



APPENDIX 4-4

**CONSTRUCTION AND
ENVIRONMENTAL
MANAGEMENT PLAN**

Construction and Environmental Plan

Proposed Cahermurphy
Two Wind Farm, Co. Clare





DOCUMENT DETAILS

Client: **Mid Clare Renewable Energy Windfarm Ltd**

Project Title: **Proposed Cahermurphy Two Wind Farm, Co. Clare**

Project Number: **170238**

Document Title: **Construction and Environmental Management Report**

Document File Name: **CEMP F - 2020.09.18 - 170238**

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Rev	Status	Date	Author(s)	Approved By
01	Final	18/09/2020	EG	MW

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1. INTRODUCTION

This Construction and Environmental Management Plan (CEMP) has been developed by McCarthy Keville O' Sullivan Ltd. (MKO) on behalf of Mid Clare Renewable Energy Windfarm Ltd, who intends to apply to Clare County Council for planning permission to construct a renewable energy development and all associated infrastructure in the townland of Cahermurphy and adjacent townlands, in Co. Clare.

The CEMP has been prepared in conjunction with the Environmental Impact Assessment Report (EIAR) which accompanies the planning application for the Proposed Development submitted to the competent authority. 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 wind farm 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. The CEMP also details the mitigation measures and commitments made in the EIAR. The contractor will be contractually obliged to comply with all such measures.

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 Construction and Environmental Management Plan

This report is presented as a guidance document for the construction of the proposed Cahermurphy Two Wind Farm 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

The proposed wind farm site is located approximately 5 kilometres to the north of Kilmihil and 25 kilometres southwest of Ennis, Co. Clare. The site will use the same access route and same site entrance used by the existing Cahermurphy Wind Farm which was recently constructed in 2019. The existing Cahermurphy Wind Farm obtained planning permission for a four turbine wind farm development under Clare County Council planning reference No. 14/551 (An Bord Pleanála reference No. PL.03.245189). The site itself is served by a number of existing forest roads which will be used for the proposed development.

It is proposed to connect the development to the national electricity network via an underground cable which will connect the proposed onsite substation to the existing Booltiagh 110kV substation, located approximately 7 kilometres to the southeast of the site. The planning application includes 2 No. substations; however, only one substation and associated grid connection will ultimately be constructed and used should the proposed development be consented.

Current land-use on the subject site comprises coniferous forestry, agriculture and turbary. Land-use in the wider landscape comprises a mix of agriculture, low density housing, wind farms and commercial forestry.

2.2 Description of the Development

The proposed development will comprise the construction of up to 10 No. wind turbines and all associated works. The proposed turbines will have a maximum blade tip height of up to 170 metres. The full description of the proposed development, as per the public planning notices, is as follows:

- i. Construction of up to 10 No. wind turbines with a maximum overall blade tip height of up to 170 metres and associated hard stand areas;*
- ii. 1 no. permanent Meteorological Mast with a maximum height of up to 100 metres;*
- iii. 1 no. 38kV permanent electrical substation which will be constructed at one of two possible locations on site: either Option A in Carrownagry South townland or Option B in Cahermurphy townland. The electrical substation will have 1 no. control building with welfare facilities, all associated electrical plant and equipment, security fencing, all associated underground cabling, waste water holding tank and all ancillary works;*
- iv. All associated underground electrical and communications cabling connecting the turbines to the proposed on-site substation;*
- v. All works associated with the connection of the proposed wind farm to the national electricity grid via an underground cable to the existing Booltiagh 110kV substation;*
- vi. Upgrade of existing tracks, roads and provision of new site access roads and hardstand areas;*
- vii. Junction access road works;*
- viii. 2 no. borrow pits;*
- ix. 1 no. temporary construction compound;*
- x. Site Drainage;*
- xi. Forestry Felling to facilitate construction and operation of the proposed development; and*
- xii. All associated and ancillary site development works.*

2.2.1.1 Substation and Grid Connection

The planning application for the proposed wind farm includes connection to the national electricity grid. The planning application includes 2 No. substations; however, only one substation and associated grid connection will ultimately be constructed.

The proposed wind farm will connect to the national grid via one of the following methods:

- Option A: It is proposed to construct a 38 kV substation at the northern end of the site and to connect from here to the existing Booltiagh 110kV substation, located approximately 7 kilometres to the southeast of the site. Option A also includes for an alternative cable route running from the proposed onsite substation south to the access road and north along the local road to the east of the site. The alternative cable route option measures approximately 1.7 km in length. Connection via the Booltiagh route would comprise underground cabling, measuring approximately 12.1 km in total, located on existing forestry and agricultural land and within the public road corridor.












Or

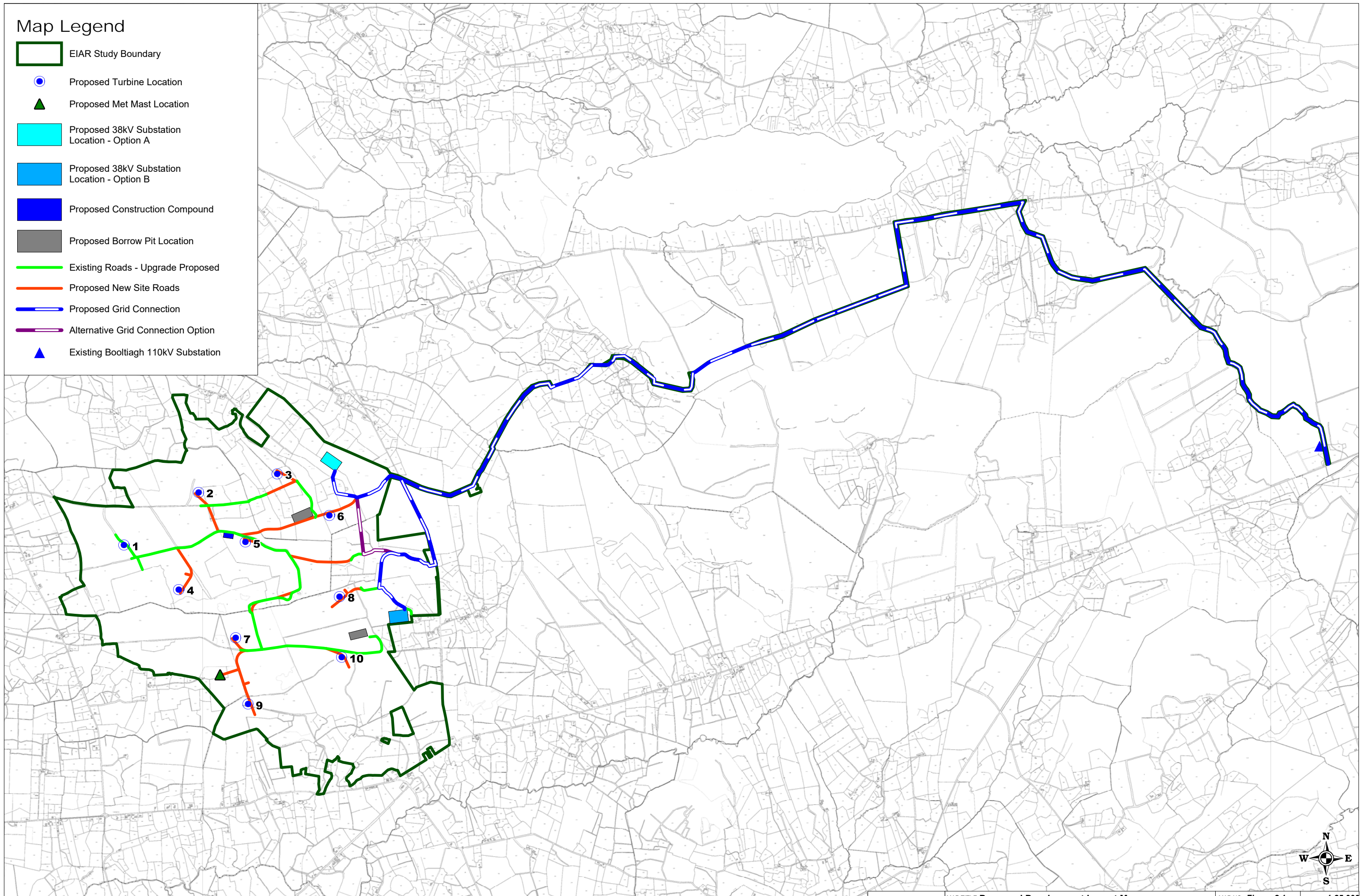
- Option B: It is proposed to construct a 38kV substation at the south eastern end of the site and to connect from here to the existing Booltiagh 110kV substation, located approximately 7 kilometres to the southeast of the site. Connection via the Booltiagh route would comprise underground cabling, measuring approximately 12.1 km in total, located on existing forestry and agricultural land and within the public road corridor.

The substation options are required to provide flexibility to the electrical network provider when determining the most appropriate connection point for the export of the electricity to the national grid. The proposed on-site electrical substation will have one control building, associated electrical plant and equipment, and waste water holding tank.

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 Study Boundary
-  Proposed Turbine Location
-  Proposed Met Mast Location
-  Proposed 38kV Substation Location - Option A
-  Proposed 38kV Substation Location - Option B
-  Proposed Construction Compound
-  Proposed Borrow Pit Location
-  Existing Roads - Upgrade Proposed
-  Proposed New Site Roads
-  Proposed Grid Connection
-  Alternative Grid Connection Option
-  Existing Booltiagh 110kV Substation



	MAP TITLE: Proposed Development Layout Map		MAP NO.: Figure 2.1	SCALE: 1:25,000
	PROJECT TITLE: Cahermurphy Two Wind Farm			
	DRAWING BY: Eoin O'Sullivan		CHECKED BY: Michael Watson	
	DATE: 20-08-2020		ISSUE NO.: 170238-2020.08.20-D4	

2.3 Targets and Objectives

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;

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

The key site objectives are as follows;

- Keep impact of construction to a minimum on the local environment, watercourses, habitats and wildlife;
- Comply with all relevant water quality legislation;
- Ensure construction works and activities are completed in accordance with mitigation and best practice approach presented in the Environmental Report and associated planning documentation;
- Ensure construction works and activities are completed in accordance with any planning conditions for the development;
- Ensure construction works and activities have minimal impact/disturbance to local landowners and the local community; and
- Ensure construction works and activities have minimal impact on the Natural Environment.

2.4 Construction Methodologies Overview

2.4.1 Introduction

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

2.4.2 Overview of Proposed Construction Methodology

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

- > Proposed New Site Access Roads;
- > Temporary Construction Compound;
- > Borrow Pits
- > Site Drainage System;
- > Culvert crossings
- > Crane Hardstands;
- > Turbine and Anemometry Mast Foundations;
- > Electricity Substation and Control Buildings;
- > Cable Trenching;
- > Grid Connection Cabling.

2.4.2.1 New Site Access Roads

There is approximately 4.9 km of new access roads to be installed at the site. The new access roads will be constructed as follows using an excavated site road methodology. Due to the relatively shallow nature of the site and the relatively steep slope angles, floating roads have not been considered for the site.

2.4.2.1.1 Construction of New Excavated Roads

Excavate and replace type roads are the predominant road construction type proposed for the site. The general construction methodology for the construction of excavated roads, as presented in the Peat and Spoil Management Plan (Appendix 4.2 of the EIAR), is summarised below. This methodology includes procedures that are to be included in construction to minimise any adverse impact on peat stability.

1. *Prior to commencing road construction movement monitoring posts will be installed in areas where the peat depth is greater than 2m.*
2. *Interceptor drains will be installed upslope of the access road alignment to divert any surface water away from the construction area.*
3. *Excavation will take place to a competent stratum beneath the peat. Peat depths recorded across the site ranged from 0 to 4.5m with an average of 0.8m.*
4. *Road construction will be carried out in sections of approximately 50m lengths i.e. no more than 50m of access road will be excavated without re-placement with stone fill.*
5. *Excavation of materials with respect to control of peat stability.*
 - a. *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 prior to main excavations.*
 - b. *Where possible, the acrotelm shall be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation.*
 - c. *All catotelm peat (peat below about 0.3 to 0.4m depth) shall be transported immediately on excavation to the designated areas.*
6. *Side slopes in peat shall be not greater than 1 (v): 2 or 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required. Battering of the side slopes of the excavations will be carried out as the excavation progresses.*
7. *The surface of the excavated access road will be overlaid with up to 500mm of selected granular fill. Granular fill to be placed in layers in accordance with the designer's specification.*

8. *Access roads to be finished with a layer of capping across the full width of the road.*
9. *A layer of geogrid/geotextile may be required at the surface of the competent stratum (to be confirmed by the designer).*
10. *At transitions between floating and excavated roads a length of road of about 10 to 20m shall have all peat excavated and replaced with suitable fill. The surface of this fill shall be graded so that the road surface transitions smoothly from floating to excavated road.*
11. *Where relatively steep peat slopes are encountered along with relatively deep peat (i.e. typically greater than 1m) and where it is proposed to construct the access road perpendicular to the slope contours it is best practice to start construction at the bottom of the slope and work towards the top, where possible. This method avoids any unnecessary loading to the adjacent peat and greatly reduces any risk of peat instability.*
12. *A final surface layer shall be placed over the excavated road, as per design requirements, to provide a road profile and graded to accommodate wind turbine construction and delivery traffic.*

2.4.2.1.2 Upgrade of Existing Roads

There will be approximately 6.6 kilometres of existing roadway/ tracks requiring upgrading. This methodology includes procedures that are to be included in the construction to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations.

1. For upgrading of existing excavated and floated roads and tracks, the following guidelines apply:
 - a. *Excavation will be required on one or both sides of the existing access track to a competent stratum.*
 - b. *Granular fill to be placed in layers in accordance with the designer's specification.*
 - c. *The surface of the existing access track will be overlaid with up to 300mm of selected granular fill.*
 - d. *Access roads to be finished with a layer of capping across the full width of the road.*
 - e. *A layer of geogrid/geotextile may be required at the surface of the existing access road (to be confirmed by the designer).*
 - f. *For excavations in peat & spoil, side slopes shall be not greater than 1 (v): 2 or 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required.*
2. For upgrading of the limited area of existing floated access track, the following guidelines apply:
 - a. *The typical make-up of the existing floating access roads on site appears to be locally tree brash/trunks laid directly onto the peat surface and/or geotextile overlain by up to 400mm of coarse granular fill/till type (fine granular/cohesive) site won material. It should be noted that there are localised variations in the make-up of the existing floated access tracks on site, frequently no tree brash/trunks were used in the make-up and the presence of a geogrid was also noted in localised sections of the existing track.*
 - b. *The surface of the existing access track will be graded/tidied up prior the placement of any geogrid/geotextile, where necessary (to prevent damaging the geogrid/geotextile).*

- c. *Where coarse granular fill has been used in the existing floated access road make-up, a layer of geogrid will be placed on top of the existing floated access track.*
 - d. *Where fine granular/cohesive type material has been used in the existing floated access road make-up (as is the case on some of the existing access roads in the southeast of the site), a layer of geotextile is likely to be required as a separator layer with a layer of geogrid.*
 - e. *The geogrid may be overlaid with up to 900mm of selected granular fill. Granular fill to be placed in layers in accordance with the designer's specification.*
 - f. *Additional geogrid and granular fill may be required in certain sections of the works (to be confirmed by the designer).*
3. *The straight section of finished road width will be 5m.*
 4. *On side long sloping ground any road widening works required will be done on the upslope side of the existing access road, where possible.*
 5. *At transitions between floating and existing excavated roads a length of road of about 10 to 20m shall have all peat excavated and replaced with suitable fill. The surface of this fill shall be graded so that the road surface transitions smoothly from floating to excavated road.*
 6. *A final surface layer shall be placed over the existing access track, as per design requirements, to provide a road profile and graded to accommodate wind turbine construction and delivery traffic.*

2.4.3 Temporary Construction Compounds

The temporary construction compounds will 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 will be installed around the perimeter;
- The compound platform will be established using a similar technique as the construction of the substation platform discussed above;
- A layer of geo-grid 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;
- The compound will be fenced and secured with locked gates if necessary; and,
- Upon completion of the Proposed Development the temporary construction compound will be decommissioned by backfilling the area with the material arising during excavation, landscaping with topsoil as required.

2.4.3.1 Borrow Pits

The development will comprise 2 no. borrow pits. It is proposed to obtain the majority of all rock and hardcore material that will be required during the construction of the proposed development from the on-site borrow pits. Usable rock may also be won from other infrastructure construction including the substation and the turbine base excavations.

Borrow pit No. 1 located approximately 120 metres to the west of Turbine No. 6, measures approximately 12,300m² in area and is intended to supply hardcore materials for the construction of the turbines in the north of the site, access roads thereto, the electricity substation and the temporary construction compound. Borrow pit No. 2 located approximately 150 metres to the northeast of Turbine No. 10, measures approximately 13,600m² in area and is intended to supply hardcore materials

for the construction of turbines in the south of the site, access roads thereto, the electricity substation and the anemometry mast.. All borrow pits are shown in Figure 2.1. The borrow pit will typically be excavated as follows:

- The areas to be used for 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 and overburden from the top of bedrock. These materials will be used to form a berm on the downhill side of the borrow pit to provide screening of the borrow pit operations;
- 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 excavations 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 treatment 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.
- If borrow pit is not fully re-instated it may have to be permanently secured with a stock-proof fence erected around the borrow pit to prevent access to the area as well as the installation of appropriate health and safety signage.

Once the required volume of rock has been extracted from the borrow pit areas, it is intended to reinstate these areas with peat and overburden excavated from the works areas of the Proposed Development. The total estimated volume of peat and spoil to be excavated and managed during the construction phase of the proposed development, including cable route is 258,839m³. The borrow pit areas, within the site of the Proposed Development will undergo restoration with this peat and spoil material after all rock has been excavated from the borrow pit. The volume of excavated peat and overburden will be managed as outlined below:

- Excavators will remove the peat from the permanent development footprint areas i.e. excavated roads, hardstanding areas and turbine foundation areas.
- Temporary, sealed stockpiling areas, located adjacent to the hardstanding areas and turbine foundation areas, will be chosen following onsite discussions between the construction site manager, an ecologist, a geotechnical engineer and hydrologist.
- The excavators will move the excavated peat to the designated temporary stockpiling areas within the construction and soft levelled areas.
- The temporary stockpiling areas will be surrounded by silt fences to ensure sediment-laden run-off does not occur.
- The excavated peat will remain in these areas over a period of time until the volume of the peat has reduced as the water drains out of the mounded peat.
- The excavators will then load the peat directly into dump trucks, to transport the peat to the borrow pit area.
- The material will be backfilled into the borrow pit and will be spread evenly across the area.
- The peat and subsoil will also as part of landscaping and reinstatement along access roads and turbine excavations.

This method of managing the volume of surplus peat and other overburden material will ensure that no excavated material will be left on-site, or stockpiled adjacent to access roads and turbine locations, following the completion of the construction works.

2.4.3.2 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.

Surface drainage design and management is summarised with in Section 3.2 below.

2.4.3.3 Culvert Crossings on the Wind Farm Site

Culverts will be required where site roads, crane pads and turbine pads cross main bog drainage networks. Indicative locations of the culverts are shown on the drawings in Appendix 4.5 of the EIAR.

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

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 outside of the salmonid spawning season, October to June in any year, in accordance with Inland Fisheries Ireland best practice (IFI, 2016). This will ensure no potential impacts on salmonid spawning habitat.

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

2.4.3.4 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. Where an excavated crane hardstand cannot be used due to the depth of peat, the hardstand will be supported by using reinforced concrete piles as per the methodology outlined for piled foundations summarised below. The position of the crane pads varies between turbine locations depending on topography, position of the site access road, and the turbine position.

2.4.3.5 Turbine and Anemometry Mast Foundations

The wind turbines and anemometry mast foundations will be a reinforced concrete base designed to Eurocode 2/BS8110. Foundation loads will be provided by wind turbine and mast supplier, 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 will measure approximately 20 metres in diameter. 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.

Reinforced concrete piled foundations will be completed 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;
- No material will be removed from site and placement areas will be stripped of vegetation prior to placement in line with best working practices;
- A piling platform for the piling rig will be constructed. This can be done in two ways depending on the bearing capacity of the underlying soil.
 - The first method is to lay geo-textile on the existing surface and a stone layer will then be placed on top of the geo-textile by an excavator and compacted in order to give the platform sufficient bearing capacity for the piling rig.
 - The second method is to excavate the soils to a suitable intermediate mineral subsoil and backfill to the formation level.
- The piling rig, fitted with an auger, will then bore through the soft material with a sleeve fitted around the auger to prevent the sidewalls of the peat from collapsing. The borehole is then extended to a suitable depth into the subsoil/bedrock.
- When the auger and the sleeve are removed high tensile steel cages will be lowered into the boreholes. These steel cages will extrude above the level of the top of the concrete pile.
- As the auger is removed concrete is pumped into the borehole.
- Reinforcing steel on the top of the pile will tie to the foundation base steel.

The procedure for standard excavated reinforced concrete bases as outlined below can be applied from here.

Standard excavated reinforced concrete bases will be completed as follows:

- 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 will be protected from rainfall during curing and all surface water runoff from the curing concrete will 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 pokers to the levels and profile indicated on the drawings. Upon completion of the concreting works the foundation base will be covered and allowed to cure;
- 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 4.3.4 of Chapter 4 of the EIAR.

2.4.4 Onsite Electricity Substation and Control Building

The proposed electricity substation will be constructed by the following methodology:

- The area of the onsite substation will be marked out using ranging rods or wooden posts and the soil and overburden stripped and removed to nearby temporary storage area for later use in landscaping. Any excess material will be sent to one of the on-site peat repositories or the proposed borrow pit, for reinstatement purposes.
- The dimensions of the onsite substation area will be set to meet the requirements of the ESB or Eirgrid and the necessary equipment to safely and efficiently operate the permitted wind farms;
- Two control buildings will also be built within the onsite substation compound;
- The foundations will be excavated down to the level indicated by the designer and appropriately shuttered reinforced concrete will be laid over it. An anti-bleeding admixture will be included in the concrete mix;
- The block work walls will be built up from the footings to DPC level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors;
- The block work will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the building for this operation;
- The 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.
- Perimeter fencing will be erected.
- The construction and components of the substation will be to ESB or Eirgrid specifications.

2.4.5 Cable Trenching and Grid Connection

The transformer in each turbine is connected to the substation through a network of buried electrical cables. 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 cables will be laid at a depth that meets all national and international requirements, and will generally be approximately 1.3m below ground level; a suitable marking tape is installed between the cables and the surface (see Plate 2.1 below). On completion, the ground will be reinstated as previously described above. The route of the cable ducts will follow the access track to each turbine location, and are visible on the site layout drawings included as Appendix 4.1 of the EIAR.

The proposed on-site substation will be connected to the existing Booltiagh substation via underground grid connection cabling which will be constructed to ESB/Eirgrid specifications, using a similar methodology to that outlined below.

2.4.6 Grid Connection Construction Methodology

The underground cable required to facilitate grid connection will be laid beneath the surface of the site and/or public road using the following methodology:

- The area where excavations are planned will be surveyed, prior to the commencement of works to confirm the conditions predicted in this EIAR, with a cable-avoiding tool and all existing underground services will be confirmed.
- Two teams consisting of two tracked excavators, two dumpers and a tractor and stone cart with side-shoot will dig the trench for and lay approximately 300m of the underground cable ducting per day.
- Both teams will start approximately 150m apart with the team behind finishing at the starting point of the team ahead.
- The excavators will open a trench at the edge of the road surface, the trench will be a maximum of approximately 600mm wide and 1,250mm deep.
- Clay plugs will be installed at 50m intervals to prevent the trench becoming a conduit for surface water runoff.
- Cable joint pits will be located at approximately 500m intervals or as otherwise required by ESB requirements along the proposed cable route, each joint pit will be approximately 2.6m x 8m in size and contain a communications chamber, an earth link box and a cable joint bay, all of which will be located in the road edge and accessible for cable pulling and future maintenance.
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height. Stockpiles will be located a minimum of 50m from surface water features and all stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECoW).
- Once the trench has been excavated, a base layer of blinding will be installed by the tractor and cart and compacted by the excavators.
- The ducting along with marker strips will then be placed in the trench as per relevant specifications.
- Blinding will be installed to approximately 75mm above the cable ducting and compacted.
- The remainder of the trench will be backfilled with granular material and compacted.
- The trench will be surfaced as per the road surface specifications of the local public road.
- An unbound surface layer shall be placed over the grid connection route where it transverses forestry and agricultural land, as per ESB design requirements, in order to provide a road profile and graded to accommodate maintenance vehicles.

Typical cable trench is shown on Plate 2.1.



Plate 2.1 Cable Trench View

2.5 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 the ESB/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 left in situ, as appropriate to facilitate on-going forestry operations. 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 however, this is not envisaged at this time. Underground cables, including grid connection, will be removed and the ducting left in place. A decommissioning plan will be agreed with the local authorities three months prior to decommissioning the Proposed Development.

However, as noted in the Scottish Natural Heritage report (SNH) *Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms* (SNH, 2013) reinstatement proposals for a wind farm are made approximately 30 years in advance, so within the lifespan of the wind farm, technological advances and preferred approaches to reinstatement are likely to change. According to the SNH guidance, it is therefore:

“best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the wind farm”.

3. ENVIRONMENTAL MANAGEMENT

3.1 Introduction

This CEMP is a working document, the final CEMP will be prepared and presented as a standalone document and will include all best practice measures required to construct the wind farm. 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 Good Environmental Management During Construction

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

3.2.2 Site Drainage Principles

The site drainage features have been outlined in Chapter 4, 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 and 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.

3.2.3 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.

- National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Department of the Environment, Heritage and Local Government (2006): Wind Farm Development Guidelines for Planning Authorities;
- Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. Eastern Regional Fisheries Board;
- Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries During Construction Works Adjacent to Waters;
- Scottish Natural Heritage (2010): Good Practice During Wind Farm Construction;
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note);
- PPG5 – Works or Maintenance in or Near Water Courses (UK Guidance Note);
- CIRIA (Construction Industry Research and Information Association) guidance on ‘Control of Water Pollution from Linear Construction Projects’ (CIRIA Report No. C648, 2006);
- Control of water pollution from construction sites - Guidance for consultants and contractors. CIRIA C532. London, 2001; and,
- Control of water pollution from linear construction projects -Technical guidance. CIRIA C648 London, 2006.

3.2.4 Site Drainage Design and Management

The proposed site drainage features for this site are outlined in Chapter 4, 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

The majority of the site drains in a south-westerly direction towards the Creegh River which is located approximately 3.5km downstream (south) of the site. There are three main first order streams which emerge from the southern section of the site and flows towards the Creegh River. The northern section of the site, is drained by a headwater stream of the Annageeragh River.

Additionally, within the Proposed Development site and along forested sections of the grid connection options, there are numerous manmade drains that are in place predominately to drain the forestry plantations. The current internal forestry drainage pattern is influenced by the topography, peat subsoils, layout of the forest plantation and by the existing road network. The forest plantations, which cover ~59% of the study area (where deforestation has occurred forests drains still exist as before) are generally drained by a network of mound drains which typically run perpendicular to the topographic contours of the site and feed into collector drains, which discharge to interceptor drains down-gradient of the plantation. This existing drainage system will continue to function as it is during the pre-construction phase.

However, prior to commencement of works in sub-catchments across the site, main drain inspections will be completed to ensure ditches and streams are free from debris and blockages that may impede drainage. 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.

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 Chapter 4, Section 4.6 of the EIAR. The drainage system will be excavated and constructed in conjunction with the road and hard standing construction. Drains will be excavated and stilling ponds constructed to eliminate any suspended solids within surface water running off the site.

Best practice and practical experience on other similar projects suggests that in addition to the drainage plans that are included in the EIAR, there are additional site based decisions and plans that can only be made in the field through interaction between the Site Construction Manager, the Project Hydrologist and the Project Geotechnical Engineers. The mechanisms for interaction between these are outlined within Section 4 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 below:

- 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/road side drains will be maintained to intercept and collect runoff from access roads and hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to stilling ponds for sediment settling;
- Check dams will be maintained at regular intervals along interceptor drains and swales/roadside drains in order to reduce flow velocities and therefore minimise erosion within the system during storm rainfall events; and,
- Stilling ponds/settlement ponds, emplaced downstream of swales and roadside drains, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses. The stilling ponds will be sized according to the size of the area they will be receiving water from, but will be sufficiently large to accommodate peak flows storm events. Inspection and maintenance of all settlement ponds will be ongoing through the construction period.

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. 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.

3.2.5 Forestry Felling Drainage Measures

Tree felling to facilitate the Proposed Development will not be undertaken simultaneously with construction groundworks. Keyhole felling to facilitate construction works will take place prior to groundworks commencing. Some further turbulence felling may take place after all groundworks have been completed but while turbines are being commissioned.

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

- Attend the site for the setup period when drainage protection works are being installed, and be present on site during the remainder of the forestry keyhole felling works.
- Prior to the commencement of works, review and agree the positioning by the Operator of the required Aquatic Buffer Zones (ABZs), silt traps, silt fencing (see below), water crossings and onsite storage facilities for fuel, oil and chemicals (see further below).
- Be responsible for preparing and delivering the Environmental Tool Box Talk (TBT) to all relevant parties involved in site operations, prior to the commencement of the works.
- Conduct daily and weekly inspections of all water protection measures and visually assess their integrity and effectiveness in accordance with Section 3.4 (Monitoring and Recording) and Appendix 3 (Site Monitoring Form (Visual Inspections)) of the *Forestry & Freshwater Pearl Mussel Requirements*.
- Take representative photographs showing the progress of operation onsite, and the integrity and effectiveness of the water protection measures.
- Collect water samples for analysis by a 3rd party accredited laboratory, adhering to the following requirements:
 - Surface water samples shall be collected upstream and downstream of the keyhole felling site at suitable sampling locations.
 - Sampling shall be taken from the stream / river bank, with no in-stream access permitted.

- The following minimum analytical suite shall be used: pH, Electrical Conductivity, Total Suspended Solids, Biochemical Oxygen Demand, Total Phosphorus, Ortho-Phosphate, Total Nitrogen, and Ammonia.
- Review of operator's records for plant inspections, evidence of contamination and leaks, and drainage checks made after extreme weather conditions.
- Prepare and maintain a contingency plan.
- Suspend work where potential risk to water from siltation and pollution is identified, or where operational methods and mitigation measures are not specified or agreed.
- Prepare and maintain a Water Protection Measure Register. This document is to be updated weekly by the ECoW.

All relevant measures set out in the *Forestry & Freshwater Pearl Mussel Requirements, Forestry & Water Quality Guidelines, Forest Harvesting & the Environment Guidelines and the Forest Protection Guidelines* will apply. To protect watercourses, the following measures will be adhered to during all keyhole/tree felling activities.

- Works will be overseen by an ECoW as described above.
- The extent of all necessary tree felling will be identified and demarcated with markings on the ground in advance of any felling commencing.
- All roads and culverts will be inspected prior to any machinery being brought on site to commence the felling operation. No tracking of vehicles through watercourses will occur. Vehicles will only use existing road infrastructure and established watercourse crossings.
- Existing drains that drain an area to be felled towards surface watercourses will be blocked, and temporary silt traps will be constructed to ensure collection of all silt within felling areas. These temporary silt traps will be cleaned out and backfilled once felling works are complete. This ensures there is no residual collected silt remaining in blocked drains after felling works are completed. No direct discharge of such drains to watercourses will occur from within felling areas.
- New collector drains and sediment traps will be installed during ground preparation to intercept water upgradient of felling areas and divert it away. Collector drains will be excavated at an acute angle to the contour (0.3%-3% gradient), to minimise flow velocities.
- All silt traps will be sited outside of buffer zones and have no direct outflow into the aquatic zone. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of away from all aquatic zones.
- All new collector drains will taper out before entering the aquatic buffer zone to ensure the discharging water gently fans out over the buffer zone before entering the aquatic zone.
- Machine combinations will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance;
- Mechanised operations will be suspended during and immediately after heavy rainfall.
- Where brush is required to form brush mats, it is to be laid out at harvesting stage to prevent soil disturbance by machine movement.
- Brush which has not been pushed into the soil may be moved within the site to facilitate the creation of mats in more demanding locations.
- Felling of trees will be pointed directionally away from watercourses.
- Felling will be planned to minimise the number of machine passes in any one area.
- Extraction routes, and hence brush mats, will be aligned parallel to the ground contours where possible.
- Harvested timber will be stacked in dry areas, and outside any 50-metre watercourse buffer zone. Straw bales and check dams to be emplaced on the down gradient side of timber storage sites.

- Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but removing of natural debris deflectors will be avoided.

3.2.6 Borrow Pit Drainage

While surface water will be contained in the borrow pits areas, the design proposal is to control the level of water in the borrow pit area by creating a single point outlet from the basin-like area that will ensure the water does not overtop the pit area. Run-off from the proposed borrow pit areas will be controlled via a single outlet that will be installed at the edge of the borrow pit. The single outfall point will be constructed to handle runoff from the borrow pit and its immediate surrounds. Interceptor drains will already have been installed upgradient of the borrow pit area before any extraction begins.

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 and level spreader, which will receive the water from the single outlet.

3.2.7 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.

3.3 Refuelling, Fuel and Hazardous Materials Storage

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

- Minimal refuelling or maintenance of construction vehicles or plant will take place on site. Off-site refuelling will occur at a controlled fuelling station;
- On-site refuelling will take place using a mobile double skinned 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 wind farm. 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 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 will 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.

3.4

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 10.5.3.1 of the EIAR. 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 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 will 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;
- Brush 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. Brush mat renewal will take place when they become heavily used and worn. Provision will be made for brush 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 50m stream buffer zone. Straw bales and check dams to be emplaced on the down gradient side of timber storage/processing sites;
- Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water run-off;
- Checking and maintenance of roads and culverts will be on-going through the felling operation;
- Refuelling or maintenance of machinery will not occur within 50m of 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

3.5

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.

3.6 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 General Recommendations for Good Construction Practice

The peat stability assessment prepared by Fehily Timoney indicates that the site has an acceptable margin of safety and is suitable for the proposed wind farm development. The following mitigation measures from the peat stability assessment are recommended and will be taken into account when preparing Construction Method Statements for the development:

- > Appointment of experienced and competent contractors;
- > The site will be supervised by experienced and qualified personnel;
- > Allocate sufficient time for the project (be aware that decreasing the construction time has the potential to increase the risk of initiating a peat movement);
- > Prevent undercutting of slopes and unsupported excavations;
- > Maintain a managed robust drainage system;
- > Prevent placement of loads/overburden on marginal ground;
- > Set up, maintain and report readings from peat stability monitoring systems;
- > Ensure construction method statements are followed; and,
- > Revise and amend the Construction Risk Register as construction progresses to ensure that risks are managed and controlled for the duration of construction.

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 Establishing Good Site Hygiene

- A risk assessment and method statement must be provided by the Contractor prior to commencing works.
- Fences will be erected around areas of infestation, as confirmed by test pits, and warning signs shall be erected.
- A designated wash-down area will be created, where power-washed material from machinery can be contained, collected and disposed of with other contaminated material. This area will contain a washable membrane or hard surface.
- Stockpile areas will be chosen to minimise movement of contaminated soil.
- Stockpiles will be marked and isolated.
- Contaminated areas which will not be excavated will be protected by a root barrier membrane if they are likely to be disturbed by machinery. Root barrier membranes will be protected by a layer of sand above and below and topped with a layer of hardcore.
- The use of vehicles with caterpillar tracks within contaminated areas will be avoided to minimise the risk of spreading contaminated material.
- An ECoW/suitably qualified ecologist will be on site to monitor and oversee the implementation of invasive species management plans.

Plant and equipment which is operated within an area for the management of materials in contaminated areas will be decontaminated prior to relocating to a different works area. The decontamination procedures will 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 10 no. turbines, new and upgraded site access roads, internal cabling and grid connection, substation 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 2 on-site borrow pits 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 the 2 on-site borrow pits

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

3.11.3.2 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 will be taken to ensure excess waste is not generated during construction, including;

- Ordering of materials will be on an ‘as needed’ basis to prevent over supply to site. Co-ordination is required with suppliers enabling them to take/buy back surplus stock.
- Purchase of materials pre-cut to length to avoid excess scrap waste generated on site.
- Request that suppliers use least amount of packaging possible on materials delivered to the site.
- Ensuring correct storage and handling of goods to avoid unnecessary damage that would result in their disposal
- Ensuring correct sequencing of operations.
- Use reclaimed materials in the construction works.

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

3.11.3.3 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 no 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 peat 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 for Waste Management

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

3.11.4.3.2 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, will 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 are the project focal point relating to construction-related environmental issues.

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

The Environmental Clerk of Works will report directly to the Site Supervisor/Construction Manager. An Environmental Clerk of Works 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:

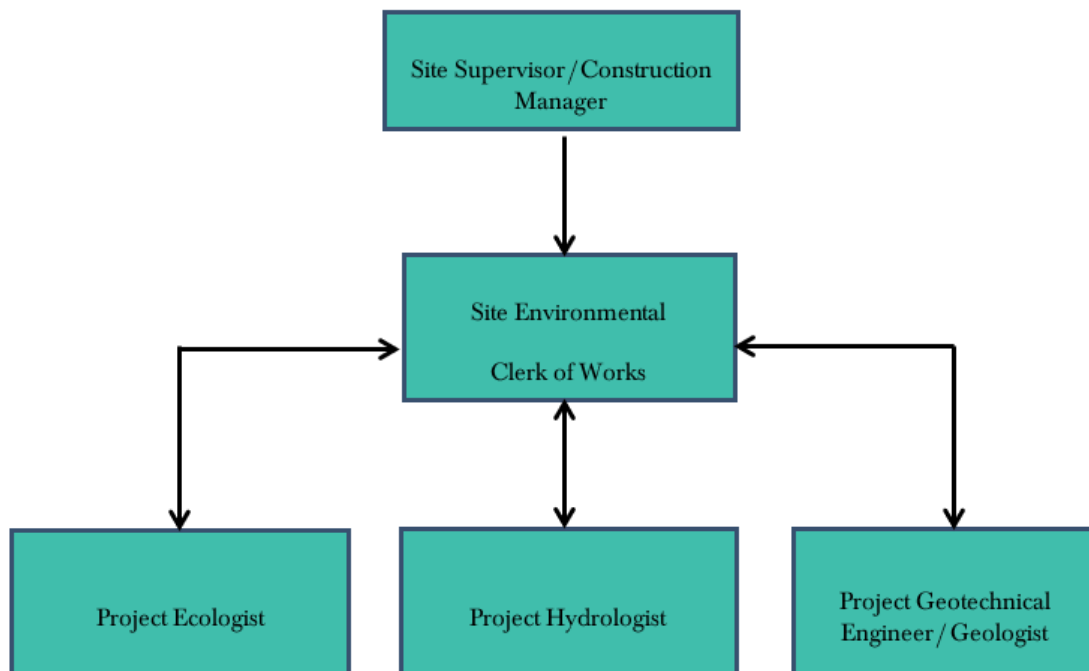


Figure 4-1 Site Management Chain of Command

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 Site Supervisor/Construction Manager 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 Environmental Clerk of Works 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.

4.1.2 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 Environmental Clerk of Works will report to the Site Supervisor/Construction Manager. The responsibilities and duties of the Environmental Clerk of Works 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 Environmental Clerk of Works 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 Environmental Clerk of Works 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 Environmental Clerk of Works 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 Environmental Clerk of Works 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 peat repository 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 Water Quality and Monitoring

4.2.1 Pre-Construction Baseline Monitoring

Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of felling and construction at the site. The baseline monitoring programme will be subject to agreement with Clare County Council.

Analysis will be for a range of parameters with relevant regulatory limits along with Environmental Quality Standards (EQSs) and sampling will be undertaken for each watercourse e.g. at SW1, SW2 & SW3 as outlined in Figure 10-3 of the EIAR on a monthly basis.

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

4.2.2 Construction Phase Monitoring

4.2.2.1 Daily Visual Inspections

Daily visual inspections of drains and outfalls will be performed during the construction period to ensure suspended solids are not entering streams and rivers on site, to identify any obstructions to channels and to allow appropriate maintenance of the drainage regime. Should the suspended solids levels measured during construction be higher than the existing levels, the source will be identified and additional mitigation measures implemented.

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

The following periodic inspection regime will be implemented:

- Daily general visual inspections of site operations and inspections of all watercourses within the site and in the surrounding area by the Environmental Clerk of Works or a suitably qualified and competent person as delegated by the Environmental Clerk of Works;
- Inspections to include all elements of drainage infrastructure to ensure the system is operating correctly and to identify and maintenance that is required. Any changes, such as discolouration, odour, oily sheen or litter will be noted and corrective action will be implemented. High risk locations such as settlement ponds will be inspected

- daily. Daily inspections checks will be completed on plant and equipment, and whether materials such as straw bales or oil absorbent materials need replacement;
- Event based inspections by the Environmental Clerk of Works as follows:
 - >10 mm/hr (i.e. high intensity localised rainfall event);
 - >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day);
 - or,
 - Rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week).
 - Monthly site inspections by the Project Hydrologist/ Environmental Clerk of Works during construction phase;
 - Quarterly site inspections by the Project Hydrologist/ Environmental Clerk of Works after construction for a period of one year following the construction phase; and,
 - A written record will be maintained or available on-site within this Construction Environmental Management Plan (CEMP) which will be maintained on-site during the construction phase.

4.2.2.2 Continuous Turbidity Monitoring

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

4.2.2.3 Monthly Laboratory Analysis

Baseline laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken as per water monitoring programme for the overall windfarm development and each primary watercourse along the route. This will not be restricted to just these locations around the immediate wind farm site with further sampling points added as deemed necessary by the Environmental Clerk of Works in consultation with the Project Hydrologist and Site Manager.

4.2.2.4 Field Monitoring

Field chemistry measurements of unstable parameters, (pH, conductivity, temperature) will be taken at the surface water monitoring locations, as per water monitoring programme for the overall wind farm development and each primary watercourse along the route along with at all installed sonde locations. These analyses will be carried out by either the Environmental Clerk of Works or the Project Hydrologist. In-situ field monitoring will be completed on a weekly basis. In-situ field monitoring will also be completed after major rainfall events, i.e. after events of >25mm rainfall in any 24-hour period. The supervising hydrologist will monitor and advise on the readings collected by in-situ field monitoring.

4.2.2.5 Monitoring Parameters

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

- pH (field measured)
- Electrical Conductivity (field measured)
- Temperature (field measured)
- Dissolved Oxygen (field measured)
- Total Phosphorus
- Chloride

- > Nitrate
- > Nitrite
- > Total Nitrogen
- > Ortho-Phosphate
- > Ammonia N
- > Biochemical Oxygen Demand
- > Total Suspended Solids
- > Turbidity

4.2.3 Construction Phase Drainage Inspections & Maintenance

Drainage performance will form part of the civil works contract requirements. During the construction phase the effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treatment of potentially silt-laden water from the works areas will be monitored periodically.

(daily, weekly, and event based monitoring, i.e. after heavy rainfall events) by the Environmental Clerk of Works and/or the Project Hydrologist. The Environmental Clerk of Works will respond to changing weather and drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained.

Prior to the commencement of construction an inspection and maintenance plan for the on-site drainage system which will be prepared by the Environmental Clerk of Works in consultation with the Project Hydrologist. 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.

Regular inspections of all existing and installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water within the system. Any excess build-up of silt levels at check dams, the settlement ponds, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.

The following periodic inspection regime is likely to be proposed:

- > Daily general visual inspections by Environmental Clerk of Works;
- > Weekly (existing & new drains) inspections by the Environmental Clerk of Works and/or the site Construction Manager;
- > Inspection to include all elements of drainage systems and all monitoring. Inspections required to ensure that drainage systems are operating correctly and to identify any maintenance that is required. Any changes, such as discolouration, odour, oily sheen or litter should be noted and corrective action should be implemented. High risk locations such as settlement ponds will be inspected daily. Daily inspections checks will be completed on plant and equipment, and whether materials such as silt fencing or oil absorbent materials need replacement;
- > Event based inspections by the Environmental Clerk of Works as follows:
 - > >10 mm/hr (i.e. high intensity localised rainfall event);
 - > >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
 - > Rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week).
- > Monthly site inspections by the Project Hydrologist during construction phase; and,
- > Quarterly site inspections by the Project Hydrologist after construction for a period of one year following the construction phase.
- > A written record will be maintained or available on-site of all construction phase monitoring undertaken.

4.2.4 Surface Water Monitoring Reporting

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

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

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

4.2.5 Post Construction Monitoring

4.2.5.1 Monthly Laboratory Analysis Sampling

Monthly sampling for laboratory analysis for a range of parameters adopted during pre-commencement and construction phases will continue for six months after construction is complete. The supervising hydrologist will monitor and advise on the readings being received from the testing laboratory.

4.3 Environmental Awareness and Training

4.3.1 Environmental Induction

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

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

4.3.2 Toolbox Talks

Tool box 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 tool box 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.

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.

5. EMERGENCY RESPONSE PLAN

5.1 Overview

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

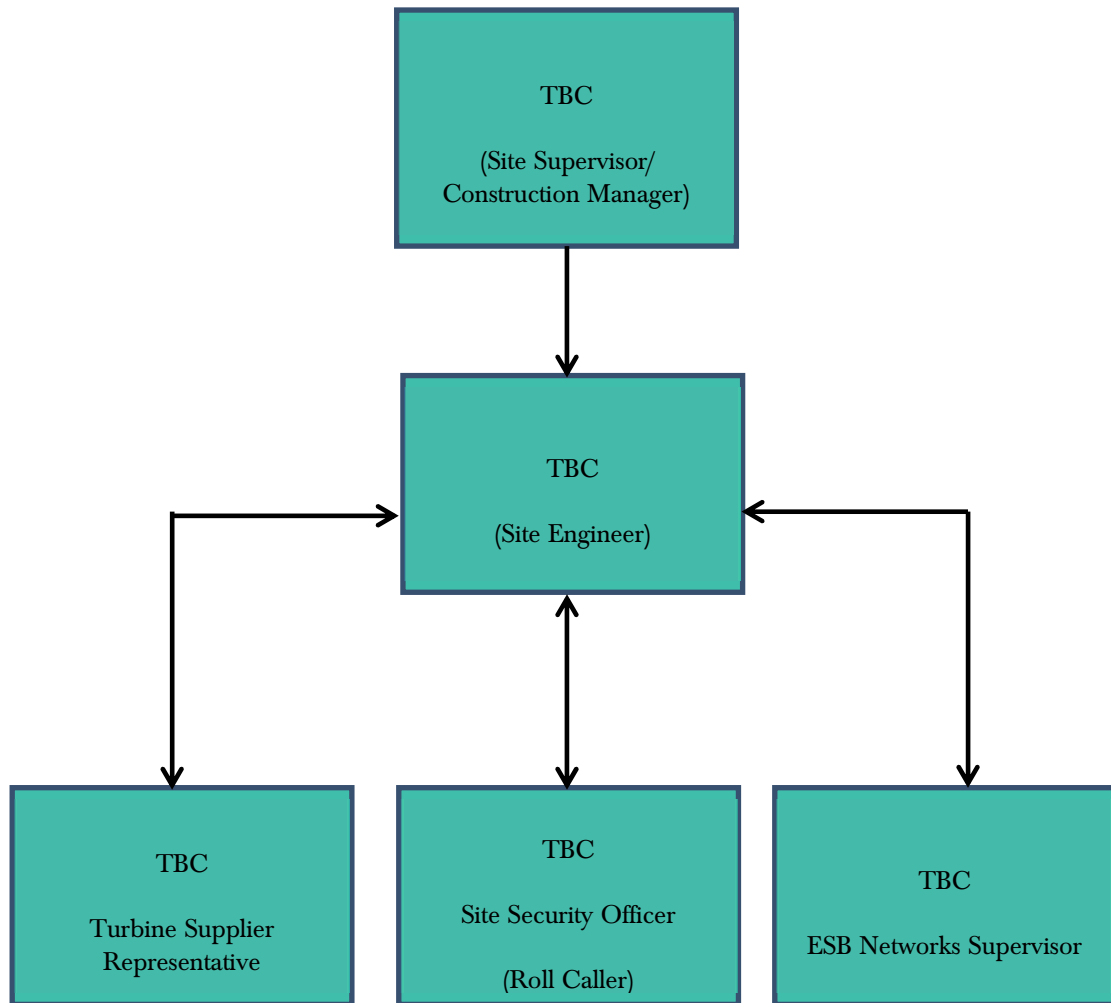


Figure 5-1 Emergency Response Procedure Chain of Command

5.1.2 Hazard Identification

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

Table 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

Hazard	Emergency Situation
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.

5.2 Environmental Emergency Response Procedure

5.2.1 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.

1. *All construction activities shall cease within the affected area.*
2. *Increased monitoring at the location shall be carried out. The area will be monitored, as appropriate, until such time as movements have ceased.*
3. *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.*

5.2.2 Onset of Peat Slide

In the unlikely event of the onset or actual detachment of peat (e.g. cracking, surface rippling) then the following shall be carried out.

1. *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.*
2. *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.*
3. *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.*

5.2.3 Spill Control Measures

Every effort will be made to prevent an environmental incident during the construction and operational phase of the project. However, in the event of an oil / fuel spill occurring the following steps will be followed:

- 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 Environmental Clerk of Works immediately giving information on the location, type and extent of the spill so that they can take appropriate action.
- The Environmental Clerk of Works 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 Environmental Clerk of Works will notify the appropriate regulatory body such as Clare 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 Environmental Clerk of Works must be immediately notified.
- If necessary, the Environmental Clerk of Works 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 Environmental Clerk of Works will liaise with the Project Ecologist.
- If the incident has impacted on a sensitive receptor such as an archaeological feature the Environmental Clerk of Works will liaise with the Project Archaeologist.
- A record of all environmental incidents will be kept on file by the Environmental Clerk of Works and the Main Contractor. These records will be made available to the relevant authorities such as Clare County Council, EPA if required.

The Environmental Clerk of Works 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.

5.3 Contact the Emergency Services

5.3.1 Emergency Communications Procedure

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

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

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

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

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

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

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

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

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

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

5.4

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 – Abbey Medical Centre, Ennis	065 682 9975
Hospital – Mid Western Regional Hospital Ennis	065 686 3121
ESB Emergency Services	1850 372 999
Gas Networks Ireland Emergency	1850 20 50 50
Gardaí –Ennis Garda Station	065 684 8100
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): MKO	091 735611
Client: Mid Clare Renewable Energy Windfarm Ltd	TBC

5.4.1 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.

5.5 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 undergo 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 Clare 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.

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
Pre-Commencement Phase					
MM1	Environmental Management	EIAR Chapter 4	The Contractor will be responsible for implementing the mitigation measures specified throughout the EIAR and compiled in the Audit Report which is included in the CEMP. The Contractor will also be responsible for ensuring that all construction staff understand the importance of implementing the mitigation measures. The implementation of the mitigation measures will be overseen by the environmental clerk of works or supervising hydrogeologists, environmental scientists, ecologists or geotechnical engineers, depending on who is best placed to advise on the implementation. The system of auditing referred to above ensures that the mitigation measures are maintained for the duration of the construction phase, and into the operational phase where necessary.		
MM2	Environmental Management	EIAR Chapter 4	The Environmental Clerk of Works will maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. In addition, an Environmental Clerk of Works or Project Ecologist, Project Hydrologist, Project Geotechnical engineer will visit the site regularly and report to the Site Environmental Office.		
MM3	Environmental Management	EIAR Chapter 4	A Site Environmental Clerk of Works 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 Site Environmental Clerk of Works 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- Invasive Species	CEMP Section 3	A baseline invasive species survey will be carried out at the site to identify the presence and location of any invasive species (listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) by a suitably qualified ecologist. If the presence of such species		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			is found at or adjacent to the site, particularly in areas where 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.		
MM5	Roads	CEMP Section 2	Prior to commencing road construction movement monitoring posts should be installed in areas where the peat depth is greater than 2m.		
MM6	Drainage	CEMP Section 3	Interceptor drains should be installed upslope of the access road alignment to divert any surface water away from the construction area.		
MM7	Drainage	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		
MM8	Traffic Management Plan, Delivery Programme, pre-commencement road works	EIAR Chapter 15	<ul style="list-style-type: none"> ➤ A Pre-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. Where required the timing of these surveys will be agreed with the local authority. ➤ 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: ➤ 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. 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> <li data-bbox="846 352 1585 651">➤ 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. <li data-bbox="846 651 1585 916">➤ 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 authority during normal working hours. An "out of hours" emergency number will also be provided. <li data-bbox="846 916 1585 1283">➤ 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. <li data-bbox="846 1283 1585 1347">➤ Liaison with the relevant local authority - Liaison with the Clare County Council Road Section and An Garda Siochana, 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			<p>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.</p> <ul style="list-style-type: none"> ➤ Implementation of temporary alterations to road network at critical junctions – at locations highlighted in section 15.1.8. In addition, in order to minimise the impact on the existing environment during turbine component deliveries the option of blade adaptor trailers can also be used where deemed necessary. Identification of delivery routes – These routes assessed in this EIAR will be agreed and adhered to by all contractors. ➤ 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 within the construction compound. ➤ Delivery times of large turbine components - The management plan will include the proposal to deliver the large wind turbine plant components at night in order to minimise disruption to general traffic during the construction stage. ➤ Additional measures - Various additional measures will be put in place in order to minimise the effects of the development 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			<p>traffic on the surrounding road network including site and sweeping / cleaning of local roads as required.</p> <ul style="list-style-type: none"> ➤ Re-instatement works - All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers. A roads conditions survey (and any other analyses) where requested by the Roads Section of the Council would be undertaken immediately prior to construction commencement of the project to assess the condition of the road network at that time and to agree any required works with the local authority. Where such a survey is requested by Clare County Council it would be repeated immediately after completion of the construction phase of the project in order to ensure that any reinstatement works were carried out to a satisfactory standard as required by the local authority. 		
MM9	Information to Local Residents	EIAR Chapter 15	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 authority during normal working hours. An "out of hours" emergency number will also be provided.		
Construction Phase					
<i>Construction Management</i>					
MM10	Health and Safety	EIAR Chapter 5	<p>During construction of the Proposed Development, all staff will be made aware of and adhere to:</p> <ul style="list-style-type: none"> ➤ Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005); ➤ Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. No. 299 of 2007), as amended; 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> ➤ Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. 291 of 2013), as amended; and ➤ Safety, Health and Welfare at Work (Work at Height) Regulations 2006 (S.I. No. 318 of 2006). <p>This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan which will include measures to exclude members of the public from certain areas of the site during construction.</p>		
MM11	Health and Safety	EIAR Chapter 5	<p>The scale and scope of the project requires that a Project Supervisor Design Process (PSDP) and Project Supervisor Construction Stage (PSCS) are required to be appointed in accordance with the provisions of the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006'.</p> <p>The PSDP appointed for the construction stage shall be required to perform his/her duties as prescribed in the Safety, Health and Welfare at Work (Construction) Regulations. These duties include (but are not limited to):</p> <ul style="list-style-type: none"> ➤ Identify hazards arising from the design or from the technical, organisational, planning or time related aspects of the project; ➤ Where possible, eliminate the hazards or reduce the risks; ➤ Communicate necessary control measures, design assumptions or remaining risks to the PSCS so they can be dealt with in the Safety and Health Plan; ➤ Ensure that the work of designers is coordinated to ensure safety; ➤ Organise co-operation between designers; ➤ Prepare a written Safety and Health Plan; ➤ Prepare a safety file for the completed structure and give it to the client; and 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> ➤ Notify the Authority and the client of non-compliance with any written directions issued 		
MM12	Health and Safety	EIAR Chapter 5	<p>The PSCS appointed for the construction stage shall be required to perform his/her duties as prescribed in the Safety, Health and Welfare at Work (Construction) Regulations. These duties include (but are not limited to):</p> <ul style="list-style-type: none"> ➤ Development of the Safety and Health Plan for the construction stage with updating where required as work progresses; ➤ Compile and develop safety file information ➤ Reporting of accidents / incidents; ➤ Weekly site meeting with PSCS; ➤ Coordinate arrangements for checking the implementation of safe working procedures. Ensure that the following are being carried out: <ul style="list-style-type: none"> ➤ Induction of all site staff including any new staff enlisted for the project from time to time; ➤ Toolbox talks as necessary; ➤ Maintenance of a file which lists personnel on site, their name, nationality, current Safe Pass number, current Construction Skills Certification Scheme (CSCS) card (where relevant) and induction date; ➤ Report on site activities to include but not limited to information on accidents and incidents, disciplinary action taken and PPE compliance; ➤ Monitor the compliance of contractors and others and take corrective action where necessary; and ➤ Notify the Authority and the client of non-compliance with any written directions issued. 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
MM13	Refuelling,	EIAR Chapter 4, 7, 9, 10 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 holding a permit to refuel. Mobile anti-pollution measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.		
MM14	Borrow Pits	EIAR Chapter 4	The borrow pits areas will be permanently secured and a stock-proof fence will be erected around the borrow pit areas to prevent access to these areas. Appropriate health and safety signage will also be erected on this fencing and at locations around the fenced area.		
MM15	Waste Materials	CEMP Section 3	A fully licensed waste contractor will be employed to remove waste from the site and will be required to provide documented records for all waste dispatches leaving the site of the proposed development.		
<i>Drainage Design and Management</i>					
MM16	Earthworks	EIAR Chapter 10	Avoid working during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded.		
MM17	Excavation Dewatering and Surface Water Quality	EIAR Chapter 10	<ul style="list-style-type: none"> ➤ If required, pumping of excavation inflows will prevent build-up of groundwater in the excavation; ➤ The interceptor drainage will be discharged to the existing drainage system or onto the bog surface; ➤ The pumped water volumes will be discharged via volume and sediment attenuation ponds adjacent to excavation areas, or via specialist treatment systems such as a “Siltbuster” unit; 	➤	➤

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> ➤ There will be no direct discharge to the existing drainage network and therefore no risk of hydraulic loading or contamination will occur; and, ➤ 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. 		
MM18	Watercourse Buffers	EIAR Chapter 10	During the wind turbine construction phase a self-imposed buffer zone of 50 metres will be maintained for all streams where possible.		
MM19	Near Stream Works	EIAR Chapter 10	<ul style="list-style-type: none"> ➤ During the near stream construction work double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase. There will be no batching or storage of cement allowed in the vicinity of the crossing construction areas. ➤ As a further precaution, near stream construction work, will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to the Eastern Regional Fisheries Board (2004) guidance document “Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites”, i.e., May to September inclusive. This time period coincides with the period of lowest expected rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses (any deviation from this will be done in discussion with the IFI) 		
MM20	Drainage Swales	EIAR Chapter 10, Appendix 4-5	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.		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
MM21	Interceptor Drains	EIAR Chapter 10, Appendix 4-5	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.		
MM22	Transverse drains	EIAR Chapter 10, Appendix 4-5	On steep sections of access road transverse drains ('grips') will be constructed where appropriate in the surface layer of the road to divert any runoff off the road into swales/roadside drains;		
MM23	Check dams	EIAR Chapter 10, Appendix 4-5	Check dams will not be used in any natural watercourses, only artificial drainage channels and interceptor drains. Check dams will be used along sections of access road drains to intercept silts at source		
MM24	Level Spreaders	EIAR Chapter 10, Appendix 4-5	Level spreaders will be constructed at the end of interceptor drains to convert concentrated flows in the drain into diffuse sheet flow on areas of vegetated ground.		
MM25	Settlement ponds	EIAR Chapter 10, Appendix 4-5	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.		
MM26	Siltbuster	EIAR Chapter 10, Appendix 4-5	If the discharge water from construction areas fails to be of a high quality, then a filtration treatment system (such as a 'siltbuster' or similar equivalent treatment train (sequence of water treatment processes)) will be used to filter and treat all surface discharge water collected in the dirty water drainage system. This will apply for all of the construction phase.		
MM27	Silt Fences	EIAR Chapter 10, Appendix 4-5	Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to the existing drainage network of sand and gravel-sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin and entrained in surface water runoff. Inspection and maintenance of these		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase.		
MM28	Silt Bags	EIAR Chapter 10, Appendix 4-5	Silt bags will be used where small to medium volumes of water need to be pumped from excavations (e.g. the proposed underpass locations). As water is pumped through the bag, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through.		
MM29	Potential Release of Hydrocarbons	EIAR Chapter 10 CEMP Section 3	<ul style="list-style-type: none"> ➤ All plant will be inspected and certified to ensure they are leak free and in good working order prior to use on site; ➤ On-site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer or truck will be re-filled off site and will be towed/driven around the site to where machinery are located. The 4x4 jeep/fuel truck 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 compound when not in use and 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 stored on site will be minimised. Any storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction; ➤ The electrical control building will be bunded appropriately to the volume of oils likely to be stored and to prevent leakage of any associated chemicals and to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor; ➤ An emergency plan for the construction phase to deal with accidental spillages will be contained within the Construction 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			Environmental Management Plan. Spill kits will be available to deal with accidental spillages.		
MM30	Plant and equipment inspections	EIAR Chapter 9	Site plant will be regularly inspected for leaks and fitness for purpose; and, an emergency plan for the construction phase to deal with accidental spillages will be contained within Environmental Management Plan. Spill kits will be available to deal with accidental spillages.		
MM31	Wastewater Disposal	EIAR Chapter 10	It is proposed to manage wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. It is not proposed to treat wastewater on-site.		
MM32	Concrete Deliveries and Management	EIAR Chapter 10, CEMP Section 3	No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete products will be used and where possible, pre-cast elements for culverts and concrete works will be used.		
MM33	Concrete Deliveries and Management	EIAR Chapter 10, CEMP Section 3	No washing out of any plant used in concrete transport or concreting operations will be allowed on-site.		
MM34	Concrete Deliveries and Management	EIAR Chapter 10, CEMP Section 3	Where concrete is delivered on site, only the chute need be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water is to be directed into a dedicated lined washout area. This lined area will be removed from site once the construction phase is complete.		
MM35	Concrete Deliveries and Management	EIAR Chapter 10, CEMP Section 3	Weather forecasting will be used 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		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
MM36	Concrete Deliveries and Management	CEMP Section 3	Where possible pre-cast elements for culverts and concrete works will be used		
<i>Felling</i>					
MM37	Felling Licence	EIAR Chapter 4	Felling will be carried out under the terms of a licence application to the Forest Service, as per the Forest Service's policy on granting felling licenses for wind farm developments		
MM38	Clear felling of Coniferous Plantation	EIAR Chapter 4. CEMP Section 3	<ul style="list-style-type: none"> ➤ Works will be overseen by an ECoW. ➤ The extent of all necessary tree felling will be identified and demarcated with markings on the ground in advance of any felling commencing. ➤ All roads and culverts will be inspected prior to any machinery being brought on site to commence the felling operation. No tracking of vehicles through watercourses will occur. Vehicles will only use existing road infrastructure and established watercourse crossings. ➤ Existing drains that drain an area to be felled towards surface watercourses will be blocked, and temporary silt traps (which may include a combination of the drainage components outlined in Section 4.6.3) will be constructed to ensure collection of all silt within felling areas. These temporary silt traps will be cleaned out and backfilled once felling works are complete. This ensures there is no residual collected silt remaining in blocked drains after felling works are completed. No direct discharge of such drains to watercourses will occur from within felling areas. ➤ New collector drains and sediment traps will be installed during ground preparation to intercept water upgradient of felling areas and divert it away. Collector drains will be excavated at an acute 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			<p>angle to the contour (0.3%-3% gradient), to minimise flow velocities.</p> <ul style="list-style-type: none"> ➤ All silt traps will be sited outside of buffer zones and have no direct outflow into the aquatic zone. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of away from all aquatic zones. ➤ All new collector drains will taper out before entering the aquatic buffer zone to ensure the discharging water gently fans out over the buffer zone before entering the aquatic zone. ➤ Machine combinations, such as mechanical harvesters or chainsaw felling, will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance; ➤ Mechanised operations will be suspended during and immediately after heavy rainfall. ➤ Where brash is required to form brash mats, it is to be laid out at harvesting stage to prevent soil disturbance by machine movement. ➤ Brash which has not been pushed into the soil may be moved within the site to facilitate the creation of mats in more demanding locations. ➤ Felling of trees will be pointed directionally away from watercourses. ➤ Felling will be planned to minimise the number of machine passes in any one area. ➤ Extraction routes, and hence brash mats, will be aligned parallel to the ground contours where possible. ➤ Harvested timber will be stacked in dry areas, and outside any 50-metre watercourse buffer zone. Straw bales and check dams 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			<p>to be emplaced on the down gradient side of timber storage sites.</p> <ul style="list-style-type: none"> ➤ Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but removing of natural debris deflectors will be avoided. 		
<i>Peat, Subsoils and Bedrock</i>					
MM39	Topsoil/Peat and Subsoil Excavation	EIAR Chapter 9	<ul style="list-style-type: none"> ➤ The peat and subsoil which will be removed during the construction phase will be localised to the wind farm infrastructure turbine location, substation and temporary compounds and access roads; ➤ The proposed development has been designed to avoid sensitive habitats within the application area; ➤ A minimal volume of peat and subsoil will be removed to allow for infrastructural work to take place in comparison to the total volume present on the site due to optimisation of the layout by mitigation by design. 		
MM40	Peat Instability and Failure	EIAR Chapter 9	<ul style="list-style-type: none"> ➤ Appointment of experienced and competent contractors; ➤ The site should be supervised by experienced and qualified personnel; ➤ Allocate sufficient time for the project (be aware that decreasing the construction time has the potential to increase the risk of initiating a peat movement); ➤ Prevent undercutting of slopes and unsupported excavations; ➤ Maintain a managed robust drainage system; ➤ Prevent placement of loads/overburden on marginal ground; ➤ Set up, maintain and report findings from monitoring systems; 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> ➤ Ensure construction method statements are followed or where agreed modified/ developed; and, ➤ Revise and amend the Geotechnical Risk Register as construction progresses. 		
MM41	Erosion of Exposed Subsoils and Peat During Tree Felling and Construction works	EIAR Chapter 9 and Appendix 4-2	<ul style="list-style-type: none"> ➤ All excavated material will be completed in accordance with the Peat and Spoil Management Plan. Material will be moved over the least possible distance. ➤ Any excess peat will be moved to peat storage areas or will be temporarily surrounded by earthen berms to prevent erosion. This will prevent erosion of soil. Silt fences will be installed around temporary stockpiles to limit movement of entrained sediment in surface water runoff. The use of earthen berms and silt fencing around earthworks and spoil mounds will prevent egress of water from the works. 		
MM42	Erosion of Exposed Subsoils and Peat During Tree Felling and Construction works	EIAR Chapter 9	Any excess temporary mounded peat in storage for long periods will be surrounded by earthen berms or seeded at the earliest opportunity.		
MM43	Erosion of Exposed Subsoils and Peat During Tree Felling and Construction works	EIAR Chapter 9	During tree felling brush 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.		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
Biodiversity					
MM44	Rhododendron Management Plant	EIAR Chapter 7 CEMP Section 3	<p>Where works are proposed along the proposed grid connection route which will directly impact on a particular stand of Rhododendron the following methods will be employed:</p> <ul style="list-style-type: none"> ➤ Digging: Where the stand is small enough removal will be carried out manually by hand. Where stands are too large to be completely removed the stand will need to be removed by digging. Removal will take place outside of the optimal seed dispersal period (Feb/March) and flowering season (Spring/Summer). The effectiveness of digging the stumps and root ball out is increased by removing all viable roots. This will be done manually or with an excavator. To avoid regrowth, stumps and root balls will be turned upside down and the soil should be brushed off the roots. ➤ Excavated Plant Material: Soil will be removed from excavated material and the material will be placed inverted on a root barrier membrane within the works area. This will be located >30m from any watercourse. The plant material will be stored here and allowed to completely dry out. Once dry, the rhododendron material shall be mulched on site and composted or burned. ➤ An Environmental Clerk of Works (ECoW) or suitably qualified Ecologist will be required to monitor rhododendron management works. The ECoW shall confirm that the risk of contamination beyond the already contaminated area is avoided prior to the commencement of any works. Biosecurity measures on the site will stay in place until all works are completed. 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
MM45	Invasive Species	Appendix 7-4	<ul style="list-style-type: none"> ➤ Good construction site hygiene will be employed to prevent the introduction and spread of problematic invasive alien plant species (e.g. Himalayan balsam, Japanese knotweed etc.) by thoroughly washing vehicles prior to leaving the site. ➤ All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) will be thoroughly cleaned down using a power washer unit prior to arrival on site to prevent the spread of invasive plant species ➤ Wheel washing facilities will be provided at the site entrance. All washing must be undertaken in areas with no potential to result in the spread of invasive species. This process will be detailed in the contractor's method statement. ➤ Any soil, topsoil or stone material required on the site will be sourced from a stock that has been screened for the presence of any invasive species and where it is confirmed that none are present. 		
<i>Ornithology</i>					
MM46	Hen Harrier and Peatland Habitat Enhancement Plan	EIAR Chapter 8 and Appendix 8-8	<p>Hen Harrier and Peatland Habitat Enhancement Plan will be implemented to enhance potential habitats and minimise potential habitat loss.</p> <p>Management prescriptions to be implemented by the applicant include:</p> <ul style="list-style-type: none"> ➤ Forestry and brash will be removed on the site and the area will be allowed to revert to open peatland habitat. Pre-mature felling of forestry will be undertaken in accordance with a felling licence, before the first breeding season of the construction phase of the project programme. This would allow time for the clear-felled site to revegetate in advance of the operational phase. ➤ Reinstatement of livestock proof fencing. ➤ Re-vegetation with native vegetation is therefore expected to occur naturally within the enhancement area. 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> ➤ Forestry drainage channels will be blocked, using peat dams or plastic dams, as appropriate. In flat areas drain blocks should be placed every 15m and more frequently when accounting for a slope. ➤ Habitat maintenance of the enhancement area will involve the eradication of self-seeding conifers, and removal off-site. It is envisaged that the enhancement areas will require maintenance twice during the life of the wind farm, once during the construction phase and once after approximately 12 years. ➤ In the event of any invasive species being recorded within the area identified for enhancement measures, an invasive species management plan will be put in place to eradicate any stands of such species. A pre-commencement survey for invasive species to confirm the conditions predicted in this EIAR will be undertaken as part of preparatory work and if recorded an Invasive species management plan shall be prepared. ➤ Enhancement and maintenance works will be undertaken outside of the nesting season as per the Wildlife Act 1976, as amended. 		
MM47	Ornithology	EIAR Chapter 8	<ul style="list-style-type: none"> ➤ Taking a precautionary approach, it is proposed that construction works will commence outside the bird nesting season (1st of March to 31st of August inclusive). ➤ In addition, to avoid impacting breeding hen harrier along the grid connection route no construction works shall be undertaken within a 500m buffer (Forestry Commission Scotland 2006; Ruddock & Whitfield 2007) of the Doo Lough hen harrier territory. See Figure 1-1 in confidential appendix 8.7 for territory location. No works shall be permitted within the buffer between 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			<p>the 1st of March and the 31st of August or until it can be demonstrated that the nest is no longer occupied.</p> <ul style="list-style-type: none"> ➤ 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. ➤ During the construction phase, noise limits, noise control measures, hours of operation (i.e. dusk and dawn is high faunal activity time) and selection of plant items will be considered in relation to disturbance of birds. ➤ Plant machinery will be turned off when not in use. ➤ All plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations 1996 (SI 359/1996) and other relevant legislation. ➤ An Ecological Clerk of Works (ECoW) will be appointed and will operate for the duration of construction works. Duties will include: <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. 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> ○ Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress. 		
Noise					
MM48	Best Practise Measures BS5528-1	EIAR Chapter 12	<p>Best Practice Mitigation Measures from BS5528-1 standard will be implemented for the duration of the construction phase:</p> <ul style="list-style-type: none"> ➤ Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted; ➤ Establishing channels of communication between the contractor/developer, Local Authority and residents; ➤ Appointing a site representative responsible for matters relating to noise and vibration; ➤ Monitoring typical levels of noise and vibration during critical periods and at sensitive locations; ➤ Keeping site access roads even to mitigate the potential for vibration from lorries. <p>A variety of practicable noise control measures will also be employed. These include:</p> <ul style="list-style-type: none"> ➤ 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. 		
MM49	Blasting	EIAR Chapter 12	<p>The methods used to minimise impacts will consist of the following:</p> <ul style="list-style-type: none"> ➤ Restriction of hours within which blasting can be conducted (e.g. 09:00 – 18:00hrs). 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			<ul style="list-style-type: none"> ➤ Notification to nearby residents before blasting starts (e.g. 24-hour written notification). ➤ The firing of blasts at similar times to reduce the ‘startle’ effect. ➤ On-going circulars informing people of the progress of the works. ➤ The implementation of an onsite documented complaints procedure. ➤ The use of independent monitoring by external bodies for verification of results. ➤ Trial blasts in less sensitive areas to assist in blast designs and identify potential zones of influence. 		
MM50	Rock Breaking	EIAR Chapter 12	<p>Where rock breaking is employed in relation to the proposed borrow pit location, the following are examples of measures that will be employed, where necessary, 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 lines 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. 		
<i>Air Quality/Dust</i>					
MM51	Dust Emissions	EIAR Chapter 5,11	<ul style="list-style-type: none"> ➤ In periods of extended dry weather, dust suppression may be necessary along haul roads, site roads, around borrow pit areas and other infrastructure to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling ponds in 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 3	<p>the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads, borrow pit and site compounds to prevent the generation of dust where required. Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff.</p> <ul style="list-style-type: none"> ➤ All plant and materials vehicles shall be stored in dedicated areas (on site). ➤ Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction. ➤ Turbines and construction materials will be transported to the site on specified haul routes only. ➤ The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as necessary. ➤ The transport of construction materials to the site that have significant potential to cause dust, will be undertaken in tarpaulin or similar covered vehicles where necessary. ➤ The transport of dry peat and spoil, that has the significant potential to generate dust, to the on-site borrow pits will be minimised. If necessary, excavated peat and spoil will be dampened prior to transport to the borrow pits. 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
MM52	Exhaust Emissions	EIAR Chapter 5, Chapter 11	<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. ➤ Aggregate materials for the construction of site access tracks and all associated infrastructure will all be locally sourced, where possible, which will further reduce potential emissions. 		
MM53	Greenhouse Gas Emissions	EIAR Chapter 11	<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 wind farm will be obtained from the three proposed borrow pits on the site of the Proposed Development. This will significantly reduce the number of delivery vehicles accessing the site, thereby reducing the amount of emissions associated with vehicle movements. 		
Traffic					
MM54	Traffic Management Co-Ordinator	EIAR Chapter 15	A competent Traffic Management Coordinator 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.		
MM55	Liaison with the relevant local authority	EIAR Chapter 15	Liaison with the relevant local authority including the roads section of local authorities that the delivery routes traverse and An Garda Síochána, during the delivery phase.		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
MM56	Travel Plans for Construction Workers	EIAR Chapter 15	The construction company will be required to provide a travel plan for construction staff, which will include the identification of a routes to / from the site and identification of an area for parking.		
MM57	Temporary traffic signs	EIAR Chapter 15	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.		
<i>Cultural Heritage</i>					
MM58	Site Infrastructure	EIAR Chapter 14	<ul style="list-style-type: none"> ➤ Care will be taken to minimise damage to the townland boundary wall during the construction phase. ➤ The section of stone wall townland boundary which is to be removed to facilitate the construction of the met mast access road will be recorded by means of photographs and a written description prior to removal. ➤ Groundworks at the three specified townland boundary locations shall be monitored and any sub-surface traces of the townland boundaries shall be recorded by means of photographs, written descriptions and scale drawings if necessary. ➤ Sections of old field walls which are to be removed to facilitate the construction of access roads and other infrastructure will be recorded by means of photographs and written descriptions prior to removal. ➤ The gate post will be salvaged and reused at an appropriate location. 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
Operational Phase					
Health and Safety					
MM59	Health & Safety	EIAR Chapter 5	<p>Access to the turbines is through a door at the base of the structure, which will be locked at all times outside maintenance visits.</p> <p>Signs will be erected at suitable locations such as, amenity access points and carparks, setting out the conditions of public access under the relevant legislation and providing normal hours (and out of hours) contact details. Staff associated with the project will conduct frequent visits, which will include inspections to establish whether any signs have been defaced, removed or are becoming hidden by vegetation or foliage, with prompt action taken as necessary.</p> <p>Signs will also be erected at suitable locations across the site as required for the ease and safety of operation of the wind farm. These signs include:</p> <ul style="list-style-type: none"> ➤ Buried cable route markers at 30m (maximum) intervals and change of cable route direction; ➤ Directions to relevant turbines at junctions; ➤ “No access to Unauthorised Personnel” at appropriate locations; ➤ Speed limits signs at site entrance and junctions; ➤ “Warning these Premises are alarmed” at appropriate locations; ➤ “Danger HV” at appropriate locations; ➤ “Warning – Keep clear of structures during electrical storms, high winds or ice conditions” at site entrance; ➤ “No unauthorised vehicles beyond this point” at specific site entrances; and 		

Ref. No.	Reference Heading	Location	Mitigation Measure	Audit Result	Action Required
			Other operational signage required as per site-specific hazards.		
MM60	Decommissioning	CEMP Section 2.5	A decommissioning plan will be agreed with the local authorities three months prior to decommissioning the Proposed Development.		
Traffic Management					
MM61	Roads	EIAR Chapter 15	A Post Construction Condition Survey – Where required by the local authority, 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		
Drainage Management Plan					
MM62	Drainage Inspection	EIAR Chapter 10, CEMP Section 3	➤ Monitoring the effectiveness of drainage measures installed during the construction phase will continue to be monitored into the operational phase. Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.		

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 Clare 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.

Ref. No.	Reference Heading	Reference Location	Monitoring Measure
Pre-Commencement Phase			
MX1	Water Quality and Monitoring	EIAR Section 10	An inspection and maintenance plan for the on-site drainage system will be prepared in advance of commencement of any works.
MX2	Invasive Species	CEMP Section 3	A pre-commencement invasive species survey shall be completed for the site
MX3	Mammal Survey	EIAR Section 7	A pre-construction mammal survey will be undertaken to identify any Otter holts or Badger setts within the works areas associated with the development. The survey will be undertaken to ensure that Otter or Badger have not taken up residence within or close to the development footprint
MX4	Bird Survey	EIAR Section 7	A breeding bird survey will be undertaken between April and July. Monitoring will be undertaken by a suitably qualified ornithologist
Construction Phase			
MX5	Water Quality and Monitoring	EIAR Section 10	An inspection and maintenance plan for the on-site drainage system will be prepared in advance of commencement of any works. Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended.
MX6	Daily Monitoring	EIAR Section 10	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
MX7	Check Dams	EIAR Section 4	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.
MX8	Settlement Ponds	EIAR Section 4, CEMP Section 5	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.
MX9	Culverts	EIAR Section 4	All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance.

Ref. No.	Reference Heading	Reference Location	Monitoring Measure
MX10	Drainage Management	EIAR Section 4 CEMP Section 5	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 or supervising hydrologist on-site. The Environmental Clerk of Works 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.
MX11	Plant and Equipment Inspections	EIAR Section 8 CEMP Section 5	The plant used should be regularly inspected for fuel leaks, unnecessary noise generation and general fitness for purpose.
MX12	Drainage Inspection	EIAR Section 10 CEMP Section 4	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.
MX13	Archaeological Monitoring	EIAR Section 14	Archaeological monitoring of groundworks during construction is deemed to be a suitable mitigation measure. A report on the results of monitoring shall be compiled and submitted to the relevant authorities on completion of the project.
Operational Phase			
MX14	Vantage Point Surveys	EIAR Section 8 Appendix 8-9	Vantage Point bird surveys will be carried in years 1, 2, 3, 5, 10 and 15.
MX15	Breeding Bird Surveys	EIAR Section 8 Appendix 8-9	Breeding bird surveys will be carried in years 1, 2, 3, 5, 10 and 15 between the months of March to July.
MX16	Hen Harrier Roost Surveys	EIAR Section 8 Appendix 8-9	Hen Harrier Roost Surveys will be carried in years 1, 2, 3, 5, 10 and 15.
MX17	Bat Monitoring	EIAR Section 7	Ongoing monitoring of bat activity will be undertaken for at least three years' post construction of the wind farm. The monitoring will also include corpse searching in the areas surrounding the turbines to gather data on any actual collisions.
MX18	Corpse Searching	EIAR Section 8	Corpse searching will be carried in years 1, 2, 3, 5, 10 and 15. The survey will be carried out on 12 monitoring visits per year (1 visit/month) and will be targeted corpse searches at turbine bases.
MX19	Drainage Inspection	EIAR Section 10	Monitoring the effectiveness of drainage measures installed during the construction phase will continue to be monitored into the operational phase.

Ref. No.	Reference Heading	Reference Location	Monitoring Measure
			Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.
MX20	Shadow Flicker	EIAR Chapter 6	Where daily or annual shadow flicker exceedances are experienced at buildings, a site visit will be undertaken to determine the level of occurrence, existing screening and window orientation.

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.

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

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

The phasing and scheduling main construction task items are outlined in Figure 8-1 below, where 1st October 2022 has been selected as an arbitrary start date for construction activities.

ID	Task Name	Task Description	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023	Q1 2024	Q2 2024	Q3 2024		
1	Site Health and Safety		[Active]									
2	Site Compounds	Site Compounds, site access, fencing, gates	[Active]									
3	Site Roads	Construction/upgrade of roads, construct underpasses install	[Active]									
4	Turbine Hardstands	Excavate/pile for turbine bases where required		[Active]								
5	Turbine Foundations	Fix reinforcing steel and anchorage system, erect				[Active]						
6	Substation Construction and Electrical Works	Construct substation, underground cabling, grid		[Active]								
7	Backfilling and Landscaping						[Active]					
8	Turbine Delivery and Erection						[Active]					
9	Substation Commissioning									[Active]		
10	Turbine Commissioning									[Active]		

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 impact, relevant to the construction activities taking place at the time, are in place.

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

9.2 Auditing

The Contractor will be responsible for implementing the mitigation and monitoring measures specified throughout the EIAR and compiled in Sections 6 and 7 of this CEMP. The Contractor will also be responsible for ensuring that all construction staff understand the importance of implementing the mitigation measures. The implementation of the mitigation measures will be overseen by the environmental clerk of works or supervising hydrogeologists, environmental scientists, ecologists or geotechnical engineers, depending on who is best placed to advise on the implementation.

Environmental audits will be carried out during the construction phase of the project. 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 contractor staff or alternatively by external personnel acting on their behalf. 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.

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 Site Environmental Clerk of Works will be conducted. This in turn will be passed down to the site staff involved. A Corrective Action Notice will be completed at a later date.

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.