essentially come to rest the area will be stabilised initially by rock infill, if required. The failed area and surrounding area will then be assessed by the engineering staff and stabilisation procedures implemented. The area will be monitored, as appropriate, until such time as movements have ceased.

5.1.6 Spill Control Measures

Every effort will be made to prevent an environmental incident during the construction and operational phase of the 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 ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring.
- The ECoW will notify the appropriate regulatory body such as Cork County Council, and the Environmental Protection Agency (EPA), 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 ECoW 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 Main Contractor. These records will be made available to the relevant authorities such as Cork County Council, EPA 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.

5.2

Contact the Emergency services

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

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

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

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

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

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

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

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

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

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

5.3

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 5-2 Emergency Contacts

Contact	Telephone no.
Emergency Services - Ambulance, Fire, Gardaí	999/112
Doctor - Macroom Health Centre	026 20650
Hospital - Cork University Hospital	021 492 2000
ESB Emergency Services	1850 372 999
Gas Networks Ireland Emergency	1850 20 50 50
Gardaí - Local Garda Station. Ballineary	026 47002
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: Wingleaf Ltd.	021 7336034

5.3.1

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.

5.4 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 project.

Table 5-3 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	
Due to the remoteness of the site 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 undergone a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.	

6. MITIGATION PROPOSALS

All mitigation measures relating to the pre-commencement, construction and operational phases of the Proposed Development were set out in the various sections of the Environmental Impact Assessment Report (EIAR) prepared as part of the planning permission application to Cork County Council.

This section of the CEMP groups together all of the mitigation measures presented in the EIAR. The Mitigation Measures are presented in the following pages.

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 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 6-1 Site Preparation and Mitigation Measures

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Pre-Commencement Phase					
MM1	Environmental Management	EIAR Section 4	All proposed site activities will be provided for in a Construction 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 EIS/EIAR and will set out the monitoring and inspections procedures and frequencies.		
MM2	Environmental Management	EIAR Section 4	The Environmental Clerk of Works (ECoW) will maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. In addition, a Project Ecologist, Project Hydrologist, Project Archaeologist, Project Geotechnical Engineer will visit the site regularly and report to the Site Environmental Office.		
MM3	Environmental Management	CEMP Section 4	A Site ECoW will oversee the site works and implementation of 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 parties where required prior to commencement of construction, and may be further adjusted as required during the course of the project.		
MM4	Environmental Management	EIAR Section 7	<p>A Project Ecologist will be appointed. Duties will include:</p> <ul style="list-style-type: none"> ➤ 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 Development 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 where required with regular updates in relation to construction progress. 		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM5	Concrete Deliveries	EIAR Section 4	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.		
MM6	Wastewater Management	CEMP Section 4	All wastewater from the staff welfare facilities in the control buildings will pass to a sealed storage tank. 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)		
MM7	Site Drainage Plan	CEMP Section 4	The Project Hydrologist/Design Engineer will assist in preparing a site drainage plan before construction commences.		
MM8	Preparative Site Drainage Management,	CEMP Section 4	All materials and equipment necessary to implement the drainage mitigation measures will be brought on-site in advance of any works commencing. The drainage measures outlined in the EIAR will be installed prior to, or at the same time as the works they are intended to drain. An adequate amount of clean stone, silt fencing, stakes, etc. will be kept on site at all times to implement the drainage design measures as necessary.		
MM9	Pre-emptive site drainage management	CEMP Section 4	The works programme for the groundworks part of the construction phase of the project will also take account of weather forecasts and predicted rainfall in particular.		
MM10	Drainage Inspection	CEMP Section 3	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.		
MM11	Drainage Maintenance	CEMP Section 4	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 supervising hydrologist.		
MM12	Earthworks	CEMP Section 3	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		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			possibility of impact on surface waters by suspended sediment released during construction and entrained in surface run-off.		
MM13	Earthworks	EIAR Section 9 NIS Section 5	A 50-metre buffer zone will be maintained around hydrological features and 10m to main drains during the windfarm construction. With the exception of road crossings of streams and associated culvert construction, no development infrastructure, vehicle or plant movement, construction activity or stock-piling of construction materials or construction waste will take place within this zone, and no vegetation will be removed from within this zone.		
MM14	Felling/Site Clearance	EIAR Section 6, 7	The removal of woody vegetation will be undertaken in full compliance with Section 40 of the Wildlife Act 1976 - 2018. 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		
MM15	Felling	EIAR Section 4	Construction will not commence during the Breeding Bird season from March to August inclusive. If breeding activity is identified, the nest site will be located, and no works shall be undertaken within a 500m buffer (Forestry Commission Scotland 2006; Ruddock & Whitfield 2007). No works shall be permitted within the buffer until it can be demonstrated that the nest is no longer occupied.		
MM16	Archaeology	EIAR Section 13	Establish a 30m Buffer Zone around recorded hut site east of Turbine no. 2 to be directed by an archaeologist prior to construction. Keep out fencing and signage should be utilised		
Construction Phase					
<i>Construction Management</i>					
MM17	Health and Safety	CEMP Section 4	During construction of the proposed development, all staff will be made aware of and adhere to the Health & Safety Authority's ' <i>Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006</i> '. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM18	Health and Safety	EIAR Section 4	Stock-proof fencing will be erected around the borrow pit if deemed necessary to prevent uncontrolled access to this area. Appropriate health and safety signage will also be erected on this fencing and at locations around the site		
MM19	Refuelling,	EIAR Section 4 NIS Section 5 CEMP Section 3	On-site refuelling will be carried out using a mobile double skinned, bunded fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site and will be towed around the site by a 4x4 jeep to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the cranes, excavators, etc. that will be used during the construction of the proposed wind farm development. The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction when not in use. Refuelling operations will be carried out only by designated trained and competent operatives. Mobile anti-pollution measures such as drip trays and fuel absorbent mats will be used during all refuelling operations		
MM20	Plant and Equipment Inspections	CEMP Section 3	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.		
MM21	Temporary water supply and onsite sanitation	EIAR Section 9	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		
MM22	Pre-emptive site drainage management	EIAR Section 9 CEMP Section 3	The works programme for the groundworks part of the construction phase of the project will also take account of weather forecasts and predicted rainfall in particular.		
MM23	Protection of Watercourses	EIAR Section 9	Silt traps will be strategically placed down-gradient within forestry drains near streams. The main purpose of the silt traps and drain blocking is to slow water flow, increase residence time, and allow settling of silt in a controlled manner.		
MM24	Protection of Watercourses	NIS Section 4	The Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters will be adopted and Inland		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			<p>Fisheries Ireland stipulated that measures should be in place with regard to protection of watercourses during construction of the Proposed Development, including:</p> <ul style="list-style-type: none"> ➤ There be no drainage or other physical interference with the bed or bank of any watercourse without prior consultation with IFI. ➤ Suspended solids and or hydrocarbon contaminated site run-off waters are controlled adequately so that no pollution of surface waters can occur. More specifically IFI feels the following issues should be addressed <ul style="list-style-type: none"> ➤ Identifying and zoning the project for environmental impact should a peat slip occur ➤ Setting out contingency plan should a peat movement occur. ➤ Setting out a plan for the control of silt in such a scenario, including measures to be put in place at the initial stages of construction. ➤ In the event of any watercourse crossings being bridged or culverted the following general criteria should apply, <ul style="list-style-type: none"> ➤ The free passage of fish must not be obstructed. ➤ The original slope of the riverbed should be maintained with no sudden drops on the downstream side. ➤ Bridges are preferable to culverts. ➤ In the event of a crossing being in excess of 1ft in width IFI should be consulted prior to works commencing. ➤ All instream works should be carried out only in the April-September period. 		
MM25	Concrete Deliveries and Management	EIAR Section 4 NIS Section 9	Only ready-mixed concrete will be used during the construction phase, with all concrete being delivered from local batching plants in sealed concrete delivery trucks.		
MM26	Concrete Deliveries and Management	EIAR Section 4 NIS Section 5	No washing out of any plant used in concrete transport or concreting operations will be carried out onsite. When concrete is delivered to site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the site. Concrete trucks will be directed back to their batching plant for washout.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM27	Concrete Deliveries and Management	EIAR Section 4	No concrete will be transported around the site in open trailers or dumpers so as to avoid spillage while in transport.		
MM28	Concrete Deliveries and Management	EIAR Section 4	Clearly visible signs in prominent locations will be placed close to concrete pour areas specifically stating washout of concrete lorries is not permitted on the site		
MM29	Concrete Deliveries and Management	EIAR Section 4	Main pours will be planned days or weeks in advance. Large pours will be avoided when prolonged periods of heavy rain are forecast.		
MM30	Concrete Deliveries and Management	EIAR Section 4	Concrete pumps and machine buckets will be restricted from slewing over watercourses while placing concrete.		
MM31	Concrete Deliveries and Management	EIAR Section 4	Excavations will be sufficiently dewatered before concreting begins. Dewatering will continue while concrete sets.		
MM32	Concrete Deliveries and Management	EIAR Section 4	Covers will be available for freshly placed concrete to avoid the surface washing away in heavy rain.		
MM33	Concrete Deliveries and Management	EIAR Section 4 CEMP Section 3	Surplus concrete after completion of a pour will be returned to the concrete suppliers batching plant for recycling.		
MM34	Road Cleanliness	EIAR Section 4. CEMP Section 3	A road sweeper will be available if any section of the public roads were to be dirtied by trucks associated with the proposed development.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM35	Road Cleanliness	EIAR Section 4 CEMP Section 3	Where it is deemed necessary, wheel washes will be provided near all site entrances to the public road		
Drainage Design and Maintenance					
MM36	Watercourse Buffers	EIAR Section 4. CEMP Section 3	All discharges from the proposed works areas will be made over vegetation filters at a minimum of 50m from streams and lakes respectively.		
MM37	Water Discharge	EIAR Section 4	There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows.		
MM38	Wastewater Management	EIAR Section 4. CEMP Section 3	During the construction phase, a self-contained port-a-loo with an integrated waste holding tank will be used on site for toilet facilities. This will be maintained by the service contractor as required and will be removed from the site on completion of the construction phase.		
MM39	Borrow Pit Drainage	EIAR Section 4	During the construction phase of the project, it will be necessary to keep the borrow pit area free of standing water while rock is still being extracted. This will be achieved by using a mobile pump, which will pump water into the same series of drains, settlement ponds with a level spreader, siltbuster or equivalent, which will receive the water from the single outlet		
MM40	Drainage Swales,	EIAR Section 4. CEMP Section 3	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.		
MM41	Interceptor Drains,	EIAR Section 9. CEMP Section 3	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.		
MM42	Check Dams	EIAR Section 4	Check dams will not be used in any natural watercourses, only artificial drainage channels and interceptor drains. The check dams will be installed at regular		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 3	intervals along interceptor drains to restrict flow velocity, minimise channel erosion and promote sedimentation behind the dam as per the drainage design.		
MM43	Level Spreaders,	EIAR Section 4. CEMP Section 3	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.		
MM44	Piped Slope Drains	EIAR Section 4	Piped slope drains will be used to transfer water away from areas where slopes are too steep to use level spreaders and will only remain in place for the duration of the construction phase		
MM45	Vegetation Filters	EIAR Section 4, 9	Vegetation filters, that is areas of existing vegetation, accepting drainage water issuing from level spreaders as sheet flow, will remove any suspended sediment from water channelled via interceptor drains or any remaining sediment in waters channelled via swales and settlement ponds.		
MM46	Settlement Ponds	EIAR Section 4, 9. CEMP Section 3	Settlement ponds, placed either singly or a pair in series, will buffer volumes of run-off 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 water courses as per the drainage design.		
MM47	Dewatering Silt Bag	EIAR Section 4, 9. CEMP Section 3	Dewatering silt bags will be used which allow the flow of water through 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.		
MM48	Siltbuster	EIAR Section 4.	A “siltbuster” or similar equivalent piece of equipment will be available to filter any water pumped out of excavation areas if necessary, prior to its discharge to stilling ponds or swales. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM49	Culvert Upgrades	EIAR Section 4, 9	<p>The following mitigation is proposed for completion of windfarm culvert upgrades:</p> <ul style="list-style-type: none"> ➤ Where possible pre-cast elements for culverts and concrete works will be used; ➤ All new proposed culverts and proposed culvert upgrades will be suitably sized for the expected peak flows in the watercourse; ➤ 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. ➤ All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance 		
MM50	Silt Fences,	EIAR Section 4, 9.	<ul style="list-style-type: none"> ➤ Silt fences will be emplaced 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 		
MM51	Sediment disposal	EIAR Section 4	<p>Sediment that is removed from settlement ponds, check dams, silt bags etc. as part of routine maintenance will be carefully disposed of away from all aquatic zones or will be transported off-site for disposal.</p>		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM52	Excavation seepages and treatment	EIAR Section 4, 9	<ul style="list-style-type: none"> ➤ 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, along with use of more specialist treatment systems such as a Siltbags; ➤ There will be no direct discharge to surface watercourses, and therefore no risk of hydraulic loading or contamination will occur; 	➤	➤
<i>Felling</i>					
MM53	Felling Licence	EIAR Section 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		
MM54	Clear felling of Coniferous Plantation	EIAR Section 9	<p>Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses comprise best practice methods (from the guidance listed above) which are set out as follows:</p> <ul style="list-style-type: none"> ➤ Machine combinations (i.e. hand-held or mechanical) will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance; ➤ Trees will be cut manually inside the 50m buffer and using machinery to extract whole trees only; ➤ 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. 		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			<p>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. Main drains to take the discharge from collector drains will include water drops and rock armour, as required, where there are steep gradients, and should avoid being placed at right angles to the contour;</p> <ul style="list-style-type: none"> ➤ 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 an area within the borrow pit where all rock has been excavated . Where possible, all new silt traps will be constructed on even ground and not on sloping ground; ➤ In areas particularly sensitive to erosion or where felling inside the 50 metre buffer is required, it will be necessary to install double or triple sediment traps; ➤ Double silt fencing will also be put down slope of felling areas which are located inside the 50 metre buffer zone; ➤ 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 peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall; ➤ Timber will be stacked in dry areas, and outside a local 50 metre watercourse buffer. Straw bales and check dams to be emplaced on the down gradient side of timber storage/processing sites; 		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> ➤ 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; ➤ No crossing of streams by machinery will be permitted and only travel perpendicular to and away from stream will be allowed; ➤ Checking and maintenance of roads and culverts will be on-going through the felling operation; ➤ 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; ➤ A permit to refuel system will be adopted at the site; and, ➤ 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 		
MM55	Clear Felling of Coniferous Plantation	EIAR Section 9	<p>Silt traps will be strategically placed down-gradient within forestry drains near streams. The main purpose of the silt traps and drain blocking is to slow water flow, increase residence time, and allow settling of silt in a controlled manner. The following items shall be carried out during pre-felling inspections and after:</p> <ul style="list-style-type: none"> ➤ 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 inspections the main drainage ditches shall be identified. Ideally the pre-felling inspection shall be carried out during rainfall; ➤ Following tree felling all main drains shall be inspected to ensure that they are functioning; ➤ Extraction tracks nears 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 		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			that it will not be carried back into the trap or stream during subsequent rainfall		
<i>Peat, Subsoils and Bedrock</i>					
MM56	Erosion of Exposed Subsoils and Peat	EIAR Section 9	The works programme for the construction stage of the development will also take account of weather forecasts and predicted rainfall in particular. Large excavations and movements of peat/subsoil or peat 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.		
MM57	Peat Management	EIAR Section 4	Peat removed from turbine locations and access roads will be used for landscaping, side-cast at appropriate locations and placed within the proposed borrow pit. Where possible, the upper vegetative layer will be placed with the vegetation of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the re-instated borrow pits.		
MM58	Peat Management	EIAR Section 4	<ul style="list-style-type: none"> ➤ Care shall be taken during peat excavation to ensure it is segregated from other soil types, therefore particular care should be taken to review recorded peat depths. ➤ Peat shall be separated and stored by type, namely the acrotelmic and catotelmic layers. ➤ Acrotelm (top about 0.3 to 0.4m of peat) is generally required for landscaping and shall be stripped and temporarily stockpiled for re-use as required. Acrotelm stripping shall be undertaken before the main excavations. ➤ Where possible, the acrotelm shall be placed with the vegetation part of the sod facing the right way up to encourage the growth of plants and vegetation. ➤ All catotelm peat (peat below about 0.3 to 0.4m depth) shall be transported immediately on excavation to the designated areas. ➤ Construction sequence planning shall minimise the time that peat is stockpiled before reuse. ➤ Peat stockpiles shall not be allowed to substantially erode or become dry. ➤ Material stockpiles shall be located at least 50m away from watercourses, including site ditches/shucks, to reduce the potential for sediment to be transferred into the wider hydrological system. 	➤	➤

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> ➤ Peat shall be stored in areas where the water table is high, or consideration shall be made for keeping the water table high where reasonably practical. ➤ Peat stockpile locations should be selected to limit re-handling as far as reasonably possible. ➤ Excavated peat shall be stored and reused within that immediate area to ensure peat is used to restore peatland habitat. ➤ The Contractor shall consult the Project Ecologist to agree on locations for material stockpiles and consider minimising impacting sensitive ecological receptors. ➤ The Contractor shall consult the site Geotechnical Engineer and review and take into account the Peat Stability Risk Assessment 19162-001 by GDG (2020), to avoid the risk of peat instability in peat excavations, peat stockpiling and all material stockpiling in areas underlain by peat. ➤ Run-off from stockpiles shall be directed through the site drainage system that shall include silt fences, settlement ponds and other drainage measures as appropriate. This shall be detailed in the Contractor's Construction and Environmental Management Plan. 		
MM59	Peat instability and failure	EIAR Section 4. CEMP Section 3	The Contractor shall consult the site Geotechnical Engineer and review and take into account the Peat Stability Risk Assessment 19162-001 by GDG (2020), to avoid the risk of peat instability in peat excavations, peat stockpiling and all material stockpiling in areas underlain by peat		
<i>Flora and Fauna</i>					
MM60	Kerry Slug	EIAR Section 6	<p>A pre-commencement survey and trapping exercise, immediately before construction works commence, will be conducted within the development footprint. Metric trapping and hand searches of the footprint will be conducted by a qualified ecologist. Any Kerry slug encountered within the development footprint will be translocated to an alternative area of suitable habitat outside the development footprint. The trapping and translocation will be conducted under a derogation licence from the NPWS</p> <p>Following trapping, the extent of the development footprint will be clearly marked to prevent any encroachment on Kerry slug habitat located outside the works area and to ensure that no Kerry slug re-enter the works area.</p>		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM61	Flora and Fauna - Natural Woodland	EIAR Section 9	To avoid potential effects on Oak-Birch-Holly Woodland (WN1) the footprint of the Proposed Development will be clearly marked out and fenced off prior to works commencing by a qualified ecologist. There will be no access to the wider woodland area. All machinery will work from the existing access road corridor. Vegetation removal will be conducted in line with the provisions of the Wildlife Act.		
MM62	Flora and Fauna - Bats	EIAR Section 6	<p>Best practice including measures in relation to noise restrictions, lighting restrictions and buffering are provided in the Bat Report (Appendix 6-3 of the EIAR), to include:</p> <ul style="list-style-type: none"> ➤ 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 (SI 359/1996). ➤ Where lighting is required, directional lighting will be used to prevent overspill on to woodland/forestry edges. This will be achieved using lighting accessories, such as hoods, cowls, louvers and shields, to direct the light to the intended area only. ➤ A 50m buffer from the blade tip to the nearest woodland, as recommended by the Natural England (2014) and SNH (2019) guidelines, shall be implemented. These vegetation-free areas will be maintained during the operational life of the development. 		
MM63	Invasive Species	EIAR Section 6 CEMP Section 3	No invasive species were recorded within the study area. However, legislative requirements should be considered to control the spread of noxious weeds and non-native invasive plant species, it is important that any activities associated with the planning, construction and operation of wind farm developments comply with the requirements of the Wildlife Acts, 1976-2012.		
Noise and Vibration					
MM64	Construction Phase Noise Control,	EIAR Section 11 CEMP Section 3	<p>The below practices be adopted during construction, including:</p> <ul style="list-style-type: none"> ➤ Managing the hours according to the CEMP during which site activities likely to create high levels of noise or vibration are permitted; ➤ Establishing channels of communication between the contractor/developer, Local Authority and residents; 		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> ➤ Appointing a site representative responsible for matters relating to noise and vibration; ➤ Monitoring typical levels of noise and vibration during critical periods and at sensitive locations; ➤ Keeping site access roads even to mitigate the potential for vibration from lorries. ➤ Furthermore, a variety of practicable noise control measures will be employed. These include: ➤ Selection of plant with low inherent potential for generation of noise and/ or vibration; ➤ Placing of noisy / vibratory plant as far away from sensitive properties as permitted by site constraints, and; ➤ regular maintenance and servicing of plant items. 		
MM65	Construction Phase Noise Control,	EIAR Section 11	Operation of plant: all construction operations shall comply with guidelines set out in British Standard documents <i>'BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Noise'</i> .		
MM66	Construction Phase Noise Control,	EIAR Section 11 CEMP Section 3	<p>The following list of measures will be considered, where necessary, to ensure compliance with the relevant construction noise criteria:</p> <ul style="list-style-type: none"> ➤ 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 or throttled back to a minimum during periods when not in use. ➤ Any plant, such as generators or pumps, which is required to operate before 07:00hrs or after 19:00hrs 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 Table 11-18 of the 		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			<p>EIAR 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.</p> <ul style="list-style-type: none"> ➤ 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 period or at critical periods within the programme it could occasionally be necessary to work out with these hours. It may also be necessary to commence turbine base concrete pours earlier due to time constraints incurred by the concrete curing process. Any such out of hours working would be agreed in advance with the local planning authority. <p>If rock breaking is employed in relation to site activities the following are examples of measures that will be considered as necessary in order to mitigate noise emissions from these activities:</p> <ul style="list-style-type: none"> ➤ Fit suitably designed muffler or sound reduction equipment to the rock breaking tool to reduce noise without impairing machine efficiency. ➤ Ensure all leaks in air line are sealed. ➤ Use a dampened bit to eliminate ringing. ➤ Erect acoustic screen between compressor or generator and noise sensitive area. When possible, line of sight between top of machine and reception point needs to be obscured. ➤ Enclose breaker or rock drill in portable or fixed acoustic enclosure with suitable ventilation. 		
MM67	Vibration	EIAR Section 11	<p>The following mitigation measures will be employed to control the vibration impact during blasts:</p> <ul style="list-style-type: none"> ➤ Trial blasts will be undertaken to obtain scaled distance analysis; ➤ Ensuring appropriate burden to avoid over or under confinement of the charge; ➤ Accurate setting out and drilling; ➤ Appropriate charging; ➤ Appropriate stemming with appropriate material such as sized gravel or stone chipping; ➤ Delay detonation to ensure small maximum instantaneous charges; ➤ Decked charges and in-hole delays; 		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> > Blast monitoring to enable adjustment of subsequent charges; > Good blast design to maximise efficiency and reduce vibration; > Avoid using exposed detonating cord on the surface 		
<i>Air Quality/Dust</i>					
MM68	Construction Phase Dust Control	EIAR Section 4. CEMP Section 3	Truck wheels or vehicle underbodies will be washed to remove mud and dirt before leaving the site where appropriate.		
MM69	Construction Phase Dust Control	EIAR Section 4 CEMP Section 3	In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and site compounds to prevent the generation of dust.		
MM70	Construction Phase Air Quality	EIAR Section 10	<ul style="list-style-type: none"> > All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise. > Turbines and construction materials will be transported to the site on specified routes only unless otherwise agreed with the Planning Authority. > The majority of aggregate materials for the construction of the Proposed Development will be obtained from the two proposed borrow pits on the site. This will significantly reduce the number of delivery vehicles accessing the site, thereby reducing the amount of emissions associated with vehicle movements. 		
<i>Landscape and Visual</i>					
MM71	Construction Compound	EIAR Section 4 CEMP Section 2	One main construction compound will be used for the storage of all construction materials and turbines. The use of one main compound as opposed to several smaller compounds interspersed throughout the site will result in a reduced visual impact arising from this stage of the development.		
<i>Cultural Heritage</i>					
MM72	Buffer Zones	EIAR Section 13	Buffers will be maintained around recorded monuments as outlined in the Cultural Heritage section of the EIAR.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM73	Turbine Delivery	EIAR Section 13	Impacts on Carriganass Castle Bawn wall will be avoided during the delivery of the turbines to the Proposed Development site and where there is a requirement, a super wing carrier can be used to lift the blade so it avoids structures within the surrounding area		
Traffic					
MM74	Management of Large Deliveries	EIAR Section 14	All deliveries comprising abnormally large loads will be made at night in order to minimise disruption to general traffic during the construction stage.		
MM75	Construction Phase Traffic and Transport - Mitigation	EIAR Section 14	<p>A detailed Traffic Management Plan (TMP), will be provided specifying details relating to traffic management and included in the CEMP prior to the commencement of the construction phase of the Proposed Development. The TMP will be agreed with the local authority and An Garda Síochána prior to construction works commencing on site. The detailed TMP will include the following:</p> <ul style="list-style-type: none"> ➤ Traffic Management Coordinator - a competent Traffic Management Co-ordinator will be appointed for the duration of the 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 the County Council in advance of deliveries of turbine components to site. Liaison with the relevant local authorities and Transport Infrastructure Ireland (TII) will be carried out where required regarding requirements such as delivery timetabling. The programme will ensure that deliveries are scheduled in order to minimise the demand on the local network and minimise the pressure on the access to the site. ➤ Information to locals - Locals in the area will be informed of any upcoming traffic related matters e.g. temporary lane/road closures (where required) or delivery of turbine components at night, via letter drops and posters in public places. Information will include the contact details of the Project Co-ordinator, who will be the main point of contact for all queries from the public or local 		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			<p>authority during normal working hours. An "out of hours" emergency number will also be provided.</p> <ul style="list-style-type: none"> ➤ A Pre and Post Construction Condition Survey - Where required by the local authority, a pre-condition survey of roads associated with the Proposed Development can be carried out immediately prior to construction commencement to record an accurate condition of the road at the time. A post construction survey will be carried out after works are completed to ensure that any remediation works are carried out to a satisfactory standard. Where required the timing of these surveys will be agreed with the local authority. All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers. ➤ Liaison with the relevant local authority - Liaison with the County Council and An Garda Síochána, will be carried out during the delivery phase of the large turbine vehicles, when an escort for all convoys will be required. Once the surveys have been carried out and "prior to commencement" status of the relevant roads established, (in compliance with the provisions of the CEMP), the Roads section will be informed of the relevant names and contact numbers for the Project Developer/Contractor Site Manager as well as the Site Environmental Manager. ➤ Implementation of temporary alterations to road network at critical junctions - at locations highlighted in section 14.1.8. In addition, in order to minimise the impact on the existing environment during turbine component deliveries the option of blade adaptor trailers will also be used where deemed practicable. ➤ Identification of delivery routes - These routes will be agreed with the County Council and adhered to by all contractors. ➤ Delivery times of large turbine components - The management plan will include the option to deliver the large wind turbine plant components at night in order to minimise disruption to general traffic during the construction stage. ➤ Travel plan for construction workers - While the assessment above has assumed the worst case in 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 routes to / from the site and identification of an area for parking. 		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> ➤ Additional measures - Various additional measures will be put in place in order to minimise the effects of the development traffic on the surrounding road network including wheel washing facilities on site and sweeping / cleaning of local roads as required. ➤ Re-instatement works - All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers. 		
Operational Phase					
MM76	Wastewater Management	EIAR Section 4	The removal and disposal of wastewater from the site will be carried out by a fully permitted waste collector holding valid Waste Collection Permits as issued under the Waste Management (Collection Permit) Regulations, 2007.		
MM77	Site Drainage	CEMP Section 4	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.		
MM78	Site Drainage	EIAR Section 9 NIS Section 5	<p>The operational phase drainage system will be installed and constructed in conjunction with the existing bog drainage network and will include the following:</p> <ul style="list-style-type: none"> ➤ 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 into downstream field drains; ➤ Collectors drains will be used to gather runoff from access roads and turbine hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to new local settlement ponds for sediment settling; ➤ On sections of access road transverse drains ('grips') will be constructed in the surface layer of the road to divert any runoff off the road into swales/roadside drains; ➤ Check dams will be used along sections of access road drains to intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock; 		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> ➤ Settlement ponds, emplaced downstream of access road 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 existing drains; ➤ Settlement ponds will be designed in consideration of the greenfield runoff rate; and <p>Finally, all surface water runoff from the development will have to pass through the settlement ponds at the existing bog outfall locations</p>		
MM79	Site Drainage	EIAR Section 4	Drainage swales and silting ponds will remain in place to collect runoff from roads and hardstanding areas of the Proposed Development during the operational phase.		
MM80	Fuel Control	EIAR Section 9	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		
MM81	Land on Decommissioning	EIAR Section 9	During decommissioning, it may be possible to reverse or at least reduce some of the potential impacts caused during construction by rehabilitating construction areas such as turbine bases and hard standing areas. This will be done by covering with peatland vegetation/scraw or poorly humified peat to encourage vegetation growth and reduce run-off and sedimentation.		
MM82	Telecoms and other service interference	EIAR Section 14	<p>It is standard practice of 2RN to produce a Protocol Document for wind farm developments, which will be signed by the developer. 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 Development.</p> <p>In the event of interference occurring to telecommunications, the Department of the Environment, Heritage and Local Government Wind Farm Planning Guidelines (2006) state that these effects are generally easily dealt with by the use of divertor relay links out of line with the proposed wind turbines.</p>		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM83	Site rehabilitation during decommissioning	EIAR Section 7	During decommissioning, it may be possible to reverse or at least reduce some of the potential impacts caused during construction by rehabilitating construction areas such as turbine bases and hard standing areas. This will be done by covering with peatland vegetation/scraw or poorly humified peat to encourage vegetation growth and reduce run-off and sedimentation.		
MM84	Flora and Fauna	EIAR Section 6	In order to reduce the value of the habitat for bat species in the areas surrounding the turbines, a buffer of at least 50m between the tip of the blade and any trees or other tall vegetation that could provide high quality foraging habitat for bat species will be implemented. Details of this mitigation and how it is calculated is detailed in Appendix 6-3 of the EIAR.		

7. MONITORING PROPOSALS

All monitoring proposals relating to the pre-commencement, construction and operational phases of the Proposed Development were set out in various sections of the EIAR prepared as part of the planning permission application to Cork County Council.

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.

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 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 Monitoring Measures

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
Pre-Commencement Phase						
MX1	Water Quality and Monitoring	EIAR Section 4	An inspection and maintenance plan for the on-site drainage system will be prepared in advance of commencement of any works.	Ongoing	Monthly	ECoW
MX3	Water Quality and Monitoring	EIAR Section 9	Baseline sampling will be undertaken to compliment the WFD water quality status	As Required	Monthly	Project Hydrologist
MX4	Water Quality and Monitoring	EIAR Section 9	Sampling will be completed before, during and after the felling activity. The 'before' sampling should be conducted within 4 weeks of the felling activity, preferably in medium to high water flow conditions.	As Required	Monthly	ECoW
MX5	Invasive Species	CEMP Section 6	A pre-commencement invasive species survey shall be completed for the site.	As Required	Once	Project Ecologist
MX6	Mammal Survey	EIAR Section 6	A pre-construction mammal survey will be undertaken to identify any Otter holts or Badger setts within the works areas associated with the proposed development. The survey will be undertaken to ensure that Otter or Badger have not taken up residence within or close to the development footprint	As Required	Once	Project Ecologist
MX7	Kerry Slug	EIAR Section 6	A pre-commencement survey and trapping exercise, immediately before construction works commence, will be conducted within the development footprint. Metric trapping and hand searches of the footprint will be conducted by a qualified ecologist. Any Kerry slug encountered within the development footprint will be translocated to an alternative area of suitable habitat outside the development footprint. The trapping and translocation will be conducted under a derogation licence from the NPWS Following trapping, the extent of the development footprint will be clearly marked to prevent any encroachment on Kerry slug habitat located outside the works area and to ensure that no Kerry slug re-enter the works area.	As Required	Once	Project Ecologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX8	Archaeological Monitoring	EIAR Section 13	Archaeological monitoring (under licence from the National Monuments Service) of any further geotechnical / engineering trial pits or investigations and a report detailing the results of same.			
Construction Phase						
MX9	Water Quality and Monitoring	EIAR Section 9	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>i.e.</i> weekly, monthly and event based).	As Required	Monthly	ECoW
MX10	Daily Monitoring	EIAR Section 9 CEMP Section 5	Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work should immediately be stopped and a geotechnical assessment undertaken	As Required	Monthly	ECoW
MX11	Daily Monitoring	CEMP Section 3	Where daily monitoring identifies 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.	As Required	Monthly	ECoW
MX12	Check Dams	EIAR Section 3	Check dams will be inspected and maintained regularly to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.	As Required	Monthly	ECoW
MX13	Silt Traps	EIAR Section 3	Silt traps will be inspected weekly during the construction phase of the project and following rainfall events. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows with sediment cleaned out of the silt trap as necessary and on a regular basis.	As Required	Monthly	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX14	Drainage Swales	EIAR Section 3	Drainage swales will be regularly inspected for evidence of erosion along the length of the swale. If any evidence of erosion is detected, additional check dams will be installed to limit the velocity of flow in the channel and reduce the likelihood of erosion occurring in the future.	As Required	Monthly	ECoW
MX15	Settlement Ponds	EIAR Section 3	Settlement ponds will be inspected weekly and following rainfall events. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows. Inspection and maintenance of these of these structures during construction phase is critical to their functioning to stated purpose.	As Required	Monthly	ECoW
MX16	Culverts	EIAR Section 3	All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance.	Weekly / As Required	As Necessary	ECoW
MX17	Drainage Management	EIAR Section 3	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 Project Hydrologist on-site. The Environmental Clerk of Works/Project 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.	As Required	As Necessary	ECoW / Project Hydrologist
MX18	Plant and Equipment Inspections	EIAR Section 9 CEMP Section 4	The plant used should be regularly inspected for fuel leaks, unnecessary noise generation and general fitness for purpose.	Before Use	As Necessary	Drivers / ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX19	Drainage Inspection	EIAR Section 9	Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended. Inspections will also be undertaken after tree felling.	Weekly/ Monthly	As Necessary	ECoW
MX20	Surface Water Quality Monitoring	EIAR Section 9	<p>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 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). The felling surface water monitoring data will also be compared with the EIAR baseline water quality sampling data.</p> <p>Criteria for the selection of water sampling points include the following:</p> <ul style="list-style-type: none"> ➤ Avoid man-made ditches and drains, or watercourses that do not have year round flows, i.e. avoid ephemeral ditches, drains or watercourses; ➤ Select sampling points upstream and downstream of the forestry activities; ➤ It is advantageous if the upstream location is outside/above the forest in order to evaluate the impact of land-uses other than forestry; ➤ Where possible, downstream locations will be selected: one immediately below the forestry activity, the second at exit from the forest, and the third some distance from the second (this allows demonstration of no impact through dilution effect or contamination by other land-uses where impact increases at third downstream location relative to second downstream location); and, 			

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			<p>➤ The above sampling strategy will be undertaken for all on-site sub-catchments streams where tree felling is proposed.</p> <p>Also, daily surface water monitoring forms will be utilised at every works site near watercourses. These will be taken daily and kept on site for record and inspection</p>			
MX21	Water Quality Monitoring	EIAR Section 9.	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>i.e.</i> weekly, monthly and event based).	Weekly, monthly and event based	As Necessary	ECoW / Project Hydrologist
MX22	Archaeological Monitoring	EIAR Section 13	Archaeological monitoring of ground works during construction (in areas of previously undisturbed ground). The National Monuments Service will be informed of such findings to discuss how best to proceed. If archaeological finds, features or deposits are uncovered during archaeological monitoring, the developer will be prepared to provide resources for the resolution of such features whether by preservation by record (excavation) or preservation in situ (avoidance). Once the project is completed, a report on the results of the monitoring will be compiled and submitted to the relevant authorities.	Ongoing	As required	Project Archaeologist
Operational Phase						
MX23	Wintering Birds Survey	EIAR Section 6	A detailed post-construction Bird Monitoring Programme has been prepared for the operational phase of the Proposed Development. The programme of works will involve vantage point surveys and targeted bird collision surveys during the lifetime of the project. Surveys will be scheduled to coincide with Years 1, 2, 3, 5, 10 & 15 of the life-time of the wind farm. Monitoring measures are broadly based on guidelines	Monthly or as required	Years 1, 2, 3, 5, 10 and 15 of the life of a wind farm	Project Ornithologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			<p>issued by the Scottish Natural Heritage (SNH, 2009). The following individual components are proposed:</p> <ul style="list-style-type: none"> ➤ Flight activity surveys: breeding season vantage point surveys ➤ Targeted bird collision surveys (corpse searches) will be undertaken with trained training dogs. The surveys will include detection and scavenger trials, to correct for these two biases and ensure the resulting data is robust 			
MX24	Drainage Inspection	EIAR Section 9	Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended. Inspections will also be undertaken after tree felling.	Weekly/ Monthly	As Necessary	ECoW
MX25	Operational Phase Noise	EIAR Section 11	Once the site is operational a Noise Compliance Monitoring Programme will be carried out by a suitable qualified noise consultant/engineer	Once	On completion of Programme	Project Noise Consultant

8. PROGRAMME OF WORKS

8.1 Construction Schedule

The construction phase will take approximately 12 - 18 months to complete from starting on site to the commissioning of the electrical system and export of electricity from site.

The EIAR stipulated that in the interest of breeding birds, construction would not commence during the breeding bird season, which runs from March to August. The EIAR also stipulated that the removal of conifers (forestry) by felling will take place between the 1st of September and the end of February, thus avoiding the period from the 1st of March to the 31st of August inclusive, as prescribed in the Wildlife Acts.

At this time, it is envisaged that construction will commence in the first quarter of 2021. This provisional start date is dependent on some final details relating to various factors such as grid connection and turbine supply, but it is the current projected start date that project team members are working towards.

The phasing and scheduling of the main construction task items are outlined in Figure 8-1 below, where January 2021 has been shown as the start date for construction activities.

ID	Task Name	Task Description	Q1			Q2			Q3			Q4			Q1			Q2		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1	Site Health & Safety		[Blue bar spanning all months]																	
2	Site Compound	Site Compound, Site Access, Fencing, Gates	[Blue bar]																	
3	Site Roads	Excavate/upgrade roads; Install drainage measures; Install culvert; Install water protection measures.	[Blue bar]																	
4	Turbine Hardstands	Excavate base; construct hardstanding areas				[Blue bar]														
5	Turbine Foundations	Fix steel; Erect shuttering; Concrete pour							[Blue bar]											
6	Substation Construction & Electrical Works	Construct Substation; Underground cabling between turbines;	[Blue bar]																	
7	Backfilling & Landscaping														[Blue bar]					
8	Turbine Delivery & Erection														[Blue bar]					
9	Substation Commissioning														[Blue bar]					
10	Turbine Commissioning														[Blue bar]					

Figure 8-1 Indicative Construction Schedule

9. COMPLIANCE AND REVIEW

9.1 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 impacts, 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.

9.2 Auditing

An Environmental audit will first be carried out prior to the construction phase of the development 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 project and again after the commissioning of the wind turbines.

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 appointed contractor. It is important that an impartial and objective approach is adopted. 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 project management personnel.

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 development. 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 in an audit report within the EMP for the site. The audit report will be made available to Cork County Council on request.

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

9.3 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.

9.4 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 ECoW 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.

9.5 Construction Phase Plan Review

This CEMP will be updated and reviewed prior to commencement of construction, and also every six months thereafter during the construction phase of the project.



APPENDIX A

HARVEST MANAGEMENT PLAN

Proposed Measures to Protect Social & Environmental Features & Considerations (Cont..)

<input type="checkbox"/> Water sampling	<input type="checkbox"/> Forest edge planting
<input checked="" type="checkbox"/> Install silt traps/barriers	<input type="checkbox"/> Environmental setback planting
<input checked="" type="checkbox"/> Drain blocking/slow-water dams	<input type="checkbox"/> Other (specify)
<input checked="" type="checkbox"/> Utilise brush mats along extraction routes	<input type="checkbox"/> Other (specify)
<input checked="" type="checkbox"/> Exclude machinery in areas adjoining aquatic zones, water abstraction points & water-related 'hotspots'	<input type="checkbox"/> Other (specify)

Ancillary Information (include relevant information to expand on above & to detail important aspects such as the sequencing of operations, the width of environmental setbacks & contingency planning. Ensure accurate cross-referencing and consistency with maps) *

Harvesting Plan

Where possible, harvesting and extraction processes will be undertaken during dry periods in the late spring to autumn period to limit surface water run-off. It is proposed that a harvester and low-ground pressure forwarder will be used in these processes. Where brush material on site is limited, brush mats will be deployed to help reinforce sections of the extraction route outside of the existing hardcore forestry road.

Silt traps will be installed within any manmade relevant watercourses (RWs) within or adjacent to the felling compartments, prior to the commencement of felling works, to preserve the turbidity and integrity of the downstream river catchment. These sediment traps will be monitored and maintained throughout the period of works and for a period afterwards until the site has stabilised. Additional traps may be placed along the edge of the adjacent aquatic zones (AZs), in locations where surface run-off may be possible.

10m buffer zones will be established around the RWs, as shown in the attached map, within which there will be no traversal of machinery permitted. Similarly, 20m buffer zones will be established around AZs. Fully-trained, experienced forest contractors will be selected for the felling operation.

Harvested timber will be extracted to the north-east (see map) along the existing tracks to enable easy loading and transport offsite along the public road.

Reforestation Plan

Localised replanting will be limited to the extents of the felling compartments covered under the 'temporary' felling application, and will comprise windrowing and pit-planting of North Coastal Lodgepole Pine at a density of around 2500 stems per hectare.

Setback zones of 10m will be established around RWs.

Planted areas will be maintained on an annual basis until the crop is established, which includes vegetation control, pest control and restocking.

*See also Forest Harvesting and the Environment Guidelines for further information

Curraglass Renewable Energy Project
Forestry Harvest Management Plan
Overview Map - 1:20000 @ A4
2020-05-14 - PMcM



Sheet 1 of 3

Sheet 2 of 3

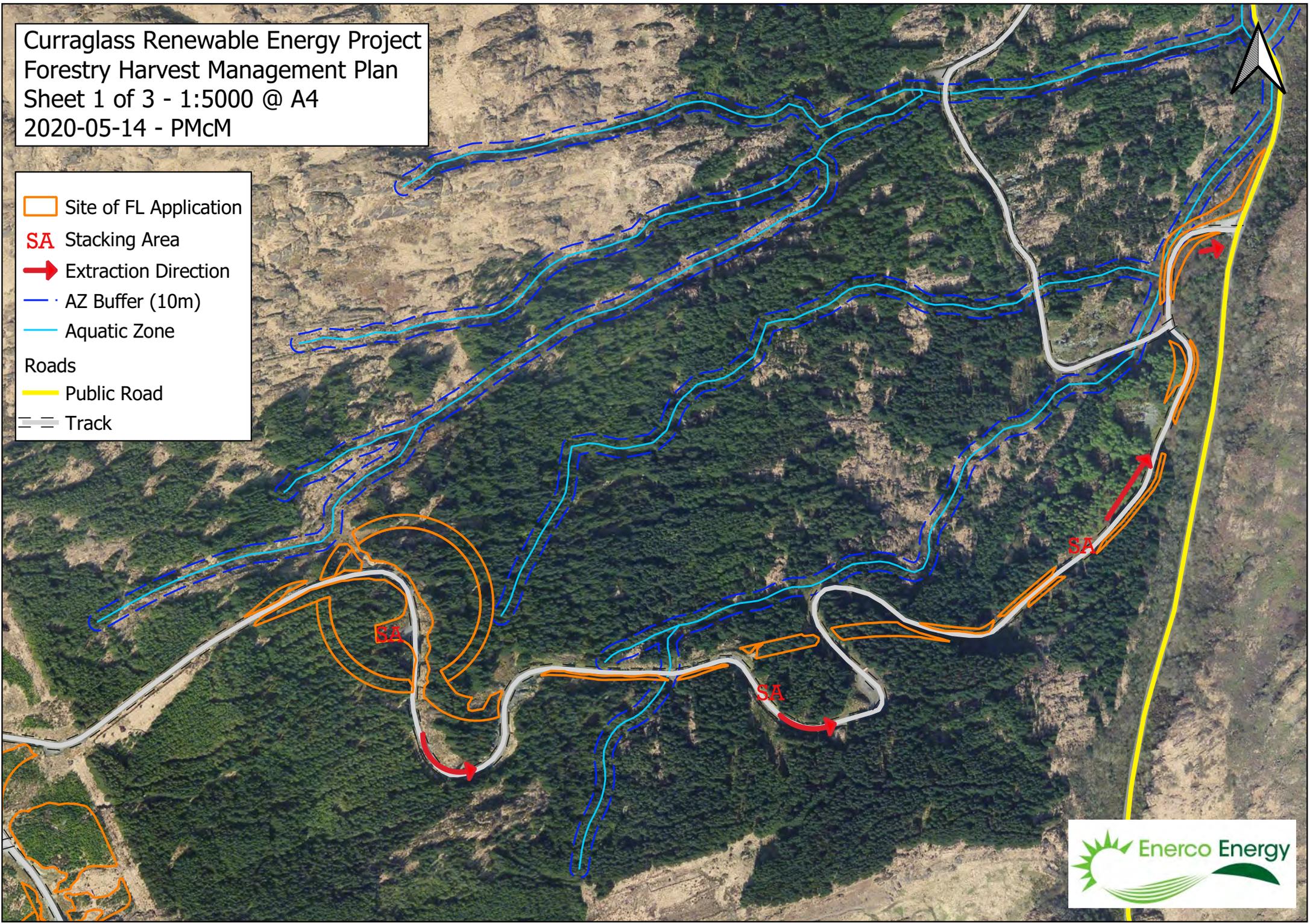
Sheet 3 of 3

-  Site of FL Application
-  Hazards - OHL & Substation
-  National_Monuments
-  Aquatic Zone (AZ)
-  AZ Buffer Line
- Roads
 -  Public Road
 -  Track



Curraglass Renewable Energy Project
Forestry Harvest Management Plan
Sheet 1 of 3 - 1:5000 @ A4
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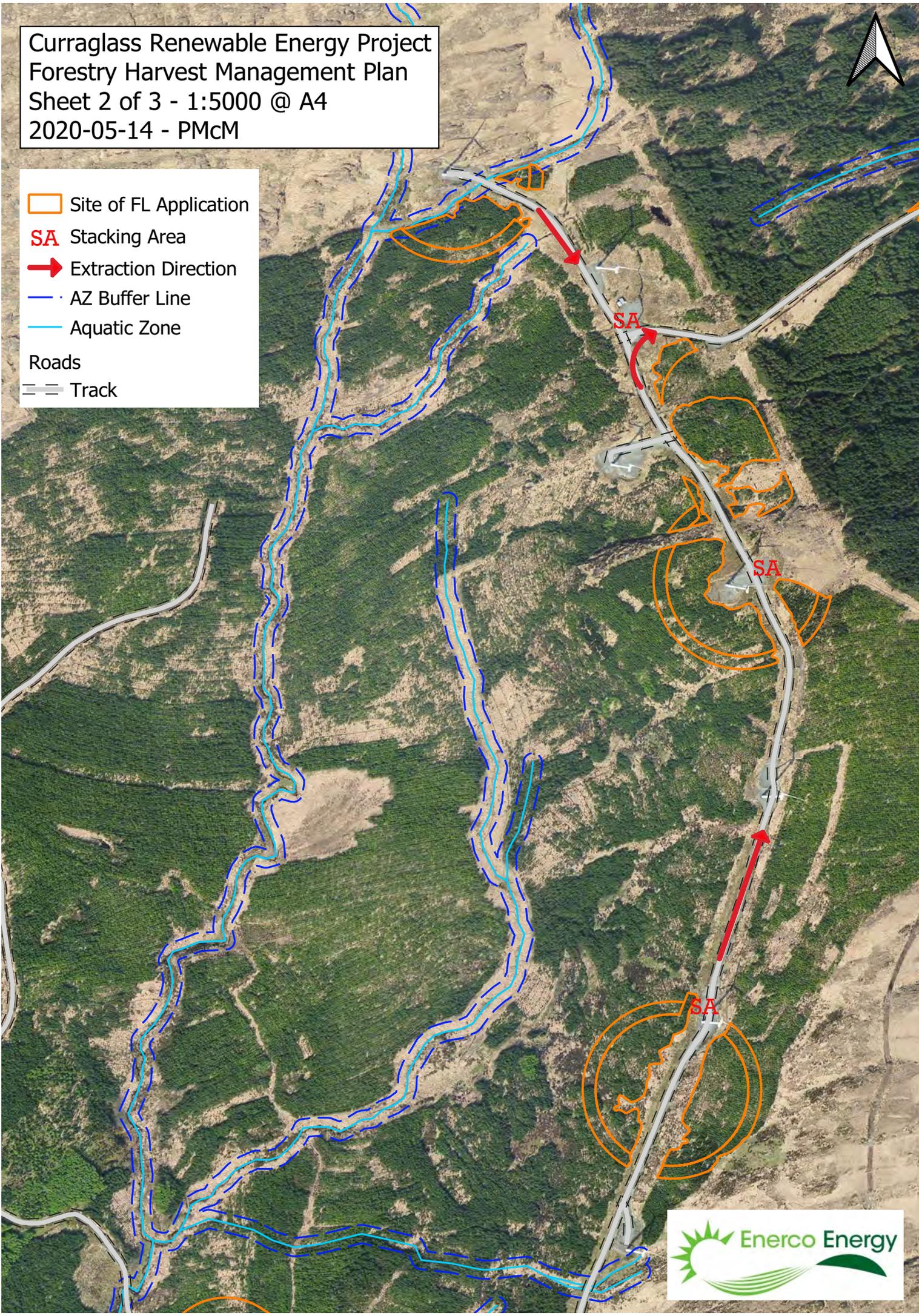
- Site of FL Application
- SA Stacking Area
- ➔ Extraction Direction
- AZ Buffer (10m)
- Aquatic Zone
- Roads
 - Public Road
 - Track



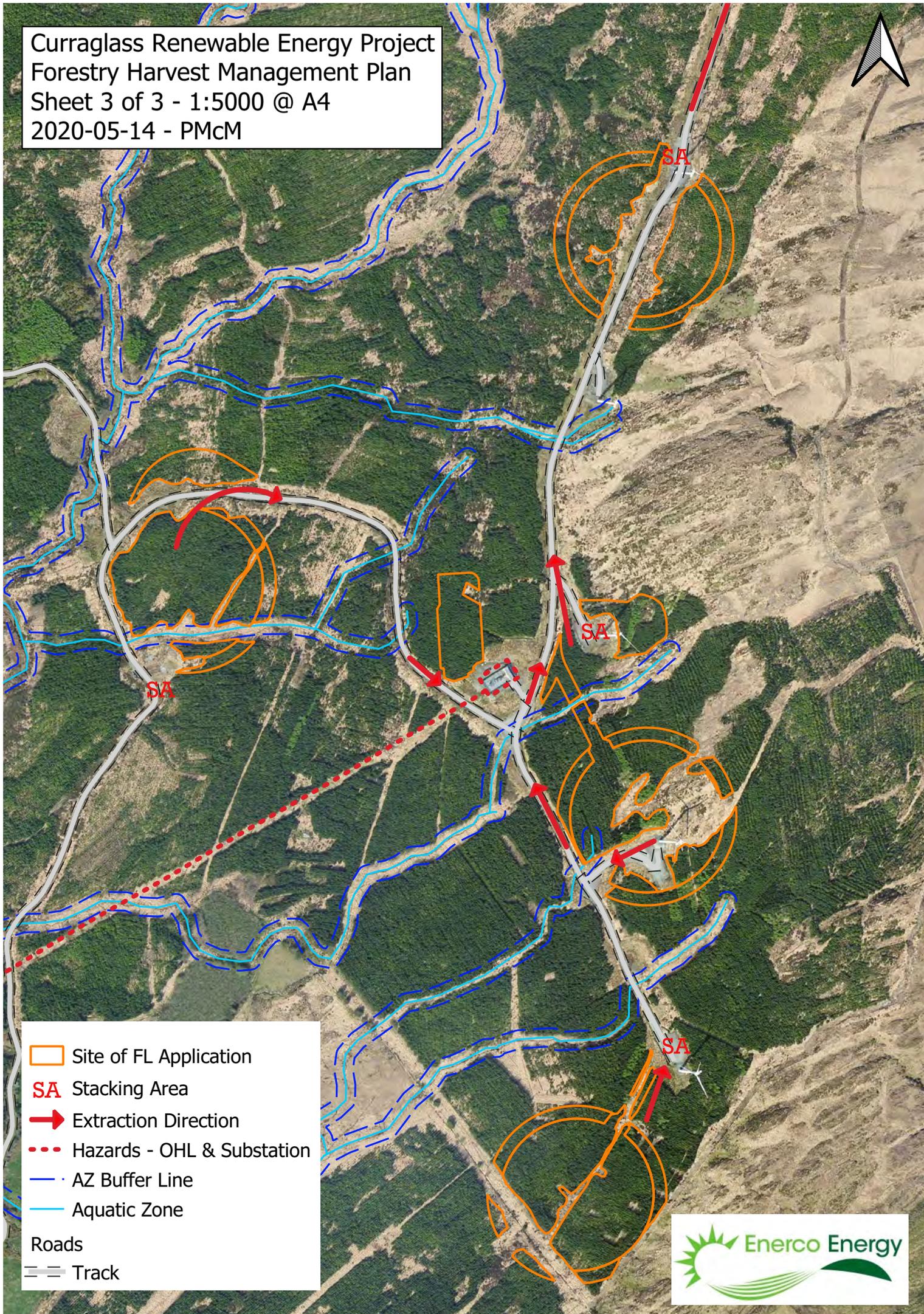
**Curraglass Renewable Energy Project
Forestry Harvest Management Plan
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2020-05-14 - PMcM**



-  Site of FL Application
-  Stacking Area
-  Extraction Direction
-  AZ Buffer Line
-  Aquatic Zone
- Roads
-  Track



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-  Site of FL Application
-  Stacking Area
-  Extraction Direction
-  Hazards - OHL & Substation
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-  Track

