



APPENDIX 4-3

**CONSTRUCTION
ENVIRONMENT
MANAGEMENT PLAN**

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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 Bord na Móna Powergen Ltd., who intend to apply to An Bord Pleanála for planning permission to construct a wind energy development and all associated infrastructure at Ballivor and adjacent townlands, on the border of Counties Meath and Westmeath. The Proposed Development will be located on the Ballivor, Carranstown, Bracklin, Lisclogher, and Lisclogher West Bogs which are part of the Ballivor Bog Group. The CEMP has been prepared in conjunction with the Environmental Impact Assessment Report (EIAR) which will accompany the planning application for the Proposed Development to be submitted to the competent authorities.

Should the project secure planning permission, the CEMP will be updated, in line with all conditions and obligations which apply to any grant of permission. The CEMP should be read in conjunction with the EIAR and planning drawings. The CEMP will also require updating by the selected contractor in order to identify, assess and satisfy the contract performance criteria as set out by the various stakeholders. The CEMP due to its structure and nature will also require constant updating and revision throughout the construction period as set out below. Therefore, this is a working document and will be developed further prior to and during the construction phase of the 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 CEMP identifies the key planning and environmental considerations that must be adhered to and delivered during site construction and operation. The Contractor, as appointed by the Project Developer, will be required to implement all of the requirements set out in this CEMP. The CEMP may be updated and revised throughout the construction phase of the project, but all future iterations must meet or exceed the standards and requirements set out in this document and the Project Developer must be satisfied that all requirements set out in this document can and will be implemented in full by the appointed contractor.

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

Scope of Construction and Environmental Management Plan

This report is presented as a guidance document for the construction of the proposed Ballivor 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 and Description

The site of the Proposed Development is located on four bogs within the Ballivor Bog Group at the Meath-Westmeath border, namely Ballivor, Carranstown, Bracklin and Lisclogher Bogs. The closest settlements to the site are Delvin, located 5km north, Raharney, 4km west and Ballivor, 3.5km east of the site.

The Wind Farm Site Boundary measures approximately 1,170 hectares. The site topography ranges between 86 metres above ordnance datum (mAOD) at its highest point to approximately 69 mAOD at its lowest point. The site measures approximately 9km in length from north to south, and approximately 6 km from east to west, at its widest point. The Grid Reference co-ordinates for the approximate centre of the site are E263560, N257213. The site is accessed via the R156 National Secondary Road which bisects the site and various local roads off the N52, N51, N4 the L4101, the L4106, the R161 which surround the site.

The Wind Farm Site bare cutaway peat, re-vegetation of bare peat, degraded blanket bog, scrub, low woodland, remnants of high bog and a very small area of conifer plantation. Approximately 18.9km of Bord na Móna permanent fixed gauge rail lines can be found in Ballivor, Bracklin and Carranstown Bogs. Existing activities within the site include site management and environmental monitoring as required under IPC Licence P0-501, temporary wind measurement (a single 100m meteorological mast on Lisclogher Bog). Several telecommunication links traverse the site but there is no communication infrastructure e.g. communication towers within the Wind Farm Site Boundary. Please see Chapter 14 Material Assets of the accompanying EIAR for further details on this.

Active peat extraction permitted under IPC Licence No. 501 ceased in June 2020. Under IPC Licence, the applicant is required to commence decommissioning and rehabilitation of the Ballivor Bog Group. Part of the decommissioning involves removing previously harvested and stockpiled peat off the bogs. The removal of stockpiled peat will be completed by 2024.

As part of the IPC licence rehabilitation requirements, the applicant is required to produce peatland rehabilitation plans. These plans have considered the Proposed Development footprint and demonstrate that both peatland rehabilitation and renewable energy can coexist harmoniously onsite. Please see Appendix 4-6 for details on the rehab plans.

The Peatland Climate Action Scheme (PCAS) which comprises enhanced peatland rehabilitation (above and beyond IPC licence requirements), commenced and was completed at Carranstown East, adjacent to the Wind Farm Site Boundary. Bracklin West, also adjacent to the Wind Farm Site Boundary has been selected for PCAS and it is expected to commence in 2023. This accelerated form of peatland rehabilitation has been undertaken at the recently constructed Cloncreen wind farm. The PCAS scheme is supported by Government through the Climate Action Fund and Ireland's National Recovery and Resilience Plan administered by the Department of Environment, Climate and Communications (DECC). Please see <https://www.bnmpcas.ie/> for details. The National Parks and Wildlife Service (NPWS) acts as the Scheme regulator and there is ongoing engagement with the EPA. This scheme is in addition to the IPC licence requirements and therefore does not form part of the proposed Ballivor Wind Farm application.

The proposed grid connection forms part of the planning application. It is proposed to construct a 110kV substation within the site at Carranstown Bog in the townland of Grange More and to connect from here via a 110 kV loop-in and loop out connection to the existing Mullingar-Corduff 110 kV Overhead line. The electrical substation will have 2 No. control buildings, associated switchgear room, electrical plant and equipment, and wastewater holding tank and a 36 metre high telecom tower.

The Proposed Development will require the permanent vertical realignment of the R156 in the vicinity of the site entrance to achieve required sight lines. On the R156 in between the proposed component entrances to Ballivor and Carranstown Bogs, existing visibility is currently impacted by a trough and rise in the road. An assessment of the vertical alignment shown indicates that a 44m section of the R156 impedes on required sightlines and as a result, a maximum reduction of approximately 0.47m for 44m along the R156 is required in this area. This proposed work will be undertaken prior to any construction phase works and will be retained for the operational phase and beyond. This proposed lowering of the road section will enhance the road safety for both construction and operational phase users as well as local road users of the R156.

2.2 Description of the Development

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

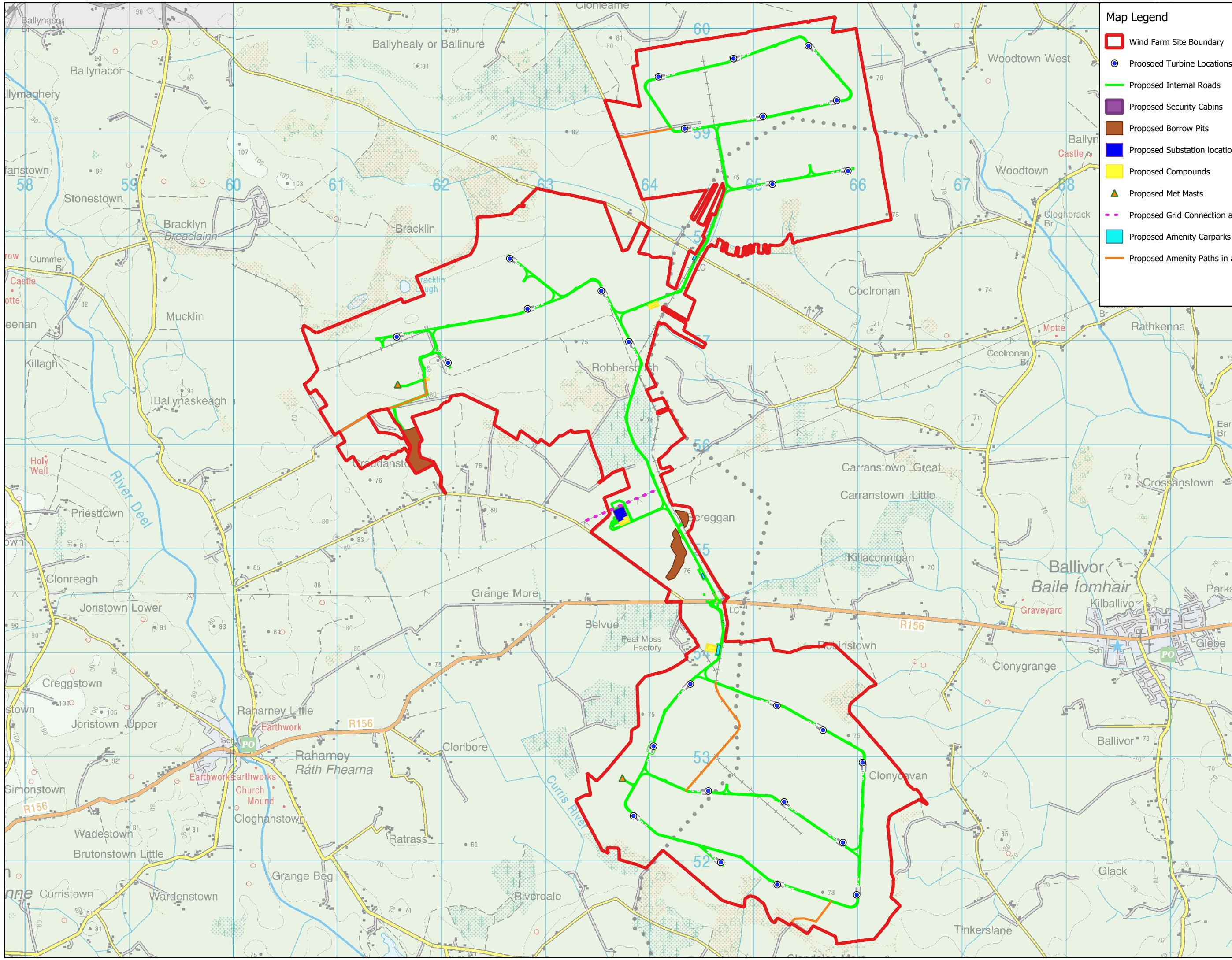
This application seeks a ten-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.

The key components of the Proposed Development include the following:

- i. 26 No. wind turbines with a blade tip height of 200m and all associated hard-standing areas.*
- ii. 2 No. permanent Meteorological Anemometry Masts with a height of 115 metres and removal of existing meteorological mast.*
- iii. 4 No. temporary construction compounds, in the townlands of Bracklin and Grange More.*
- iv. 5 No. temporary security cabins at the main construction site entrances as well as at a number of access points around the site, in the townland of Killagh, Grange More and Coolronan.*
- v. 2 No. borrow pits located in Carranstown Bog, and in third party land in the townland of Craddanstown; All works associated with the opening, gravel and spoil extraction, and decommissioning of the borrow pits.*
- vi. 1 No. 110 kV electrical substation, which will be constructed in the townland of Grange More. The electrical substation will have 2 No. control buildings, a 36 metre high telecom tower, associated electrical plant and equipment, a groundwater well and a wastewater holding tank. All associated underground electrical and communications cabling connecting the turbines and masts to the proposed electrical substation, including road crossings at R156 and local road between Lisclogher and Bracklin Bogs, and all works associated with the connection of the proposed wind farm to the national electricity grid, which will be to the existing Mullingar – Corduff 110 kV overhead line via overhead line.*
- vii. Provision of new internal site access roads with passing bays measuring a total length of 28km and provision/upgrade of existing/new pathways for amenity use measuring a total length of approximately 3.3km and associated drainage.*
- viii. Temporary accommodating works to existing public road infrastructure to facilitate delivery of abnormal loads at locations on the R156 and R161 in the townlands of Doolystown and Moyfeagher;*
- ix. Accommodating works to widen existing site entrances off the R156 into Ballivor and Carranstown Bogs and reopen entrances at Lisclogher and Bracklin Bogs for use as construction site entrances and to facilitate delivery and movement of turbine components and construction materials; Entrances will be used for maintenance and amenity access during the operational period;*
- x. Permanent vertical realignment of the R156 in the vicinity of the site entrance to achieve required sight lines.*

- xii. Construction of permanent site entrances off a local road into Lisclogher and Bracklin Bogs to facilitate a crossing point for turbine components and construction materials and operation/amenity access;*
- xiii. Provision of amenity access using existing entrances off the R156 and local roads in the townlands of Bracklin, Coolronan, Clondalee More and Craddanstown;*
- xiiii. 3 No. permanent amenity carparks in Ballivor Bog (50 car parking spaces), Carranstown (15 car parking spaces) and Bracklin Bog (15 car parking spaces) and the provision of bicycle rack facilities at each location.*
- xv. All associated site works and ancillary development including access roads, amenity pathways, drainage and signage.*
- xvi. A 10-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.*

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 (Appendix 4-1).



Map Legend

- Wind Farm Site Boundary
- Proposed Turbine Locations
- Proposed Internal Roads
- Proposed Security Cabins
- Proposed Borrow Pits
- Proposed Substation location
- Proposed Compounds
- ▲ Proposed Met Masts
- Proposed Grid Connection at existing 110kV overhead line
- Proposed Amenity Carparks
- Proposed Amenity Paths in addition to wind farm tracks



Drawing Title	
Proposed Development Layout	
Project Title	
Ballivor Wind Farm	
Drawn By	Checked By
K Mulryan	E. McCarthy
Project No.	Drawing No.
191137	Figure 2-1
Scale	Date
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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 Impact Assessment Report, NIS 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 EIAR includes construction methodologies for various elements of work to be undertaken as part of the project. These construction methodologies are reproduced in the following sub-sections but will be

superseded by an appointed contractor's construction method statements, which will form part of the CEMP. The contractor's construction method statements will be prepared to take account of the detailed engineering, geotechnical and detailed drainage design which will be prepared prior to commencement of construction and all requirements of this CEMP.

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

- > Permanent Road Improvement Works at R156
- > Proposed New Site Access Roads;
- > Proposed widening of existing site entrances and provision of amenity entrances;
- > Temporary Construction Compound;
- > Site Drainage System;
- > Culvert crossings
- > Crane Hardstands;
- > Turbine and Anemometry Mast Foundations;
- > Anemometry Mast Removal
- > Electricity Substation and Control Buildings;
- > Cable Trenching;
- > Grid Connection – Overhead Lines

Proposed Permanent Road Improvement Works at R156

An assessment of the vertical alignment along the R156 indicates that there is an existing driver visibility impediment in the vicinity of the proposed main wind farm site entrances. It is proposed to remove this existing safety issue permanently by the lowering of a stretch of the road, approximately 44m in length prior to any other construction related activities at the wind farm site. This proposed lowering of the road section will enhance the road safety for both construction and operational phase users as well as local road users of the R156. The works will be undertaken in agreement with the local authority and to TII standards and guidelines.

2.4.2.1 New Site Access Roads

There is approximately 28 km of new onsite access roads to be installed at the site. The new access roads will be constructed as follows using either a floating road or excavated site road methodology both of which are summarised below:

2.4.2.1.1 Construction of New Floating Roads

Floating access roads are the predominant road construction type proposed for the site and will be used in areas where the peat depth is in excess of 1m. This road construction type is selected for flat terrain i.e., typically less than 5-degree slope.

The general construction methodology for the construction of floating roads, as presented in FTC's Peat and Spoil Management Plan in Appendix 4-2, is summarised below. This methodology includes procedures that are to be included in the construction to minimise any adverse impact on peat stability.

1. *Prior to commencing floating road construction movement monitoring posts should be installed in areas where the peat depth is greater than 2.0m.*
2. *Floating road construction shall be to the line and level requirements as per design/planning conditions.*
3. *Base geogrid to be laid directly onto the existing peat surface along the line of the road in accordance with geogrid provider's requirements.*
4. *Construction of road to be in accordance with appropriate design from the designer.*

5. *The typical make-up of the new floated access road is up to 1,200mm of selected granular fill with 2 no. layers of geogrid with possibly the inclusion of a geotextile separator. This may vary depending on designer requirements.*
6. *Following the detailed design of the floated access roads it may be deemed necessary to include pressure berms either side of the access road in some of the deeper peat areas. The inclusion of a 5m wide pressure berm (typically 1m in height) either side of the access road will reduce the likelihood of potential bearing failures beneath the access road.*
7. *The finished road surface width will be approximately 6m (to be confirmed by the designer).*
8. *Stone delivered to the floating road construction shall be end-tipped onto the constructed floating road. Direct tipping of stone onto the peat shall not be carried out.*
9. *To avoid excessive impact loading on the peat due to concentrated end-tipping all stone delivered to the floating road shall be tipped over at least a 10m length of constructed floating road.*
10. *Where it is not possible to end-tip over a 10m length of constructed floating road then dumpers delivering stone to the floating road shall carry a reduced stone load (not greater than half full) until such time as end-tipping can be carried out over a 10m length of constructed floating road.*
11. *Following end-tipping a suitable bull-dozer shall be employed to spread and place the tipped stone over the base geogrid along the line of the road.*
12. *A final surface layer shall be placed over the floating 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 Construction of New Excavated Roads

The general construction methodology for the construction of excavated roads, as presented in the Peat and Spoil Management Plan (Appendix 4-2), 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 the construction of the excavated roads movement monitoring posts should be installed in areas where the peat depth is greater than 2.0m.*
2. *Interceptor drains should be installed upslope of the access road alignment to divert any surface water away from the construction area.*
3. *Excavation of roads shall be to the line and level given in the design requirements. Excavation should take place to a competent stratum beneath the peat (as agreed with the site designer).*
4. *Road construction should be carried out in sections of approximately 50m lengths i.e. no more than 50m of access road should be excavated without re-placement with stone fill unless otherwise agreed with the site designer or resident engineer on site.*
5. *All excavated peat shall be placed/spread alongside the excavations.*
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 should be carried out as the excavation progresses.*
7. *A layer of geogrid/geotextile may be required at the surface of the competent stratum (to be confirmed by the designer).*
8. *At transitions between floating and excavated roads a length of road of about 10m 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.*
9. *Where slopes of greater than 5 degrees are encountered along with relatively deep peat (i.e. greater than 1.5m) 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. It should be noted that slopes greater than 5 degrees are not envisaged on site.

10. *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.*

2.4.2.1.3 Upgrade of Existing Roads

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 access tracks, the following guidelines apply:*
 - a. *Excavation of the widened section of access road should take place to a competent stratum beneath the peat (as agreed with the designer) and backfilled with suitable granular fill.*
 - b. *Benching of the excavation may be required between the existing section of access road and the widened section of access road depending on the depth of excavation required.*
 - c. *The surface of the existing access track should be overlaid with up to 500mm of selected granular fill.*
 - d. *A layer of geogrid/geotextile may be required at the surface of the existing access track and at the base of the widened section of access road (to be confirmed by the designer).*
 - e. *For excavations in peat, side slopes shall be not greater than 1 (v): 2 or 3 (h). This slope inclination should be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required.*
2. *For upgrading of existing access tracks constructed using a floated construction technique the following guidelines apply:*
 - a. *The surface of the existing access track should be graded/tidied up prior to the placement any geogrid/geotextile, where necessary (to prevent damaging the geogrid/geotextile).*
 - b. *Where granular fill has been used in the existing access track make-up, a layer of geogrid should be placed on top of the existing access track.*
 - c. *The geogrid may be overlaid with up to 500mm of selected granular fill.*
 - d. *Additional geogrid and granular fill may be required in certain sections of the works (to be confirmed by the designer).*
3. *Where the ground is sloping across a section of access road (side long ground) any road widening works required should be done on the upslope side of the existing access road, where possible.*
4. *At transitions between floating and existing excavated roads a length of road of about 10m 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.*
5. *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 Site Entrance Management

Construction Site Entrances

The existing entrances off the R156 into Ballivor and Carranstown Bogs will be widened to facilitate turbine component delivery. Adjacent to the component entrance into Ballivor Bog will be a non-

component entrance. This non-component entrance is required in order to provide a staggered crossroads junction as required by TII specifications. Therefore, non-component vehicles will utilise this entrance into Ballivor Bog while all vehicles will utilise the widened component entrance into Carranstown.

Former railway entrance/egress points at the northeast of Bracklin Bog and southwest of Lislogher Bogs will be reopened and widened for the construction phase. This will facilitate the movement of construction vehicles straight across the local road from Bracklin Bog into Lislogher Bog in the morning and again in the evening, thus minimising traffic impacts by avoiding the need to travel long distances along the roads. The crossing point at Bracklin will be retained for the operational phase and an amenity carpark will be provided inside this entrance. The entrance into Lislogher will be retained for the occasional maintenance staff and pedestrians only. There will be no carparking facilities in this bog for amenity users.

There are two proposed borrow pits as part of the Proposed Development. Borrow pit 1a and 1b are located within Carranstown Bog. Borrow pit 2 is located in a field in third party lands. It is proposed to initially access to the borrow pit field via the landowners farm access track off the local road 800m south of Bracklin Bog. This existing farm access track will be upgraded prior to any borrow pit excavation works. Following the upgrading of the existing farm entrance, a new access road connecting the borrow pit field to Bracklin Bog will be constructed; approximately 50m will be constructed through pastureland via the excavated road method and approximately 120m will be floated (over an existing drain). Once complete, machinery access to and from the borrow pit area during its construction, use and reinstatement will be via internal roads only, i.e. no local road use will be required by heavy goods vehicles for the purpose of transporting stone. There may be occasional use of the local roads by employee vehicles or empty trucks from the borrow pit area. Post-construction phase, the offsite borrow pit area and any construction access works will be permanently graded over and allowed to reseed.

Turbine Component Entrances

The widened entrances into Ballivor and Carranstown Bogs will be used to facilitate turbine component delivery. The delivery of the components will enter the main site entrances via a manned traffic stop/go system under supervision by a Traffic Management Coordinator and with a Garda escort. The transportation of the turbine components will be carried out at night when traffic is at its lightest and in consultation with the relevant Roads Authority and An Garda Síochána. The delivery programme and management requirements will be detailed in a Traffic Management Plan and agreed with the local authority and An Garda Síochána. Please see Chapter 14 Material Assets and Appendix 14-1 Outline Traffic Management Plan for details.

In addition to the main component entrances off the R156, there will be a requirement for turbine components to cross the local road in the northeast of the Wind Farm Site in order to facilitate component delivery from Bracklin Bog into Lislogher Bog. The crossing of this local road with components will also be detailed in the Traffic Management Plan and agreed with the Local Authority and An Garda Síochána. It will be carried out under stop/go system at night when traffic is at its lightest.

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 wind farm drainage elements together 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 Temporary Construction Compound

Four temporary construction compounds are proposed as part of the development and are located off the R156 in Ballivor Bog, off the L5507 at the proposed substation area in Carranstown Bog and in the northeast of Bracklin Bog. The construction compounds will be constructed as follows:

- The areas to be used as the compound will be marked out at the corners using ranging rods or timber posts.
- All drainage measures prescribed in the detailed drainage design for the project will be implemented around the works area
- The compound platform will be established using a similar technique as the construction of the substation platform discussed in section 2.4.2.8 below.;
- 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;
- A bunded containment area will be provided within the compound for the storage of lubricants, oils and site generators etc.;
- The compound will be fenced and secured with locked gates if necessary;
- During the construction phase, a self-contained port-a-loo with an integrated waste holding tank will be used on site for toilet facilities. This will be maintained by the service contractor as required and will be removed from the site on completion of the construction phase;
- The water supply to the site will be from a temporary water storage tank which will be filled using a mobile water tank which will source water locally as required, and;
- Upon completion of the Proposed Development construction, the temporary construction compound at the substation and in Bracklin Bog will be decommissioned by backfilling the area with the material arising during excavation, landscaping with topsoil as required. The compound at Ballivor will be converted into an amenity carpark, as will a component set down area in Carranstown Bog. A third amenity carpark will be added to the northeast of Bracklin off a local road entrance.

2.4.3.4 Culvert Crossings on the Wind Farm Site

Culverts will be required where site roads, crane pads and turbine pads cross main bog drainage networks. Locations of the culverts are shown on the drawings in Appendix 4-1 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 does not occur above or below the culvert and water can continue to flow as necessary. All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance.

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

- The access road on the approach watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the watercourse crossing.
- The installation of the culvert will take place in low flow conditions.

- Where a flow exists, the water running through the watercourse channel will be pumped around the water crossing location and back into the watercourse channel downstream of the works area.
- Where over pumping is required, measures will be taken to ensure that the pumped water discharge does not disturb the channel bed with the force of water from the discharge. A steel plate to reduce the force of the flow will be used where appropriate.
- The project engineer will determine the required gradient of the culvert. The culvert must be laid at a gradient that will ensure water is contained within the culvert at all times. Where necessary a rock armour dam will be installed within the channel to reduce flow and ensure an acceptable depth of water remains within the culvert. Where a gradient of 1 –1.5% is identified, the use of a baffle has been recommended.
- The embedded section will be allowed to fill naturally with existing material within the base of the drain or with suitable drainage material such as gravel or round shingle where deemed applicable.
- The culvert will be lowered into place using an excavator with a lifting mechanism.
- Large stone boulders (13 approx. 400mm), sourced from the on-site borrow pits, will be placed over the culvert to create a headwall for the culvert and a suitable sub-base for road construction.
- Smaller 50mm stone sourced on site will be placed upon the sub-base to construct the road over the water crossing.

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

For crossings at Bord na Móna bog drains the bed of the watercourse channel will be excavated, if necessary, to achieve the correct line and to allow the culvert to be embedded 300mm into the base of the existing drain.

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

- All proposed new stream crossings will be bottomless or clear span culverts and the existing banks will remain undisturbed. No in-stream excavation works are proposed and therefore there will be no direct impact on the stream at the proposed crossing location;
- Where the proposed underground cabling route follows an existing road or road proposed for upgrade, the cable will pass over or below the culvert within the access road;
- All guidance / mitigation measures proposed by the OPW or the Inland Fisheries Ireland is incorporated into the design of the proposed crossings;
- As a further precaution, near stream construction work, will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to the Eastern Regional Fisheries Board (2004) guidance document “Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites”, i.e., May to September inclusive. This time period coincides with the period of lowest expected rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses (any deviation from this will be done in discussion with the IFI);
- During the near stream construction work double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase. There will be no batching or storage of cement allowed in the vicinity of the crossing construction areas; and,

All new river/stream crossings will require a Section 50 application (Arterial Drainage Act, 1945). The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent. All of the above works will be supervised by the Environmental Clerk of Works and the project hydrologist.

2.4.3.5 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 be sized 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.

2.4.3.6 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 the wind turbine and mast supplier and these will be assessed 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 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 gravity or piled type and that the formation level of the turbine foundations will be on the lower mineral subsoil or bedrock.

Gravity foundation bases will measure approximately 25 metres in diameter. They will likely be founded 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;
- the peat will be stripped over the area of the excavation, the unsuitable subsoil will be excavated and either side cast or landscaped 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
- 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 subsoil and backfill to the piling, platform 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.

2.4.3.7 Anemometry Mast Removal

There is an existing 100m high meteorological mast (Pl. Ref. 16/6259) on Lisclogher which will be decommissioned, disassembled and removed from site as it will no longer be required due to the presence of the 2 No. new masts. The disassembly process will generally follow the sequencing shown below:

- Removal of Equipment: Equipment and monitors on the mast will be removed;
- Removal of hazardous materials: Electrical cabling, solar panels and other remaining electrical equipment;
- Disassembly and removal of Mast Structure;
- Removal of Groundworks: Ground anchors will either be dug up and removed or remain in situ;
- Source segregation of material fractions for construction and demolition waste collection by an appropriately authorised waste contractor, and;
- Transport of the construction and demolition waste materials to an appropriately authorised waste facility.

2.4.3.8 Electricity Substation and Control Buildings

The electricity substation and control buildings will be constructed within the site, as shown in Figure 2.1. The dimensions of the substation area will be set to meet the requirements and specifications of Eirgrid/ESB Networks and the necessary equipment to safely and efficiently operate the Proposed Development.

The substation will be constructed by the following methodology:

- The area of the onsite substation will be marked out using ranging rods or wooden posts and the soil and overburden stripped and removed to nearby storage area
- All drainage measures prescribed in the detailed drainage design for the project will be implemented around the works area.
- Excavation of the substation footprint should take place to a competent stratum beneath the peat (as agreed with the designer) and backfilled with suitable granular fill.
- The dimensions of the onsite substation area will be set to meet the requirements of Eirgrid/ESB Networks 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 and 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.

It is proposed to install a groundwater well adjacent to the substation in accordance with the Institute of Geologists Ireland, *Guide for Drilling Wells for Private Water Supplies* (IGI, 2007). The well will be flush to the ground and covered with a standard manhole. A pump house is not currently envisaged as an in-well pump will direct water to a water tank within the roof space of the control building (subject to final design). Bottled water will be supplied for drinking, if required.

The construction and components of the substation will be to Eirgrid/ESB Networks specifications.

2.4.3.9 Cable Trenching

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 electrical cables from wind turbines to the substation will be run in ducts approximately 1.2m below the ground surface. On completion, the ground will be reinstated as previously described above.

A method statement for all internal cabling works will be prepared by the appointed contractor prior to the commencement of any construction.

2.4.3.10 Grid Connection

The proposed wind farm will connect to the existing national grid via a 110kV substation in the north-western part of the Carranstown bog from where a loop-in loop-out connection to the existing Mullingar – Corduff 110 kV overhead line will be constructed.

2.4.3.10.1 Overhead Lines

A connection between the Proposed Development and the national electricity grid will be necessary to export electricity on to the national grid. This connection from the proposed onsite substation to the national grid will occur within the vicinity of the proposed substation, via an overhead line which will connect into the existing Mullingar-Corduff 110 kV transmission line located approximately 35m north of the proposed substation within the development site boundary. Two lattice loop in/loop out masts and approximately 35m of overhead line from each mast will be required to connect from the proposed substation to the existing overhead line. The proposed lattice masts will be located within the Proposed Development site. Each mast will have a footprint of approximately 140m² and an overall height of 12–15m. They will be lattice steel structures with cross-arms which can extend over the base footprint and internal bracing. The exact final detail and specifications of the grid connection method for the Proposed Development will ultimately be decided by ESB/EirGrid

The following section outlines the methodology to be followed during construction works of the new Loop In tower structures which will be constructed underneath the existing 110 kV overhead line;

- The Steel lattice tower sites are scanned for underground services such as cables etc. Consultation with the landowner will help to identify services / constraints and ensure there are no unidentified services in the area.
- For the 2 No. towers a foundation c.3m x 3.6m x 3.6m is excavated and the formation levels (depths) will be checked by the onsite foreman. The excavated material will be temporarily stored close to the excavation and excess material will be used as berms along the site access roads.
- To aid construction, a concrete pipe is placed into each excavation to allow operatives level the mast at the bottom of the excavation. The frame of the reinforcing bars will

be prepared and strapped to a concrete pipe with spacers as required. The reinforcing bars will be lifted into each excavated foundation using the excavator and chains/slings. The base and body section of each tower will then be assembled next to excavation.

- Concrete trucks will pour concrete directly into each excavation in distinct stages.
- A third pour for the leg of the tower 1m x 1m and will be 300mm over ground level.
- Once the main concrete foundation pour is cured after circa five days, metal shuttering is installed to accommodate the placement of concrete around the tower legs. During each pour, the concrete will be vibrated thoroughly using a vibrating poker.
- Once the concrete is set after the five days the shuttering is removed.
- The tower foundations will be backfilled one leg at a time with the material already excavated at the location. The backfill will be placed and compacted in layers. All dimensions will be checked following the backfilling process. All surplus excavated material and removed from the tower locations and stored in berms adjacent to the Substation Compound or distributed on site in accordance with approved environmental procedures.
- The existing overhead line will be de-energised by Eirgrid/ESB Networks, so work can commence on the construction of the towers.
- An earth mat consisting of copper or aluminium wire will be laid circa 400mm below ground around the tower. This earth mat is a requirement for the electrical connection of the equipment on the tower structure.
- Once the base section of each tower is completed and the concrete sufficiently cured, it is ready to receive the tower body. Temporary hardstands may be removed and disposed of off site where necessary.
- A hardstand area for the crane will be created by laying geogrid material on the ground surface and overlaying this geogrid with a suitable grade of aggregate.
- A physical barrier (Heras Fence Site Boundary) will be put in place to restrict plant from coming too close to the OHL.
- The towers will be constructed lying flat on the ground beside the recently installed tower base.
- The conductor will be moved off centre using a stay wire and weights to anchor the stay wire to ground.
- The tower section will be lifted into place using the crane and guide ropes.
- The body sections will be bolted into position.
- The conductor will be centred over the towers and held in place. Once the conductor is secured at both ends it is then cut and attached onto each tower. The section of conductor in between the two towers will be removed and utilised as connector wire for the new towers.

Stringing of Conductors

Stringing of overhead lines on the supporting lattice structures will be kept clear of all obstacles applying sufficient tension. This method requires the pulling of a light pilot line (nylon rope) which is normally carried by hand into the stringing wheels. This in turn is used to pull a heavier pilot line (Steel rope) which is subsequently used to pull the conductors from the drum stands using specifically designed “puller – tensioner” machines. The main advantages with this method are:

- The line is protected from surface damage
- Major obstacles can be completed without any significant disruption.

Once the conductors have been pulled into position, one end of the straight is terminated on the appropriate tension fittings and insulator assemblies. The free end of the straight is then placed in temporary clamps which take the conductor tension. The conductor is then cut from the puller-tensioner and the conductor is sagged using a chain hoist. Bird flight diverters or warning spheres can be added following the sagging procedure if required.

2.4.4 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. The road improvement works at the R156 will also remain in place.

Upon decommissioning of the Proposed Development, the wind turbines would be disassembled in reverse order to how they were erected. All above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in significant environment nuisances such as noise, dust and/or vibration. Site roadways will be in use as amenity and recreational pathways, and therefore will not be removed during decommissioning. If it were to be confirmed that the roads were not required in the future for any other useful purpose, they could be removed where required. Underground cables, including grid connection, will be removed and the ducting left in place. A decommissioning plan will be agreed with Meath and Westmeath County Council three months prior to decommissioning the Proposed Development. An outline decommissioning plan is included as Appendix 4-5 of this EIAR.

However, as noted in the Scottish Natural Heritage report (SNH) Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms (SNH, 2013)¹ 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”.

¹ Welstead, J., Hirst, R., Keogh, D., Robb G. and Bainsfair, R. 2013. Research and guidance on restoration and decommissioning of onshore wind farms. Scottish Natural Heritage Commissioned Report No. 591. Available at: <https://www.nature.scot/sites/default/files/2017-07/Publication%202013%20-%20SNH%20Commissioned%20Report%20591%20-%20Research%20and%20guidance%20on%20restoration%20and%20decommissioning%20of%20onshore%20wind%20farms.pdf>

3. ENVIRONMENTAL MANAGEMENT

3.1 Introduction

This CEMP has been prepared and presented as a standalone document and includes all best practice measures required to construct the wind farm. The drainage proposals will be developed further prior to the commencement of construction however, any such improvements will be in line with the principles set out here and will also be in full compliance with the planning consent and mitigation measures as presented in the EIAR, NIS and all other relevant planning documents. The following sections give an overview of the drainage design principles, dust and noise control measures and a waste management plan for the site.

3.2 Protecting Water Quality

3.2.1 Environmental Management in the Construction Phase

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

3.2.2 Site Drainage Principles

The site drainage features have been outlined in Chapter 4 of the EIAR and Appendix 4-1 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. There is an existing drainage system and surface water discharges from the site which is regulated by the Environmental Protection Agency (Licence Ref. P0501). 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 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 surface of the cutover bog is drained by a network of parallel field drains that are typically spaced every 15 - 20m. The field drains are approximately 0.5 - 1.5m deep and in most areas, they intercept the mineral subsoil underlying the peat. These field drains mostly feed into larger surface water drains which drain the main catchments across the site. 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 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 suggest that in addition to the drainage plans that are included in the EIAR, there are additional site based decisions and plans that can only be made in the field through interaction between the Site Construction Manager, the Project Hydrologist and the Project Geotechnical Engineers. The mechanisms for interaction between these are outlined within Section 4 of this CEMP.

Drainage infrastructure will include:

- Interceptor drains will convey clean runoff water around works areas to the existing downstream drainage system (field drains and main drains). Where required, interceptor drains will be installed in advance of any construction works commencing. This will ensure that clean water is kept clear by diverting surface water flow around excavations, construction areas and temporary storage areas. Where possible (depending on orientation), existing field drains can be used as interceptors drains;
- Collector drains will be used to intercept and collect runoff from construction areas (from turbine base/hardstand areas, construction compounds, and the substation). During the construction phase temporary settlement ponds will be used to attenuate and treat runoff from the construction areas (from turbine base/hardstand areas, construction compounds, and the substation) and treated water will then discharge into existing field drains and main drains. Temporary settlement ponds will be removed at the end of the construction phase (end of high risk period), and wind farm runoff will discharge into existing field drains and main drains;
- During the construction phase, temporary silt traps (silt fences) will be used as an additional water protection measures around the existing bog drainage network, particularly where works are proposed within 50m of a natural watercourse. The silt fences will be placed in the existing drains downstream of construction works, and the associated construction area run-off water will be diverted into proposed interceptor drains, or culverted under/across the works area;
- During the construction phase, dewatering silt bags will also be used as required. They can be used downgradient of turbine bases, where temporary pumping is required. Discharge from dewatering silt bags will flow into settlement ponds and treated water from settlement ponds will outfall to existing field drains and main drains;
- Within the proposed site layout there are section of proposed floating road between turbine infrastructure. In these sections, and depending on intermediate topography, a collector drain (dirty water system as described above) may be used during construction stage, or over the edge (OTE) drainage will occur. Over the edge drainage allows runoff from access tracks to flow into local field drains and be managed via the existing site drainage system. OTE drainage will only occur where topography allows, and it is only proposed in areas of low risk and remote from outfall locations (at least 150m from bog outfall locations. Silt traps and check dams will be installed in field drains downstream of OTE drainage areas, and these will provide attenuation and treatment of dirty water; and,
- Culverts will be required where site roads and proposed hardstands cross the main bog drainage networks. These will be installed with a minimum gradient to reduce the entrainment of suspended solids. All culverts will be inspected regularly and maintained where appropriate. Culverts will remain in-situ during the Operational Phase of the Proposed Development.

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 installed 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;
- 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 phases as they are required during the construction phase.

A sufficient number of straw bales, clean drainage 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 take account of weather forecasts and predicted rainfall. Large excavations, large 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 by the Environmental Clerk of Works (ECoW) on-site.

The contractor is solely responsible for the implementation of the detailed drainage design on-site. The ECoW is responsible for monitoring the effectiveness of the drainage design as it is implemented on-site.

The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained. 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.

3.2.4.7 Rainfall Forecasting and Monitoring

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

The following forecasting systems are available and will be used on a daily basis at the site to direct proposed construction activities:

- General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates;
- MeteoAlarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale;
- 3-hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events;
- Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive; and,
- Consultancy Service: Met Eireann provide a 24-hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of interest.

Using the threshold rainfall values, listed below, will allow work to be safely controlled (from a water quality perspective) in the event of forecasting of an impending high rainfall intensity event.

Works will be suspended if forecasting suggests either of the following is likely to occur:

- >10 mm/hr (i.e. high intensity local rainfall events);
- >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
- >half monthly average rainfall in any 7 days.

Prior to works being suspended the following control measures shall be completed:

- Secure all open excavations;
- Provide temporary or emergency drainage to prevent back-up of surface runoff; and,
- Avoid working during heavy rainfall (listed above) and for up to 24 hours after heavy events to ensure drainage systems are not overloaded

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

3.2.5 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.

3.2.6 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 should occur at a controlled fuelling station;
- On-site refuelling will take place using a mobile double skinned fuel bowser. The fuel bowser will be re-filled off site, and will be towed by a 4x4 jeep to machinery is located. The 4x4 jeep will also carry fuel spill kits in the event of any spillages. The fuel bowser will be parked on a designated 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.
- Fuel volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor;
- The electrical substation compound fuel storage area 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 any spillage in and outside the refuelling area.

3.2.7 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. 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.

3.2.8 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.

3.2.8.1 General Recommendations for Good Construction Practice

Based on the recommendations and control measures given in the FTC **Peat Stability Assessment** (**Appendix 8-1** of the EIAR) report being strictly adhered to during construction and the detailed stability assessment carried out for the peat slopes which showed that there is a low risk of peat instability at the Ballivor Wind Farm site.

The following mitigation measures are recommended and should be taken into account when preparing Construction Method Statements for the development:

- 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 readings from peat stability monitoring systems;
- Ensure construction method statements are followed;
- Revise and amend the Construction Risk Register as construction progresses to ensure that risks are managed and controlled for the duration of construction;
- Maintain hydrology of area as far as possible by maintaining existing drains to
- water pressures in the peat to avoid peat becoming buoyant;
- Use of experienced geotechnical staff for site investigations ;
- Use of experienced contractors and trained operators to carry out the work;
- Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties;
- Potential requirement for small buttress on upslope side of access road to retain peat should any instability be noted.

3.2.9 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 public roads outside the wind farm site boundary including the two access locations off the R156 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 by the ECoW of construction sites to examine dust measures and their effectiveness.
- When necessary, sections of the haul route immediately outside the site entrances 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.

3.2.10 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:

- Keep local residents informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern.
- Ensure that any extraordinary site work continuing throughout 24 hours of a day occurring outside of the core working hours (for example, crane operations lifting components onto the tower) will be programmed, when appropriate, so that haulage vehicles would not arrive at or leave the site between 19:00 and 07:00, with the exception of abnormal loads that would be scheduled to avoid anticipated periods of high traffic flows.
- Select inherently quiet plant where appropriate - all major compressors would be 'sound reduced' models fitted with properly lined and sealed acoustic covers, which would be kept closed whenever the machines are in use.
- All ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.
- Instruct that machines will be shut down between work periods (or when not in use) or throttled down to a minimum.
- Vehicles will be loaded carefully to ensure minimal drop heights so as to minimise noise during this operation.

- 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.

3.3 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.

3.3.1 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.

3.3.2 Establishing Good Site Hygiene

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

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

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

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

3.4 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.

3.4.1 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.

3.4.2 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.

3.4.3 Construction Phase Waste Management

3.4.3.1 Description of the Works

The construction of the development will involve the construction of 26 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 local quarries and a concrete base which will contain reinforcing steel. These concrete foundations will be shuttered with steel formwork specifically designed for the works and re-usable off site on similar projects.

The construction of the substation will comprise of a concrete foundation with concrete masonry blocks and a timber roof structure with roof tile or slate covering. The roof structure will be made up of prefabricated roof trusses manufactured off site to minimise timber cutting on site.

The site roads will be constructed with rock won from local quarries

The waste types arising from the construction phase of the development are outlined in Table 3.1 below.

Table 3-1 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

Material Type	Example	EW Code
Tiles and ceramics	Slates and tiles	17 01 03
Wooden packaging	Boxes, pallets	15 01 03

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

3.4.3.2 Waste Arisings and Proposals for Minimisation, Reuse and Recycling of Construction Waste

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

Appropriate measures should be taken to ensure excess waste is not generated during construction, including;

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

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

3.4.3.3 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 waste streams generated on site will be deposited into a single waste skip. This waste material will be transferred to a Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal.

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

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

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

3.4.4 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 3.2 below.

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

Material Type	Example	EW 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

3.4.4.1 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.

3.4.4.2 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.

3.4.4.3 Implementation

3.4.4.3.1 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.

3.4.4.3.2 **Training**

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

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

3.4.4.3.3 **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

3.4.4.4 **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.

SURFACE WATER QUALITY MONITORING

This section of the SWMP sets out the programme for water quality monitoring during the pre-construction, construction, commissioning and operational phases of the wind farm development.

The surface water quality monitoring programme combines the use of laboratory analysis, water quality monitoring instrumentation and visual inspection to develop a comprehensive schedule of monitoring of all watercourses that exist both at the site and the surrounding area. The information collected by this schedule of water monitoring, particularly the continuous turbidity monitoring will inform the pre-commencement triggers in the SOWOR before works commence in an area. The turbidity monitors both upstream and downstream of the site will provide instant data on the quality of water in which they are deployed and will be equipped with an alarm system to alert site management if a peak in turbidity occurs as set out in the SOWOR.

The water monitoring programme was prepared in accordance with the following legislation:

- Planning and Development Acts 2000-2017;
- Planning and Development Regulations, 2001 (as amended);
- S.I. No. 94 of 1997: European Communities (Natural Habitats) Regulations, resulting from EU Directives 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and 79/409/EEC on the conservation of wild birds (the Birds Directive);
- S.I. No. 293 of 1988: Quality of Salmon Water Regulations, resulting from EU Directive 78/659/EEC on the Quality of Fresh Waters Needing Protection or Improvement in order to Support Fish Life;
- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 and S.I. No. 722 of 2003 European Communities (Water Policy) Regulations which implement EU Water Framework Directive (2000/60/EC) and provide for implementation of 'daughter' Groundwater Directive (2006/118/EC). Since 2000 water management in the EU has been directed by the Water Framework Directive (WFD). The key objectives of the WFD are that all water bodies in member states achieve (or retain) at least 'good' status by 2015. Water bodies comprise both surface and groundwater bodies, and the achievement of 'Good' status for these depends also on the achievement of 'good' status by dependent ecosystems. Phases of characterisation, risk assessment, monitoring and the design of programmes of measures to achieve the objectives of the WFD have either been completed or are ongoing. In 2015 it replaced a number of existing water related directives, which were successively being repealed, while implementation of other Directives (such as the Habitats Directive 92/43/EEC) form part of the achievement of implementation of the objectives of the WFD;
- S.I. No. 41 of 1999: Protection of Groundwater Regulations, resulting from EU Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive);
- S.I. No. 249 of 1989: Quality of Surface Water Intended for Abstraction (Drinking Water), resulting from EU Directive 75/440/EEC concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (repealed by 2000/60/EC in 2007);
- S.I. No. 439 of 2000: Quality of Water intended for Human Consumption Regulations and S.I. No. 278 of 2007 European Communities (Drinking Water No. 2) Regulations, arising from EU Directive 98/83/EC on the quality of water intended for human consumption (the Drinking Water Directive) and WFD 2000/60/EC (the Water Framework Directive);
- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009;
- S.I. No. 9 of 2010: European Communities Environmental Objectives (Groundwater) Regulations 2010; and,

- S.I. No. 296 of 2009: European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009.

This water monitoring programme will be the subject of independent review by the supervising hydrologist who will provide the necessary guidance on the monitoring requirements. The water monitoring programme is outlined in the following sections.

4.1.1 Pre-Construction Baseline Monitoring

Water quality field testing and laboratory analysis will be undertaken prior to commencement of construction at the site. The monitoring programme will be subject to agreement with the local authorities but will be based on the planning stage programme already outlined in the EIAR and CEMP and presented in this document.

Analysis will be for a range of parameters with relevant regulatory limits along with Environmental Quality Standard's (EQSs) and sampling will be undertaken for each stream that drains from the construction site.

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

The existing drainage system will continue to function as it is during the pre-construction phase.

However, prior to commencement of works in sub-catchments across the site, main drain inspections will be completed to ensure ditches and streams are free from debris and blockages that may impede drainage. These inspections will be done on a catchment by catchment basis as the construction works develop across the site, as works in all areas will not commence simultaneously.

4.1.2 Construction Phase Monitoring

4.1.2.1 Daily Visual Inspections

Daily visual inspections of the installed 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 baseline 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, the laboratory analysis sampling points and continuous monitoring locations. 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.

Daily Visual Inspections are subject to change upon commencement of construction activity and works in progress within the catchment areas.

The following periodic inspection regime will be implemented:

- Daily general visual inspections of site operations and inspections of all watercourses within the site and in the surrounding area by the ECoW or a suitably qualified and competent person as delegated by the ECoW;

- Inspections to include all elements of drainage infrastructure to ensure the system is operating correctly and to identify any maintenance that is required. Any changes, such as discolouration, odour, oily sheen or litter shall be noted and corrective action shall 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 of the drainage measures during construction phase;
- Quarterly site inspections by the Project Hydrologist/ Environmental Clerk of Works of the drainage measures 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.

4.1.2.2 Continuous Monitoring

Continuous, in-situ, monitoring equipment will be installed where required at locations surrounding the wind farm site. The monitoring equipment will provide continuous readings for turbidity levels, flow rate and water depth in the watercourse. This equipment will be supplemented by daily visual monitoring.

4.1.2.3 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 ECoW, in consultation with the Project Hydrologist and Site Manager, as the construction phase progresses.

4.1.2.4 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 and also at all installed sonde locations. These analyses will be carried out by either the ECoW 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 Project Hydrologist will monitor and advise on the readings collected by in-situ field monitoring.

4.1.2.5 Monitoring Parameters

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

- pH (field measured)
- Electrical Conductivity (field measured)
- Temperature (field measured)

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

4.1.3 **Surface Water Monitoring Reporting**

Visual inspection and monthly 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 local authorities in advance.

4.1.4 **Post Construction Monitoring**

4.1.4.1 **Monthly Laboratory Analysis Sampling**

Monthly sampling for laboratory analysis for the range of parameters adopted during pre-commencement and construction phases will continue after construction is complete. The project hydrologist will monitor and advise on the readings received from the testing laboratory and monitoring will only cease once the hydrologist is satisfied that the chemical and biological monitoring results show that there is no adverse impact on the quality of surface water within the natural watercourses draining the site.

5. ENVIRONMENTAL MANAGEMENT IMPLEMENTATION

5.1 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 Meath and Westmeath County Councils 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:

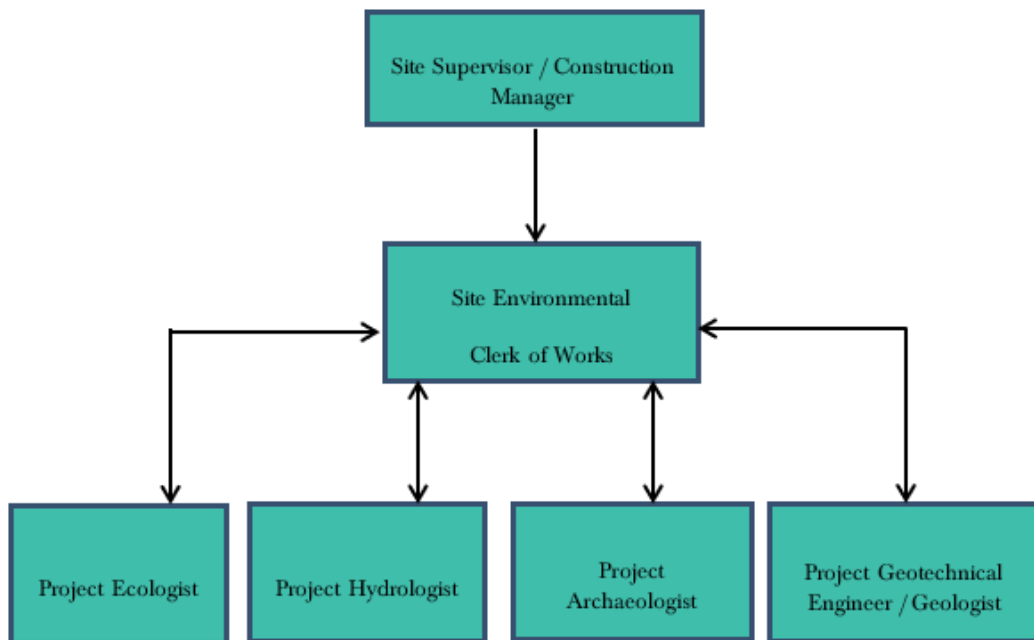


Figure 5-1 Site Management Chain of Command

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.

5.1.1 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.

5.1.2 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.

5.1.3 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.

5.1.4 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.

5.1.5 Project Geotechnical Engineer / Geologist

The Geotechnical Engineer or Project Geologist will report to the Environmental Clerk of Works and is responsible for monitoring of all soil excavation works 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.

5.1.6 Project Archaeologist

The Project Archaeologist report to the Environmental Clerk of Works and is responsible monitoring of all soil excavation groundworks associated with construction of the wind farm.

The responsibilities and duties of the Archaeologist will include the following:

- Archaeological monitoring (under licence from the National Monuments Service) of any further geotechnical / engineering trial pits or investigations and a report detailing the results of same.
- Archaeological monitoring of ground works during construction. This will include all excavation works within the EIAR site boundary as well as any topsoil removal along the haul route. If archaeological finds, features or deposits are uncovered during archaeological monitoring, the developer will be prepared to provide resources for the resolution of such features whether by preservation by record (excavation) or preservation in situ (avoidance).
- Once the project is completed, a report on the results of the monitoring will be compiled and submitted to the relevant authorities. The National Monuments Service will be informed of such findings to discuss how best to proceed.

5.2 Environmental Awareness and Training

5.2.1 Environmental Induction

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

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

5.2.2 Toolbox Talks

Toolbox talks would be held by the ECoW or Site Supervisor/Construction Manager at the commencement of each day, or at the commencement of new activities. The aims of the toolbox talks

are to identify the specific work activities that are scheduled for that day or phase of work. In addition, the necessary work method statements and sub plans would be identified and discussed prior to the commencement of the day's activities.

Site meetings would be held on a regular basis involving all site personnel. The objectives of site meetings are to discuss the coming week's 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.

6. EMERGENCY RESPONSE PLAN

6.1 Overview

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

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

6.1.1 Roles and Responsibilities

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

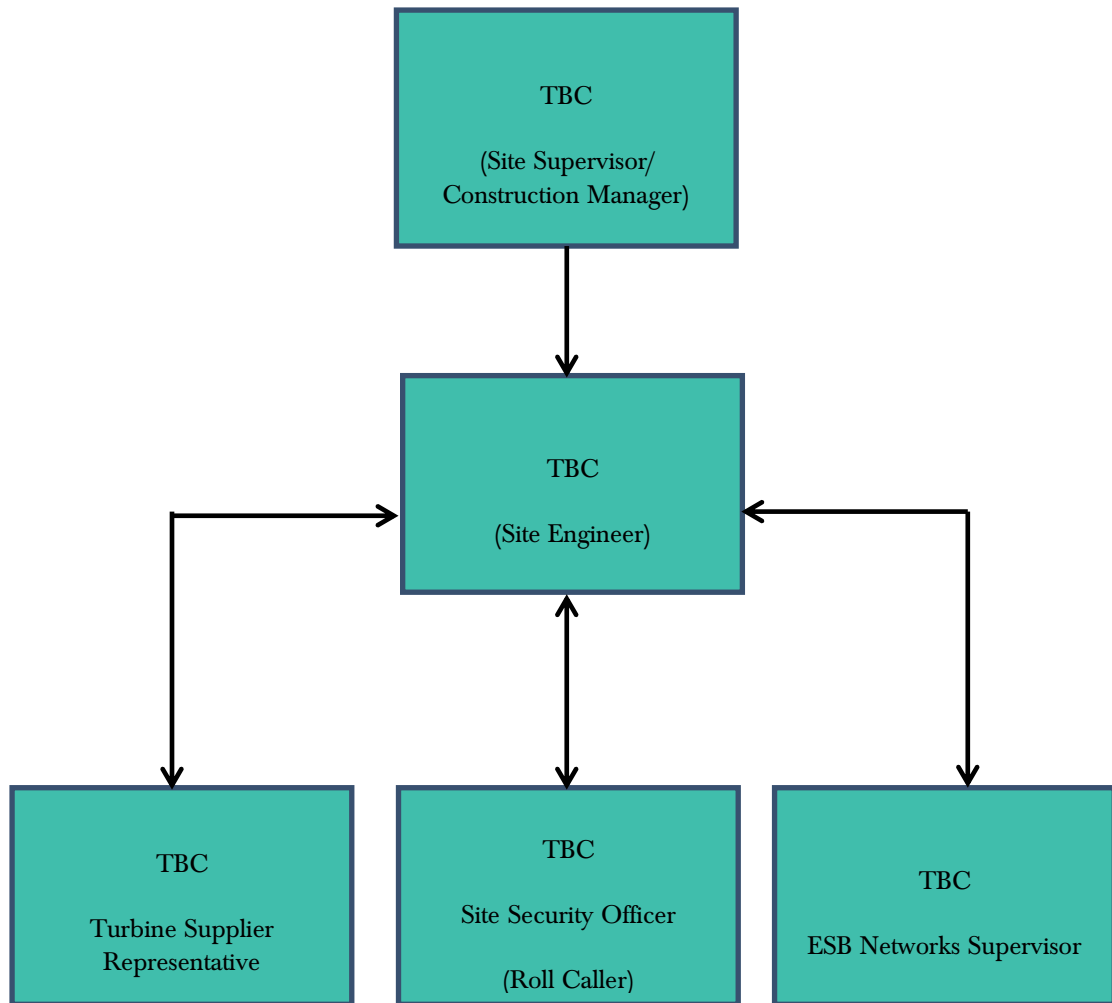


Figure 6-1 Emergency Response Procedure Chain of Command

6.1.2 Hazard Identification

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

Table 6-1 Hazards associated with potential emergency situations.

Hazard	Emergency Situation
Construction Vehicles: Dump trucks, tractors, excavators, cranes etc.	Collision or overturn which has resulted in operator or third-party injury.
Abrasive wheels/Portable Tools	Entanglement, amputation or electrical shock associated with portable tools
Contact with services	Electrical shock or gas leak associated with an accidental breach of underground services
Fire	Injury to operative through exposure to fire

Hazard	Emergency Situation
Falls from heights including falls from scaffold towers, scissor lifts, ladders, roofs and turbines	Injury to operative after a fall from a height
Sickness	Illness unrelated to site activities of an operative e.g., heart attack, loss of consciousness, seizure
Turbine Specific Incident	This will be included when the upon agreement and section of the final turbine type

In the event of an emergency situation associated with, but not restricted to, the hazards outlined in Table 5-1 the Site Supervisor/Construction Manager will carry out the following:

- Establish the scale of the emergency situation and identify the number of personnel, if any, have been injured or are at risk of injury.
- Where necessary, sound the emergency siren/fog horn that activates an emergency evacuation on the site. The Site Supervisor/Construction Manager must proceed to the assembly point if the emergency poses any significant threat to their welfare and if there are no injured personnel at the scene that require assistance. The Site Supervisor/Construction Manager will be required to use their own discretion at that point. In the case of fire, the emergency evacuation of the site should proceed, without exception. The site evacuation procedure is outlined in Section 5.1.3.
- Make safe the area if possible and ensure that there is no identifiable risk exists with regard to dealing with the situation e.g., if a machine has turned over, ensure that it is in a safe position so as not to endanger others before assisting the injured.
- Contact the required emergency services or delegate the task to someone. If delegating the task, ensure that the procedures for contacting the emergency services as set out in Section 5.3 is followed.
- Take any further steps that are deemed necessary to make safe or contain the emergency incident e.g., cordon off an area where an incident associated with electrical issues has occurred.
- Contact any regulatory body or service provider as required e.g., ESB Networks the numbers for which as provided in Section 5.4.
- Contact the next of kin of any injured personnel where appropriate.

6.1.3 Site Evacuation/Fire Drill

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

- Notification of the emergency situation. Provision of a siren or 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.

6.2 Environmental Emergency Response Procedure

6.2.1 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.*

6.2.2 Onset of Peat Slide

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

4. *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.*
5. *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.*
6. *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.*

6.2.3 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 Meath and Westmeath County Councils, 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 Meath and Westmeath County Councils, and the 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.

6.3 Contact the Emergency Services

6.3.1 Emergency Communications Procedure

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

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

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

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

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

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

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

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

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

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

6.4 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 5.6-2 Emergency Contacts

Contact	Telephone no.
Emergency Services – Ambulance, Fire, Gardaí	999/112
Doctor – Longwood Health Centre	046 9555006
Hospital – Midlands Regional Hospital Mullingar	044 9340221
ESB Emergency Services	1850 372 999
Gas Networks Ireland Emergency	1850 20 50 50
Gardaí – Ballivor Garda Station	046 9546002
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: Bord na Móna Powergen Ltd.	045 439000

6.4.1 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.

6.5 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 5-6-3 Emergency Response Plan Items Applicable to the Site Induction Process

ERP Items to be included in Site Induction	Status
All personnel will be made aware of the evacuation procedure during site induction	
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.	

7. **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 An Bord Pleanála.

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

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

Table 7-1 Mitigation Measures for pre commencement, construction, operation and decommissioning phases of the proposed Ballivor Wind Farm

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
EIAR Chapter 4 – Description of the Proposed Development						
Pre-Commencement Phase						
MM1		Environmental Management	EIAR Chapter 4	All proposed activities on the site of the Proposed Development will be provided for in a Construction and Environmental Management Plan (CEMP), prepared prior to the commencement of any operations onsite. The CEMP will set out all measures necessary to ensure works are carried out in accordance with the mitigation measures set out in the EIAR and will set out the monitoring and inspections procedures and frequencies.		
			EIAR Chapter			
MM2		Environmental Management	CEMP Section 3	A Site ECoW will oversee the site works and implementation of the Construction Environmental Management Plan (CEMP) and provide on-site advice on the mitigation measures necessary as necessary to ensure the project proceeds as intended. The level, detail and frequency of reporting expected from the ECoW for the Construction Manager, developer’s project manager, and any Authorities or other Agencies, will be agreed by parties where required prior to commencement of construction, and may be further adjusted as required during the course of the project.		
MM3		Surface Water Quality	CEMP Section 4	Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement construction at the site. The baseline monitoring programme will be subject to agreement with Meath and Westmeath County Council. Baseline laboratory analysis of a range of parameters with relevant regulatory limits and Environmental Quality Standards (EQSs) will also be undertaken as per water		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				monitoring programme for the Proposed Development and each primary watercourse along the route.		
MM4		Concrete Deliveries	EIAR Chapter 4 CEMP Section 3	<p>The arrangements for concrete deliveries to the site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout of trucks and discussing emergency procedures.</p> <p>Only ready-mixed concrete will be used during the construction phase, with all concrete being delivered from local batching plants in sealed concrete delivery trucks. The use of ready-mixed concrete deliveries will eliminate any potential environmental risks of on-site batching.</p>		
MM5		Site Drainage Plan	CEMP Section 4	The Project Hydrologist will prepare detailed drainage design before construction commences.		
MM6		Preparative Site Drainage Management	EIAR Chapter 4 CEMP Section 4	<p>The detailed drainage design will specify all materials and equipment necessary to implement the drainage measures effectively, which will be brought on site in advance of any works commencing.</p> <p>An adequate quantity of straw bales, clean stone, terram, stakes, etc. will be kept on site at all times to implement the detailed drainage design measures as necessary. The detailed drainage measures will be installed prior to, or at the same time as the works they are intended to drain.</p>		
MM7		Drainage Inspection	CEMP Section 3	Prior to commencement of works in sub-catchments across the site, main drain inspections will be completed to ensure ditches and streams are free from debris and blockages that may impede drainage. 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.		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM8		Drainage Maintenance	EIAR Chapter 4 CEMP Section 4	An inspection and maintenance plan for the drainage system onsite will be prepared in advance of commencement of any works. Regular inspections of installed drainage features will be necessary, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water within the system where it is not intended. The inspection of the drainage system will be the responsibility of the environmental clerk of works or the supervising hydrologist		
MM9		Earthworks	CEMP Section 3	Drainage and associated pollution control measures will be implemented onsite before the main construction works commence. Where possible, drainage controls will be installed during seasonally dry ground conditions. This will reduce the possibility of impact on surface waters by suspended sediment released during construction and entrained in surface run-off.		
MM10		Peat Management	EIAR Chapter 4 CEMP Section 4	Prior to commencing floating and excavated road construction movement monitoring posts should be installed in areas where the peat depth is greater than 2.0m in locations recommended by the geotechnical engineer		
Construction Phase						
MM11		Wastewater Management	EIAR Chapter 4	The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. Full details of the proposed tank alarm system can be submitted to the Planning Authority in advance of any works commencing on-site. The wastewater storage tank alarm will be part of a continuous stream of data from the site's turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007(as amended), will be employed to transport wastewater away from the site.		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM12		Environmental Management	EIAR Chapter 4 CEMP Section 3	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.		
MM13		Environmental Management	CEMP Section 3	A Site ECoW will oversee the site works and implementation of the Construction Environmental Management Plan (CEMP) and provide on-site advice on the mitigation measures necessary as necessary to ensure the project proceeds as intended. The level, detail and frequency of reporting expected from the ECoW for the Construction Manager, developer's project manager, and any Authorities or other Agencies, will be agreed by parties where required prior to commencement of construction, and may be further adjusted as required during the course of the project.		
MM14		Refuelling	EIAR Chapter 4 CEMP Section 3	<ul style="list-style-type: none"> ➤ Minimal refuelling or maintenance of construction vehicles or plant will take place on site. Off-site refuelling should occur at a controlled fuelling station; ➤ On-site refuelling will take place using a mobile double skinned fuel bowser. The fuel bowser will be re-filled off site and will be towed by a 4x4 jeep to machinery is located. The 4x4 jeep will also carry fuel spill kits in the event of any spillages. The fuel bowser will be parked on a designated 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. ➤ Fuel volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<p>the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor;</p> <ul style="list-style-type: none"> ➤ The electrical substation compound fuel storage area 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 Spill kits will be available to deal with any spillage in and outside the refuelling area. 		
MM15		Concrete Deliveries and Management	EIAR Chapter 4 CEMP Section 3	<p>The following mitigation measures are proposed to avoid release of cement leachate from the site:</p> <ul style="list-style-type: none"> ➤ 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; 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> 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. 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. 		
MM16		Road Cleanliness	EIAR Chapter 4. CEMP Section 3	When necessary, sections of the haul route immediately outside the site entrances will be swept using a truck mounted vacuum sweeper.		
MM17		Water Discharge	EIAR Chapter 4	All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses. Buffer zones around the existing natural drainage features have been used to inform the layout of the Proposed Development		
MM18		Wastewater Management	EIAR Chapter 4. CEMP Section 3	Temporary toilets will be used during the construction phase as part of the welfare facilities for site staff and visitors. Wastewater from toilets will be directed to a sealed storage tank, with all wastewater tankered off site by an appropriately consented waste collector to wastewater treatment plants.		
MM19		Collector Drains	EIAR Chapter 4.	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.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			EIAR Chapter 9			
MM20		Interceptor Drains	CEMP Section 3 EIAR Chapter 9	Interceptor drains will be installed up-gradient of any works areas to collect surface flow runoff and prevent it reaching excavations and construction areas of the site. It will then be directed to areas where it can be re-distributed over the ground as sheet flow as per the drainage design.		
MM21		Check Dams	EIAR Chapter 4. EIAR Chapter 9	<p>Check dams will restrict flow velocity, minimise channel erosion and promote sedimentation behind the dam. The check dams will be installed as the interceptor drains are being excavated. Check dams may also be installed in some of the existing artificial drainage channels on the site, downstream of where drainage swales connect in.</p> <p>Check dams will not be used in any natural watercourses, only artificial drainage channels and interceptor drains. The check dams will be installed at regular intervals along interceptor drains to restrict flow velocity, minimise channel erosion and promote sedimentation behind the dam as per the drainage design.</p>		
MM22		Level Spreaders,	CEMP Section 3 EIAR Chapter	A level spreader will be constructed at the end of each interceptor drain to convert concentrated flows in the drain into diffuse sheet flow on areas of vegetated ground. The levels spreaders will be located downgradient of any proposed works areas in locations where they are not likely to contribute further to water ingress to construction areas of the site.		
MM23		Stilling Ponds	EIAR Chapter 4. EIAR Chapter 9	Stilling ponds/settlement ponds, emplaced downstream of swales and roadside drains, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses. The stilling ponds will be sized according to the size of the area they will be receiving water from but will be		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				sufficiently large to accommodate peak flows storm events. Inspection and maintenance of all settlement ponds will be ongoing through the construction period.		
MM24		Dewatering Silt Bag	CEMP Section 3 EIAR Chapter 9	Dewatering silt bags allow the flow of water through them while trapping any silt or sediment suspended in the water. The silt bags provide a passive non-mechanical method of removing any remaining silt contained in the potentially silt-laden water collected from works areas within the site.		
MM25		Siltbuster	EIAR Chapter 4. EIAR Chapter 9	Siltbuster type concrete was unit. This type of Siltbuster unit catches the solid concrete and filters and holds wash liquid for pH adjustment and further solids separation. The residual liquids and solids will be removed off-site by an appropriately authorised waste collector for disposal at an authorised waste facility.		
MM26		Culvert Upgrades	EIAR Chapter 4. EIAR Chapter 9	<ul style="list-style-type: none"> ➤ All proposed new stream crossings will be bottomless or clear span culverts and the existing banks will remain undisturbed. No in-stream excavation works are proposed and therefore there will be no direct impact on the stream at the proposed crossing location; 		
MM27		Silt Fences	CEMP Section 3 EIAR Chapter 9	<ul style="list-style-type: none"> ➤ Silt fences will be placed within drains down-gradient of all construction areas. ➤ They will remain in place throughout the entire construction phase. ➤ Silt fences will be installed as single, double or a series of triple silt fences, depending on the space available and the anticipated sediment loading. ➤ The silt fence designs follow the technical guidance document ‘Control of Water Pollution from Linear Construction Projects’ published by CIRIA (Ciria, No. C648, 1996). Up to three silt fences may be deployed in series. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ All silt fencing will be formed using Terrastop Premium or equivalent silt fence product. ➤ Silt fences will be inspected regularly to ensure water is continuing to flow through the fabric, and the fence is not coming under strain from water backing up behind it 		
MM28		Peat Management	EIAR Chapter 4 CEMP Section 3	<ul style="list-style-type: none"> ➤ All excavated peat and non-peat will be placed/spread alongside the proposed infrastructure elements on site, where possible. ➤ The peat and spoil placed adjacent to the proposed infrastructure elements should be restricted to a maximum height of 1m over a 10m wide corridor on both sides of the proposed infrastructure elements. It should be noted that the designer should define/confirm the maximum restricted height for the placed peat and spoil within the indicated parameters. ➤ The placement of excavated peat and spoil is to be avoided without first establishing the adequacy of the ground to support the load. The placement of peat and spoil within the placement areas may require the use of long reach excavators, low ground pressure machinery and possibly bog mats in particular for drainage works. ➤ Where there is any doubt as to the stability of the peat surface then no excavated spoil shall be placed on to the peat surface. The risk of peat instability is reduced by not placing any loading onto the peat surface. ➤ Where practical, it should be ensured that the surface of the placed peat and spoil is shaped to allow efficient run-off of surface water. Where possible, shaping of the surface of the peat and spoil should be carried out as placement of peat and spoil within the placement area progresses. This will reduce the likelihood of debris run-off and ensure stability of the placed peat and spoil. ➤ Finished/shaped side slopes in the placed peat and spoil shall be not greater than 1 (v): 2 (h) or 3 (h). This slope inclination will be 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<p>reviewed during construction, as appropriate. Where areas of weaker peat and spoil are encountered then slacker slopes will be required.</p> <ul style="list-style-type: none"> ➤ All placed spoil will be allowed to revegetate naturally from the extensive seed source of the plants that have already colonised in the area. Alternatively, if significant areas of bare spoil are still evident after a 3 year period and possibly in addition, seeding of the placed spoil could be carried out which would aid in stabilising the placed spoil in the long term. ➤ Movement monitoring instrumentation may be required adjacent to the access road where peat has been placed. The locations where monitoring is required will be identified by the designer on site if required. ➤ An interceptor drain should be installed upslope of the designated spoil placement areas to divert any surface water away from these areas. This will help ensure stability of the placed spoil and reduce the likelihood of debris run-off. <p>All the above-mentioned general guidelines and requirements will be confirmed by the designer prior to construction.</p>		
Operational Phase						
MM29		Wastewater Management	EIAR Chapter 4 EIAR Chapter 14	The removal and disposal of wastewater from the site will be carried out by a fully permitted waste collector holding valid Waste Collection Permits as issued under the Waste Management (Collection Permit) Regulations, 2007.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM30	Electrical Substation	CEMP Section 3	The electrical substation compound fuel storage area 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;		
MM31	Drainage Inspection	EIAR Chapter 4 4	The frequency of drainage system inspections will be reduced following completion of the construction phase of the project. Inspections will be reduced to monthly, twice monthly and eventually quarterly during the operational phase. The frequency will be increased or decreased depending on the effectiveness of the measures in place and the amount of remedial action required in any given period.		
Decommissioning Phase					
MM32	Decommissioning	EIAR Chapter 4	Prior to the end of the operational period the Decommissioning Plan (Appendix 4-5 of the EIAR) will be updated in line with decommissioning methodologies that may exist at the time and will agree with the competent authority at that time.		
MM33	Decommissioning	DP Section 2	On removal of turbines, turbine and mast foundations would remain underground and would be covered with earth and allowed to revegetate		
MM34	Decommissioning	DP Section 3	<p>The following mitigation measures are proposed to avoid release of hydrocarbons at the site:</p> <ul style="list-style-type: none"> ➤ Road-going vehicles will be refuelled off site wherever possible; ➤ On-site refuelling will be carried out at designated refuelling areas at various locations throughout the site. Machinery will be refuelled directly by a fuel truck that will come to site as required ➤ Only designated trained and competent operatives will be authorised to refuel plant on site. ➤ Fuel volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately; 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ The plant used will be regularly inspected for leaks and fitness for purpose; and, ➤ An emergency plan for the decommissioning phase to deal with accidental spillages will be developed (refer to EIAR Chapter 4). Spill kits will be available to deal with and accidental spillage in and outside the refuelling area. <p>A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the decommissioning phase.</p>		
MM35		Decommissioning	DP Section 3	<ul style="list-style-type: none"> ➤ 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 Site Manager 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. ➤ The transport of soils or other material, which has significant potential to generate dust, will be undertaken in tarpaulin-covered vehicles where necessary. ➤ All site related traffic will have speed restrictions on un-surfaced roads to 15 kph. ➤ Daily inspection of the site to examine dust measures and their effectiveness. ➤ When necessary, local sections of the public roads being used will be swept using a truck mounted vacuum sweeper. 		
MM36		Decommissioning	DP Section 3	<ul style="list-style-type: none"> ➤ Diesel generators will be enclosed in sound proofed containers to minimise the potential for noise impacts. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ Plant and machinery with low inherent potential for generation of noise and/or vibration will be selected. All plant and equipment to be used on-site will be modern equipment and will comply with the S.I. No. 359/1996 - European Communities (Construction Plant and Equipment) (Permissible Noise Levels) (Amendment) 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 Site Manager to drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation; and, ➤ Local areas of the public road networking being used will be condition monitored and maintained, if necessary. 		
MM37		Decommissioning	EIAR Chapter 4	Site roadways will be in use as amenity and recreational pathways, and therefore will not be removed during decommissioning. If it were to be confirmed that the roads were not required in the future for any other useful purpose, they could be removed where required.		
Chapter 5: Population and Human Health						
Pre-Construction Phase						

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM38		Traffic and Transport	EIAR Chapter 5	Prior to commencement of any ground works, the occupants of dwellings in the vicinity of the proposed works will be contacted and the scheduling of works will be made known. Local access to properties will also be maintained throughout any construction works and local residents will be supplied with the number of the works supervisor in order to ensure that disruption will be kept to a minimum.		
Construction Phase						
MM39		(Human Health) Health and Safety	EIAR Chapter 5	<p>The Proposed Development will be constructed, operated and decommissioned in accordance with all relevant Health and Safety Legislation, including:</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) (Amendment) Regulations 2016 (S.I. No. 36 of 2016); ➤ S.I. No. 528/2021 - Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021 and ➤ Safety, Health and Welfare at Work (Work at Height) Regulations 2006 (S.I. No. 318 of 2006). <p>A Health and Safety Plan covering all aspects of the construction process will address the Health and Safety requirements in detail. This will be prepared on a preliminary basis at the procurement stage and developed further at construction stage.</p>		
MM40		Human Health (Noise)	EIAR Chapter 5	<ul style="list-style-type: none"> ➤ No plant used on site will be permitted to cause an on-going public nuisance due to noise. ➤ The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract. ➤ Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers. ➤ Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use. ➤ Any plant, such as generators or pumps, which is required to operate outside of general construction hours will be surrounded by an acoustic enclosure or portable screen. ➤ During the course of the construction programme, supervision of the works will include ensuring compliance with the limits detailed in Chapter 11 using methods outlined in British Standard BS 5228-1:2014+A1:2019 Code of practice for noise and vibration control on construction and open sites – Noise. ➤ The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 7:00hrs and 19:00hrs Monday to Saturday. However, to ensure that optimal use is made of good weather periods or at critical periods within the programme (i.e., concrete pours, large turbine component delivery, rotor/blade lifting) it could occasionally be necessary to work out of these hours. 		
Operational Phase						
MM41		(Human Health) Health and Safety	EIAR Chapter 5	Access to the turbines is through a door at the base of the structure, which will be locked at all times outside maintenance visits. The doors will only be unlocked as required for entry by authorised personnel and will be locked again following their exit.		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<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, faded, 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 50m (maximum) intervals and change of cable route direction; ➤ Directions to relevant turbines at junctions; ➤ “No access to Unauthorised Personnel” at appropriate locations; ➤ Speed limits signs at site entrance and junctions; ➤ “Warning these Premises are alarmed” at appropriate locations; ➤ “Danger HV” at appropriate locations; ➤ “Warning – Keep clear of structures during electrical storms, high winds or ice conditions” at site entrance; ➤ “No unauthorised vehicles beyond this point” at specific site entrances; and ➤ Other operational signage required as per site-specific hazards. <p>An operational phase Health and Safety Plan will be developed to fully address identified Health and Safety issues associated with the operation of the site. Access for emergency services will be available at all times.</p>		
MM42		Shadow Flicker	EIAR Chapter 5	<p>Where daily shadow flicker exceedances have been predicted at buildings by the modelling software, a site visit will be undertaken firstly to determine the level of occurrence, existing screening and window orientation.</p> <p>Screening Measures</p>		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<p>In the event of an occurrence of shadow flicker exceeding guideline threshold values of 30 minutes per day at a residential receptor, mitigation options will be discussed with the affected homeowner, including:</p> <ul style="list-style-type: none"> ➤ Installation of appropriate window blinds in the affected rooms of the residence; ➤ Planting of screening vegetation; ➤ Other site-specific measures which might be agreeable to the affected party and may lead to the desired mitigation. <p>If agreement can be reached with the homeowner, then it would be arranged for the required mitigation to be implemented in cooperation with the affected party as soon as practically possible and for the full costs to be borne by the wind farm operator.</p> <p>Wind Turbine Control Measures</p> <p>If it is not possible to mitigate any identified shadow flicker limit exceedance locally using the measures detailed above, wind turbine control measures will be implemented.</p> <p>The wind farm’s SCADA control system can be programmed to shut down any particular turbine at any particular time on any given day to ensure that shadow flickers occurrences at properties which are not naturally screened or cannot be screened with measures outlined above</p>		
Chapter 6: Biodiversity						
Pre-Construction Phase						

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM43		Invasive Species Management	EIAR Chapter 6 CEMP Section 3	A baseline invasive species survey will be carried out at the site to identify the presence and location of any invasive species (listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) by a suitably qualified ecologist. If the presence of such species is found at or adjacent to the site, particularly in areas where its excavation may be required, an invasive species management plan will be prepared for the site to prevent the introduction or spread of any invasive species within the footprint of the works.		
MM44		Fauna	EIAR Chapter 6	<ul style="list-style-type: none"> ➤ A pre-construction badger survey will be undertaken at the location of the identified setts at Carranstown Bog by a qualified ecologist prior to the commencement of any works to determine if the setts are in use and to identify any additional sett entrances that may have been excavated in the intervening period. ➤ The outlier sett within the footprint of the proposed substation will be monitored for 2 weeks prior to construction using a camera trap to determine if it is in use. ➤ If the outlier sett in the construction footprint is found to be in use exclusion measures will be put in place prior to construction in line with NRA Guidelines to ensure that the sett is evacuated. ➤ As per NRA guidelines exclusion from an active sett will only be carried out during the period of July to November inclusive in order to avoid the badger breeding season. ➤ During the breeding season (December to June inclusive) no works will be undertaken within 50m of active setts or pile driving within 150m of active setts. ➤ Exclusion zone fencing and appropriate signage will be put in place around the main sett to the south of the substation which lies outside the construction footprint. This will ensure that there will be no vehicles tracking in the area and no temporary storage of construction materials that could impact the sett. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM45		Bats	EIAR Chapter 6 Appendix 6-2	<p>In accordance with NatureScot (2021) and the Northern Ireland Environment Agency (NIEA) Guidance (2021), a minimum 50m buffer to all habitat features used by bats should be applied to the siting of all wind turbines.</p> <p>This 50m buffer will be implemented from the outset and monitored as per the post construction monitoring</p>		
Construction Phase						
MM46		Flora & Fauna	EIAR Chapter 6 Appendix 6-2	<p><u>Noise Restriction</u></p> <p>➤ During the construction phase, plant machinery will be turned off when not in use and all plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (S.I. No. 632 of 2001).</p> <p><u>Lighting Restriction</u></p> <p>Exterior lighting, during construction and post construction, shall be designed to minimize light spillage, thus reducing the effect on areas outside the proposed development, and consequently on bats i.e. Lighting will be directed away from mature trees/treelines around the periphery of the site boundary to minimize disturbance to bats. Directional accessories can be used to direct light away from these features, e.g. through the use of light shields (Stone, 2013). The luminaries will be of the type that prevent upward spillage of light and minimize horizontal spillage away from the intended lands.</p> <p>The proposed lighting around the site shall be designed in accordance with the Institute of Lighting Professionals Guidance Note 08/18 Bats and artificial lighting in the UK.</p>		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<p>In addition, the applicant commits to the use of lights during construction (such that they are necessary) in line with the following guidance that is provided in the Dark Sky Ireland Lighting Recommendations:</p> <ul style="list-style-type: none"> ➤ Every light needs to be justifiable, ➤ Limit the use of light to when it is needed, ➤ Direct the light to where it is needed, ➤ Reduce the light intensity to the minimum needed, ➤ Use light spectra adapted to the environment, <p>When using white light, use sources with a “warm” colour temperature (less than 3000K).</p>		
MM47		Aquatic Faunal Species	EIAR Chapter 6	While there will be no requirement for instream works, all works adjacent to watercourses, will adhere to Inland Fisheries Ireland (IFI) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016).		
MM48		Flora & Fauna	EIAR Chapter 6	While no significant effects are anticipated as a result of the loss of these habitats these linear features will be fully re-instated by replanting of the same lengths of hedgerow and treeline at the locations where they were lost following the completion of works. Planting will comprise native species.		
MM49		Invasive Species	EIAR Chapter 6 CEMP Section 3	<p>The following measures are proposed to establish good site hygiene to ensure the control of any potential spread of invasive species during construction works, if they are identified prior to the commencement of the construction phase:</p> <ul style="list-style-type: none"> ➤ 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 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<p>disposed of with other contaminated material. This area will contain a washable membrane or hard surface.</p> <ul style="list-style-type: none"> ➤ 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. <p>Plant and equipment which is operated within an area for the management of materials in contaminated areas should be decontaminated prior to relocating to a different works area. The decontamination procedures should take account of the following:</p> <ul style="list-style-type: none"> ➤ 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. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM50		Flora and Fauna	EIAR Chapter 6	<p>The Proposed Development has the potential to result in enhancement of the surrounding areas through habitat rehabilitation management (as described in the Biodiversity and Enhancement Management Plan) that will be implemented during the construction phase of the Proposed Development and maintained during the operational phase. Details of the management that will be undertaken are provided in the Biodiversity and Enhancement Management Plan in Appendix 6-5 of the EIAR. These include:</p> <ul style="list-style-type: none"> > Drain Blocking > Vegetation Monitoring > Planting of Native Woodland > Hydrological Monitoring <p>In addition to the above, during construction activities on this habitat, the works area will be fenced off to prevent encroachment onto areas of habitat outside the development footprint.</p>		
Operational Phase						

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM51		Bats	EIAR Chapter 6 Appendix 6-2	<p>As per the bat survey report in Appendix 6-2, in accordance with NatureScot (2021) and the Northern Ireland Environment Agency (NIEA) Guidance (2021), a minimum 50m buffer to all habitat features used by bats should be applied to the siting of all wind turbines. Eurobats No. 6 guidance and NIEA (2021) recommends increased buffers around woodland/forestry areas. All habitat suitable for foraging and commuting bats has been identified as linear scrub features which developed along cutover bog drains.</p> <p>NatureScot recommends that a distance of 50m between turbine blade tip and nearest scrub habitat is adequate mitigation. This 50m buffer will be implemented from the outset and monitored as per the post construction monitoring. Where possible, the proposed location of turbines has accounted for the least possible loss of scrub and woodland habitat as it provides suitable habitat for other species. Where linear scrub features are located at the edge of the felling buffers, the option to maintain the features has been considered. All buffer zones will be maintained vegetation-free for the duration of the project. The success of the buffer mitigation will be assessed as part of post construction monitoring and updated where necessary.</p> <p>Blade feathering</p> <p>NIEA Guidelines also recommend that, in addition to buffers applied to habitat features, all wind turbines are subject to ‘feathering’ of turbine blades when wind speeds are below the cut-in speed of the proposed turbine. This means that the turbine blades are pitched at 90 degrees or parallel to the wind to reduce their rotation speed to below two revolutions per minute while idling. This measure has been shown to significantly reduce bat fatalities (by up to 50%) in some studies (NIEA, 2021).</p>		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				In accordance with NIEA Guidelines, blade feathering will be implemented as a standard across all proposed turbines when wind speeds are below the cut-in speed of the turbine (i.e. 3.5 m/s).		
Decommissioning Phase						
MM52		Decommissioning	EIAR Chapter 6	The same mitigation to prevent significant impacts on water quality and associated aquatic fauna and other terrestrial fauna during construction will be applicable to the decommissioning phase. An outline decommissioning plan is contained in the CEMP, Appendix 4-3 of the EIAR. The CEMP for the project provides the details of the mitigation and best practice that will be employed to avoid any potential for significant residual effects on biodiversity during decommissioning of the proposed wind farm.		
Chapter 7 Birds (Appendix 7-1)						
Pre- Construction Phase						
MM53		Birds	EIAR Chapter 7	The project design has followed the basic principles outlined below to eliminate the potential for significant effects on avian receptors: <ul style="list-style-type: none"> ➤ The Proposed Development avoids wildlife refuge sites (e.g. waterbodies) 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ Hard standing areas have been designed to the minimum size necessary to minimise habitat loss. 		
MM54		Birds	EIAR Chapter 7	<ul style="list-style-type: none"> ➤ A Construction and Environmental Management Plan (CEMP, Appendix 4-3) has been prepared. The CEMP will be in effect prior to the start of the construction phase. Best practice measures which form part of the design of the project are included in Chapter 4 of the EIAR. The CEMP is included as an Appendix to Chapter 4. ➤ Construction works will begin outside the bird nesting season as defined by the Wildlife Act 1976 as amended (1st of March to the 31st of August). ➤ All removal of woody vegetation will be undertaken in accordance with Section 40 of the Wildlife Act 1976 as amended. 		
Construction Phase						
MM55		Birds	EIAR Chapter 7	<p>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.</p> <p>Plant machinery will be turned off when not in use.</p>		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<p>All plant and equipment for use will comply with the European Communities (Noise Emission by Equipment For Use Outdoors) Regulations, 2001 (S.I. No. 632/2001) and other relevant legislation.</p> <p>An Ecological Clerk of Works (ECoW) will be appointed. Duties will include:</p> <ul style="list-style-type: none"> ➤ Oversee a pre-construction transect/walkover bird survey is undertaken, to avoid significant effects on breeding birds will be avoided. ➤ Inform and educate on-site personnel of the ornithological and ecological sensitivities within the Application Site. ➤ Oversee management of ornithological and ecological issues during the construction period and advise on ornithological issues as they arise. ➤ Provide guidance to contractors to ensure legal compliance with respect to protected species onsite. ➤ Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress. 		
MM56		Removal of Vegetation	EIAR Chapter 4	The commencement of works where the removal of vegetation is required, or where works take place in sensitive breeding habitats (such as birch scrub and emergent wetland vegetation), will be scheduled to occur outside the bird breeding season (1st of March to 31st of August) to avoid any potentially significant effects on nesting birds.		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Operational Phase						
MM57		Birds	EIAR Chapter 7	No operational phase impacts requiring mitigation were identified. However, monitoring in line with best practice is proposed. Refer to MX19		
Decommissioning Phase						
MM58		Birds	EIAR Chapter 7	During the decommissioning phase, disturbance limitation measures will be as per the construction phase described.		
EIAR Chapter 8 Land Soils & Geology						
Pre- Construction Phase						
MM59		Peat & Subsoil Excavation	EIAR Chapter 8	<ul style="list-style-type: none"> ➤ The Proposed Development has been designed to avoid sensitive habitats within the application area; <ul style="list-style-type: none"> ○ Placement of turbines and associated infrastructure in areas with shallower peat where constraints allow; ○ Use of floating roads, where appropriate, to reduce peat excavation volumes. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Construction Phase						
MM60		Excavation of Borrow Pits	EIAR Chapter 8	<p>Upon the removal of the required volumes of granular material (for the construction of the infrastructure elements at the wind farm) from the borrow pits it is proposed to reinstate the pits using excavated peat and spoil. The borrow pits are designed and will be constructed in a way which will allow the excavated peat and spoil to be placed safely, with areas within the borrow pits designated for the storage of excavated peat. Other mitigation measures included in the design of the borrow pits are as follows:</p> <ul style="list-style-type: none"> ➤ Borrow pits will be developed with stable ground inclinations; ➤ Exposed slopes will be left with irregular faces to promote re-vegetation; ➤ Where possible segments of granular material will be left in places to help retain placed peat and spoil. Where this is not possible buttresses of permeable fill may be constructed to provide sufficient stability to the placed peat; and, ➤ Infilling of peat should commence at the back of the borrow pit and progress towards the pit entrance. 		
MM61		Peat & Subsoil Excavation	EIAR Chapter 8	<ul style="list-style-type: none"> ➤ 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; ➤ 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; ➤ Excavated peat that is not used locally for landscaping will be stored in the 3 no. borrow pits; and 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ Construction of settlement ponds will be volume neutral, and all excess material will be used locally to form pond bunds and surrounding landscaping. ➤ In general, excavated peat will be moved short distances from the point of excavation and used locally for landscaping; 		
MM62		Contamination of Soil	EIAR Chapter 8	<ul style="list-style-type: none"> ➤ On-site re-fuelling will be undertaken using a double skinned bowser with spill kits kept on site for accidental leakages or spillages; ➤ Only designated trained operatives will be authorised to refuel plant on-site; ➤ Taps, nozzles or valves associated with refuelling equipment will be fitted with a lock system; ➤ Fuels volumes stored on-site will be minimised. All storage areas will be bunded appropriately for the duration of the construction phase. All bunded areas will be fitted with a storm drainage system and an appropriate oil interceptor. Ancillary equipment such as hoses, pipes will be contained within the bunded area; ➤ Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage; ➤ The plant used during construction will be regularly inspected for leaks and fitness for purpose; and ➤ An emergency response plan for the construction phase to deal with accidental spillages will be contained within the Construction Environmental Management Plan (which is contained in Appendix 4-3) 		
MM63		Erosion	EIAR Chapter 8	<ul style="list-style-type: none"> ➤ All works will be completed in accordance with the Peat and Spoil Management Plan (FTC, 2023) 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ All excavated peat and spoil shall be transported immediately on excavation to designated peat storage areas along the access roads and will be used on site for landscaping close to the extraction area; ➤ Where peat/spoil is not used to landscaping it will be transported immediately to one of the proposed borrow pits; ➤ Peat and spoil will not be transported significant distances upon excavation; ➤ Upon excavation, the upper vegetative layer (where still present) will be stored with the vegetation part of the sod facing the right way up to keep the plants and vegetation alive to aid construction reinstatement of disturbed ground; ➤ Re-seeding and spreading/planting will also be carried out in areas where ground will be disturbed; and, ➤ A full Peat and Spoil Management Plan for the development is shown as Appendix 4-2. 		
MM64		Peat Instability	EIAR Chapter 8	<p>The following mitigation measures will be adhered to during the construction phase to minimise the risks of peat instability and failure:</p> <ul style="list-style-type: none"> ➤ Appointment of experienced and competent contractors; ➤ The site will be supervised by experienced and qualified personnel; ➤ Allocate sufficient time for the project (decreasing the construction time has the potential to increase the risk of initiating a localised 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 (as detailed in the Geotechnical and Peat Stability Assessment); ➤ Ensure construction method statements are finalised and implemented prior to the commencement of construction (these construction method 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<p>statements will align with the mitigation measures outlined in this EIAR and the CEMP); and,</p> <ul style="list-style-type: none"> ➤ Revise and amend the Construction Risk Register as construction progresses to ensure that risks are managed and controlled for the duration of construction. 		
MM65		Pilling Works	EIAR Chapter 8	<p>Other than surface level and minor excavation works, any driven piles will not produce significant volumes of spoil, these will displace soil/subsoil within the ground.</p> <p>The bored pile option could produce between 320 to 580m³ of spoil material per turbine base. Excess spoil will be removed for permanent storage in the on-site borrow pits. Bored pile spoil volumes only amount to between ~1 to 2% of the overall peat and spoil volumes for the Proposed Development.</p>		
Operational Phase						
MM66		Site Road Maintenance	EIAR Chapter 8	Use of aggregate from authorised quarries for use in road and hardstand maintenance		
MM67		Site Vehicle/Plant use	EIAR Chapter 8	<ul style="list-style-type: none"> ➤ Vehicles used during the operational phase will be refuelled off site before entering the proposed site; ➤ No fuels will be stored on-site during the operational phase; and 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ Spill kits will be available in all site vehicles to deal with an accidental spillage and breakdowns; and, ➤ An emergency plan for the operational phase to deal with accidental spillages and breakdowns will be contained in the finalised Environmental Management Plan. 		
MM68		Oils in Substation and Turbine Transformers	EIAR Chapter 8	<ul style="list-style-type: none"> ➤ The electrical control building (at the substation) will be bunded appropriately to the volume of oils likely to be stored and to prevent leakage of any associated chemicals to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor; ➤ All transformer areas at the turbines will be bunded to 110% of the volume of oil used in each transformer; ➤ An emergency plan for the operational phase to deal with accidental spillages will be contained in the Environmental Management Plan 		
Decommissioning Phase						
MM69		Decommissioning Phase	EIAR Chapter 8	Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant.		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
EIAR Chapter 9 Hydrology						
Pre- Construction Phase						
MM70		Earthworks	EIAR Chapter 9	<p>Mitigation by Avoidance:</p> <p>The key mitigation measure during the construction phase is the avoidance of sensitive hydrological features where possible, by application of suitable buffer zones (i.e. 50m to main watercourses, and 10m to main drains). All of the key Proposed Development areas (turbines, hardstands, substation, construction compounds etc.) are located significantly away from the delineated 50m watercourse buffer zones except for the upgrading of the existing watercourse crossings, new drain crossings and upgrades to the existing site access tracks. The Proposed Development includes upgrades to existing watercourse crossings and site access roads and a new proposed amenity path which cross EPA mapped watercourses at 3 no. locations within the proposed site:</p> <ul style="list-style-type: none"> ➤ Upgrades to the existing crossing over the Killanconnigan stream between Ballivor and Carranstown bogs; ➤ Upgrades to the existing crossing over the Cartenstown stream between Bracklin and Lislogher bogs; ➤ Proposed amenity path over the Cartenstown stream in the centre of Lislogher bog. However as stated above in Section Error! Reference source not found., walkover surveys have confirmed that there is no watercourse in this area of the proposed site). <p>The large setback distance from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures (discussed below) to be installed and operate effectively. The proposed buffer zone will:</p> <ul style="list-style-type: none"> ➤ Minimise physical damage (river/stream banks and river/stream beds) to watercourses (where possible, this cannot be avoided at the 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<p>watercourse crossing discussed above) and the associated release of sediment;</p> <ul style="list-style-type: none"> ➤ Minimise excavations within close proximity to surface watercourses; ➤ Minimise the entry of suspended sediment from earthworks into watercourses; and, ➤ Minimise the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone. <p>Mitigation by Design:</p> <p>There is an extensive network of drains already existing at the 4 no. bogs comprising the proposed site. The existing drainage infrastructure is operating in accordance with IPC licence requirements, with environmental monitoring and silt control measures being implemented at these bogs. The existing drainage system at the proposed site will be maintained and expanded locally as required for use within the Proposed Development drainage system. The key elements are the upgrading and improvements to water treatment elements, such as in-line controls and treatment systems, including wind farm related silt traps and settlement ponds.</p> <p>The elements of interaction with existing drains will be as follows:</p> <ul style="list-style-type: none"> ➤ Interceptor drains will convey clean runoff water around works areas to the existing downstream drainage system (field drains and main drains). Where required, interceptor drains will be installed in advance of any construction works commencing. This will ensure that clean water is kept clear by diverting surface water flow around excavations, construction areas and temporary storage areas. Where possible (depending on orientation), existing field drains can be used as interceptors drains; 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ Collector drains will be used to intercept and collect runoff from construction areas (from turbine base/hardstand areas, construction compounds, and the substation). During the construction phase temporary settlement ponds will be used to attenuate and treat runoff from the construction areas (from turbine base/hardstand areas, construction compounds, and the substation) and treated water will then discharge into existing field drains and main drains. Temporary settlement ponds will be removed at the end of the construction phase (end of high risk period), and wind farm runoff will discharge into existing field drains and main drains; ➤ During the construction phase, temporary silt traps (silt fences) will be used as an additional water protection measures around the existing bog drainage network, particularly where works are proposed within 50m of a natural watercourse. The silt fences will be placed in the existing drains downstream of construction works, and the associated construction area run-off water will be diverted into proposed interceptor drains, or culverted under/across the works area; ➤ During the construction phase, dewatering silt bags will also be used as required. They can be used downgradient of turbine bases, where temporary pumping is required. Discharge from dewatering silt bags will flow into settlement ponds and treated water from settlement ponds will outfall to existing field drains and main drains; ➤ Within the proposed site layout there are section of proposed floating road between turbine infrastructure. In these sections, and depending on intermediate topography, a collector drain (dirty water system as described above) may be used during construction stage, or over the edge (OTE) drainage will occur. Over the edge drainage allows runoff from access tracks to flow into local field drains and be managed via the existing site drainage system. OTE drainage will only occur where topography allows, and it is only proposed in areas of low risk and remote from outfall locations (at least 150m from bog outfall locations. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<p>Silt traps and check dams will be installed in field drains downstream of OTE drainage areas, and these will provide attenuation and treatment of dirty water; and,</p> <ul style="list-style-type: none"> ➤ Culverts will be required where site roads and proposed hardstands cross the main bog drainage networks. These will be installed with a minimum gradient to reduce the entrainment of suspended solids. All culverts will be inspected regularly and maintained where appropriate. Culverts will remain in-situ during the Operational Phase of the Proposed Development. 		
MM71		Drainage & Water Quality	EIAR Chapter 9	An inspection and maintenance plan for the on-site drainage system will be prepared in advance of the commencement of any works and will be included in the CEMP. Regular inspections of all installed drainage systems will be undertaken, especially before and 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.		
Construction Phase						
MM72		Water Treatment Train	EIAR Chapter 9	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 system) will be used to filter and treat all required surface discharge water collected in the dirty water drainage system. This will apply to all of the construction phase.		
MM73		Silt Fences	EIAR Chapter 9	Silt fences will be located 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 the excavation of mineral sub-soils of glacial and glacio-fluvial origin and entrained in surface water runoff. Regular inspection and maintenance of silt fences during the construction phase are critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM74	Silt Bags	EIAR Chapter 9	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.		
MM75	Weather Management	EIAR Chapter 9	<p>The works programme for the construction stage of the development will also take account of weather forecasts and predicted heavy rainfall events in particular. Large excavations and movements of peat/subsoil or peat stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.</p> <p>The following forecasting systems are available and will be used on a daily/weekly basis, as required, to allow site staff to manage construction activities:</p> <ul style="list-style-type: none"> ➤ General Forecasts: Available on a national, regional and county level from the Met Éireann website (www.met.ie/forecasts). These provide general information on weather forecasts including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates; ➤ MeteoAlarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale; ➤ 3-hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events; ➤ Rainfall Radar Images: Images covering the entire country are freely available from the Met Éireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive; and, 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ Consultancy Service: Met Éireann provide a 24-hour telephone consultancy service. The forecaster will provide an interpretation of weather data and give the best available forecast for the area of interest. <p>Using the safe threshold of rainfall values given below will allow planned works to be safely executed (from a water quality perspective) or works to be postponed if a high rainfall intensity event is forecast.</p> <p>Earthworks will be suspended if forecasting predicts any of the following is likely to occur:</p> <ul style="list-style-type: none"> ➤ >10 mm/hr (i.e. high intensity local rainfall events); ➤ >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or, ➤ >half monthly average rainfall in any 7 days. <p>Prior to earthworks being suspended the following further control measures will be completed:</p> <ul style="list-style-type: none"> ➤ All open peat/spoil excavations will be secured and sealed; ➤ Temporary or emergency drainage will be created to prevent back-up of surface runoff; and, ➤ Working during heavy rainfall and for up to 24 hours after heavy events will not be allowed to ensure drainage systems are not overloaded. 		
MM76		Runoff	EIAR Chapter 9	It is proposed that excavated peat will be used for landscaping close to its original extraction point. During the initial placement of peat and subsoil, silt fences, straw bales and biodegradable geogrids will be used to control surface water runoff from the storage areas as required. Interceptor and collector drains will be used at storage areas. ‘Siltbuster’ treatment trains will be employed if previous treatment is not of a high quality.		

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM77	Timing of Construction Works	EIAR Chapter 9	Construction of the site drainage system will only be carried out during periods of low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. Construction of the drainage system during low rainfall periods will also ensure that attenuation features associated with the drainage system will be in place and operational for all subsequent construction works.		
MM78	Surface Water Management	EIAR Chapter 9 CEMP Section 4	During the construction phase field testing (visual, supplemented with pH, electrical conductivity, temperature, dissolved oxygen and turbidity monitoring), sampling and laboratory analysis of a range of parameters ² with relevant regulatory limits and EQSs will be undertaken for each primary watercourse, and specifically following heavy rainfall events (i.e. weekly, monthly and event-based). The data will be processed and analysed and works will cease if elevated turbidity concentrations are recorded. In this event, all upstream silt traps and drainage routes will be inspected to identify the cause of the elevated turbidity levels. Works will not recommence until any issues have been resolved and the turbidity concentrations have returned to background concentrations		
MM79	Drainage Maintenance & Water Quality	EIAR Chapter 9	Any excess build-up of silt sediment levels at dams, the settlement ponds, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. During the construction phase field testing (visual, supplemented with pH, electrical conductivity, temperature, dissolved oxygen and turbidity monitoring), sampling and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for each primary watercourse, and specifically following heavy		

² example suite: pH (field measured), Electrical Conductivity (field measured), temperature (field measured), Dissolved Oxygen (field measured), Turbidity (NTU) (sonde measured), Flow (m/s), Total Suspended Solids (mg/l), Ammonia, Nitrite (NO₂) (mg/l), Ortho-Phosphate (P) (mg/l), Nitrate (NO₃) (mg/l), Phosphorus (unfiltered) (mg/l), Chloride (mg/l), and BOD (mg/l).

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				rainfall events (i.e. weekly, monthly and event-based). The data will be processed and analysed and works will cease if elevated turbidity concentrations are recorded. In this event, all upstream silt traps and drainage routes will be inspected to identify the cause of the elevated turbidity levels. Works will not recommence until any issues have been resolved and the turbidity concentrations have returned to background concentrations.		
MM80		Excavation Dewatering	EIAR Chapter 9	<p>Management of excavation seepages and subsequent treatment prior to discharge into the drainage network will be undertaken as follows:</p> <ul style="list-style-type: none"> ➤ Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place; ➤ If required, pumping of excavation inflows will prevent the build-up of groundwater in the excavation; ➤ The interceptor drainage will be discharged to the existing drainage system or onto the bog surface within the overall bog drainage and treatment system; ➤ 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; ➤ There will be no direct discharge to the existing bog drainage network and therefore no risk of hydraulic loading or contamination will occur; and, ➤ Daily monitoring of excavations and the water treatment system by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work will immediately be stopped, and a geotechnical assessment will be undertaken. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM81		Piling Works	EIAR Chapter 9	<p>Proposed mitigation measures relative to piling works will comprise:</p> <ul style="list-style-type: none"> ➤ Where driven piles are used, they will have a cross section without re-entrant angles; ➤ Strict QA/QC procedures for piling works will be followed; ➤ Piles will be kept vertical during piling works; ➤ Good workmanship will be employed during all piling works; and, ➤ Where required use bentonite seal to prevent upward/downward movement of surface water/groundwater. 		
MM82		Hydrocarbons	EIAR Chapter 9	<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 proposed site to where machinery is located. The 4x4 jeep/fuel truck will also carry fuel absorbent materials for the event of any accidental spillages. The fuel bowser will be parked in a designated location 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 available during all refuelling operations and used when required; ➤ Fuel volumes stored on site will be minimised. Any storage areas will be bunded appropriately for the fuel storage volume during the construction phase; ➤ An emergency plan for the construction phase to deal with accidental spillages will be contained within the Construction Environmental Management Plan (Appendix 4-3). Spill kits will be available to deal with accidental spillages. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM83		Release of Cement Based Products	EIAR Chapter 9	<p>Mitigation by Avoidance:</p> <ul style="list-style-type: none"> ➤ No batching of wet-cement products on-site is proposed. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will be the design approach; ➤ Where possible pre-cast elements for culverts and concrete works will be used; ➤ No washing out of the main body of any plant used in concrete transport or concreting operations will be allowed on-site; ➤ Where concrete is delivered on site, only the concrete truck chute will 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 will be isolated in temporary lined wash-out pits located near proposed site compounds. These temporary lined wash-out pits will be removed from the site their utility is no longer required or at the end of the construction phase; ➤ Any washing out of concrete pumping plant will also be into the temporary lined wash-out pits. ➤ Weather forecasts will be used to plan dry days for pouring concrete; and, ➤ Construction contractors will ensure each concrete pour site is free of standing water and plastic covers will be available in case of a sudden rainfall event. 		
MM84		Groundwater and Surface Water Contamination	EIAR Chapter 9	<ul style="list-style-type: none"> ➤ There are a total of 4 no. proposed construction compounds associated with the Proposed Development; ➤ During the construction phase, self-contained port-a-loo with an integrated waste holding tank will be used at each of the site 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		from Wastewater Disposal		<p>compounds, maintained by the providing contractor, and removed from the site on completion of the construction works;</p> <ul style="list-style-type: none"> ➤ Water supply for the site office and other sanitation will be brought to site and removed after use by a licensed contractor to be discharged at a suitable off-site treatment location; and, ➤ No water or wastewater will be sourced on the site, nor discharged to the site. 		
MM85		Transport Delivery Route	EIAR Chapter 9	<p>Mitigation by Avoidance:</p> <p>A constraint/buffer zone will be maintained for all upgrade works locations where possible. In addition, measures which are outlined below will be implemented to ensure that silt laden or contaminated surface water runoff from the excavation work does not discharge directly to the watercourse.</p> <p>The purpose of the constraint zone is to:</p> <ul style="list-style-type: none"> ➤ Avoid physical damage to surface water channels; ➤ Provide a buffer against hydraulic loading by additional surface water run-off; ➤ Avoid the entry of suspended sediment and associated nutrients into surface waters from excavation and earthworks; ➤ Provide a buffer against direct pollution of surface waters by pollutants such as hydrocarbons; and, ➤ Provide a buffer against construction plant and materials entering any watercourse. <p>General Best Practice Pollution Prevention Measures will also include:</p>		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> > No stock-piling of construction materials will take place within environmental buffer zones. No refuelling of machinery or overnight parking of machinery is permitted in this area; > No concrete truck chute cleaning is permitted in this area; > Works shall not take place at periods of high rainfall, and shall be scaled back or suspended if heavy rain is forecast; > Plant will travel slowly across bare ground at a maximum of 5km/hr. > Machinery deliveries shall be arranged using existing structures along the public road; > All machinery operations shall take place away from the stream and ditch banks, although no instream works are proposed or will occur; > Any excess construction material shall be immediately removed from the area and taken to a licensed waste facility or the on-site spoil management areas; > No stockpiling of materials will be permitted in the constraint zones; > Spill kits shall be available in each item of plant required; and, > Silt fencing will be erected on ground sloping towards watercourses at the stream crossings if required. <p>Mitigation Measures relating to the use and storage of fuels and chemicals in terms of groundwater protection:</p> <ul style="list-style-type: none"> > Onsite re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser, as described in Section Error! Reference source not found.. No maintenance of construction vehicles or plant will take place along the temporary junction works areas; > The plant used will be regularly inspected for leaks and fitness for purpose; and, > Spill kits will be available to deal with accidental spillage. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Operational Phase						
MM86		Replacement of Natural Surface with Lower Permeability Surfaces	EIAR Chapter 9	<p>As part of the Proposed Developments drainage design, it is proposed that runoff from the proposed infrastructure will be collected locally in new proposed silt traps, settlement ponds and vegetated buffer areas prior to release into the existing bog drainage network. The new proposed drainage measures will then create significant additional attenuation to what is already present. The operational phase drainage system will be installed and constructed in conjunction with the existing bog drainage network and will include the following mitigation measures:</p> <ul style="list-style-type: none"> ➤ Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed into downstream field drains; ➤ Collector drains will be used to gather runoff from access roads and turbine hardstanding areas of the site likely to have entrained suspended sediment, and channel it to new local settlement ponds for sediment settling; ➤ On sections of access road transverse drains ('grips') will be constructed where appropriate in the surface layer of the road to divert any runoff off the road into swales/roadside drains; ➤ Check dams will be used along sections of access road drains to intercept silt at source. Check dams will be constructed from a 4/40mm non-friable crushed rock; ➤ Settlement ponds, emplaced downstream of access road sections and at turbine locations, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to existing drains; 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ Settlement ponds will be designed in consideration of the greenfield runoff rate, existing bog settlement ponds will also buffer discharges from the bogs; and, ➤ Finally, all surface water runoff from the development will pass through the existing settlement ponds at the existing bog outfall locations. 		
MM87		Wastewater	EIAR Chapter 9	It is proposed to install a sealed underground holding tank for effluent (wastewater) from the substation building. The tank shall be routinely emptied by a licensed contractor. A level sensor will be installed in the tank which shall be linked to the on-site SCADA system. If the level of the tank contents rise to a predetermined 'high' level a warning shall appear on the overall SCADA system for the site and automatic notification shall be sent to the facility manager. A formal service agreement will be entered into with a suitably permitted waste contractor, in relation to the servicing and de-sludging of the wastewater holding tank on site.		
Decommissioning Phase						
MM88		Decommissioning	EIAR Chapter 9	<p>During decommissioning, it will be possible to reverse or at least reduce some of the potential effects caused during construction, and to a lesser extent operation, by rehabilitating constructed areas such as turbine bases and hardstanding areas. This will be done by re-establishing vegetation, thereby reducing runoff and sediment loads.</p> <p>Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures.</p>		
Chapter 10 Air & Climate						
Construction Phase						
MM89		Exhaust Emissions Greenhouse Gas Emissions	EIAR Chapter 10	<p>Exhaust Emissions during construction of turbine and other infrastructure:</p> <ul style="list-style-type: none"> ➤ Construction staff will be trained how to inspect and maintain construction vehicles and plant to ensure good operational order while onsite, thereby minimising any emissions that arise. The Site Supervisor/Construction Manager produce and follow a site 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<p>inspection and machinery checklist which will be followed and updated if/when required.</p> <ul style="list-style-type: none"> > Machinery will be switched off when not in use. > Turbines and construction materials will be transported to the site on specified routes only, unless otherwise agreed with the Planning Authority. Please see Chapter 14 Material Assets for details. > 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. > A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-3). The CEMP includes dust suppression measures. <p>Borrow Pits:</p> <ul style="list-style-type: none"> > Measures pertaining to exhaust emissions from turbine and other infrastructure construction will be implemented for the construction of the borrow pits. > Sporadic wetting of loose stone surface in the borrow pits will be carried out during the construction phase to minimise movement of dust particles to the air. In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and site compound to prevent the generation of dust where required. Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff. > All plant and materials vehicles shall be stored in dedicated areas (on site). > Wheel wash bays will be located at both the main site entrances into Ballivor Bog and Carranstown Bog off the R156. All vehicles 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<p>will go through the wheel wash prior to exiting the site to ensure no materials are carried onto the local road network.</p> <ul style="list-style-type: none"> ➤ Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction. ➤ The transport of construction materials from the borrow pits around the site will be undertaken in tarpaulin or similar covered vehicles, where necessary. <p>Transportation of Materials to site:</p> <ul style="list-style-type: none"> ➤ Measures listed in the section above pertaining to exhaust emissions from turbine, other infrastructure and borrow pit construction will be implemented for the transportation of vehicles to and from the Wind Farm Site. ➤ Aggregate materials for the construction of site access tracks and all associated infrastructure will all be locally sourced, where possible, which will further reduce potential emissions. ➤ Turbines and construction materials will be transported to the site on specified haul routes only. ➤ The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as necessary. 		
MM90		Dust Emissions Greenhouse Gas Emissions	EIAR Chapter 10	<ul style="list-style-type: none"> ➤ Sporadic wetting of loose stone surface will be carried out during the construction phase to minimise movement of dust particles to the air. In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and site compound to prevent the generation of dust where required. Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ All plant and materials vehicles shall be stored in dedicated areas (on site). ➤ Wheel wash bays will be located at both the main site entrances into Ballivor Bog and Carranstown Bog off the R156. All vehicles will go through the wheel wash prior to exiting the site to ensure no materials are carried onto the local road network. ➤ 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. ➤ A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-3). The CEMP includes dust suppression measures. ➤ Construction staff will be trained how to inspect and maintain construction vehicles and plant to ensure good operational order while onsite, thereby minimising any emissions that arise. The Site Supervisor/Construction Manager produce and follow a site inspection and machinery checklist which will be followed and updated if/when required. ➤ The transport of construction materials from the borrow pits around the site will be undertaken in tarpaulin or similar covered vehicles, where necessary. ➤ Aggregate materials for the construction of site access tracks and all associated infrastructure will all be locally sourced or onsite where possible, which will further reduce potential emissions. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Operational Phase						
MM91		Exhaust, Dust and Greenhouse Gas Emissions	EIAR Chapter 10	<ul style="list-style-type: none"> ➤ Maintenance vehicles brought onsite during the operational phase will be maintained in good operational order, thereby minimising any emissions that arise. ➤ Amenity carparks are spread out throughout the Wind Farm Site thus minimising the potential for traffic delays due to congestion building up at site entrance points and consequently further exhaust emissions 		
Decommissioning Phase						
MM92		Decommissioning Phase	EIAR Chapter 10	The mitigation measures prescribed for the construction phase of the Proposed Development will be implemented during the decommissioning phase thereby minimising any potential impacts.		
EIAR Chapter 11 Noise						
Pre- Construction Phase						
MM93		Construction Noise	EIAR Chapter 11	Local residents will be kept informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern;		
Construction Phase						
MM94		Construction Noise	EIAR Chapter 11	<p>Good site practices will be implemented to minimise the likely effects. Section 8 of BS5228-1:2009+A1:2014 recommends a number of simple control measures as summarised below that will be employed onsite:</p> <ul style="list-style-type: none"> ➤ Local residents will be kept informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern; ➤ No plant used on site will be permitted to cause an on-going public nuisance due to noise. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations. ➤ All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract. ➤ Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers. ➤ Machinery that is used intermittently will be shut down during periods when not in use. ➤ Any plant, such as generators or pumps, which is required to operate close to NSL's outside of general construction hours will be surrounded by an acoustic enclosure or portable screen. ➤ During the course of the construction programme, supervision of the works will include ensuring compliance with the limits detailed in Section 11.3.2 using methods outlined in British Standard BS 5228-1:2009+A1:2014 <i>Code of practice for noise and vibration control on construction and open sites – Noise</i>. ➤ The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 7:00hrs and 19:00hrs Monday to Friday and 7:00hrs to 1400hrs Saturday. However, to ensure that optimal use is made of good weather periods or at critical periods within the programme (i.e. concrete pours, rotor/tower deliveries) it will be necessary on occasion to work outside of these hours. 		
Operational Phase						

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM95	Operational Phase Noise	EIAR Chapter 11	<p>An assessment of the operational noise levels has been undertaken in accordance with best practice guidelines and procedures as outlined in Section Error! Reference source not found. of this Chapter. The findings of the assessment, presented in Section Error! Reference source not found. confirms that the predicted operational noise levels will be within the relevant best practice noise criteria curves for wind farms at all locations.</p> <p>In the unlikely event that an issue with low frequency noise is associated with the Proposed Development, an appropriate detailed investigation will be undertaken. Due consideration will be given to guidance on conducting such an investigation which is outlined in Appendix VI of the EPA document entitled <i>Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities</i> (NG4) (EPA, 2016). This guidance is based on the threshold values outlined in the Salford University document <i>Procedure for the assessment of low frequency noise complaints, Revision 1, December 2011</i>. If an exceedance of the threshold values is confirmed, measures to mitigate low frequency noise at noise-sensitive locations will be implemented through operational controls for the relevant turbine type, which may include turbine curtailment and/or stopping turbines under specific operational conditions.</p> <p>In the event that a confirmed complaint is received which indicates potential amplitude modulation (AM) associated with turbine operation, the operator will employ an independent acoustic consultant to assess the level of AM in accordance with the methods outlined in the Institute of Acoustics (IoA) Noise working Group (Wind Turbine Noise) Amplitude Modulation Working Group (AMWG) namely, <i>A Method for Rating Amplitude Modulation in Wind Turbine Noise</i> (August 2016) or subsequent revisions. These mitigation measures, if required, will consist of the implementation of operational controls for the relevant turbine type, which will include turbine curtailment and/or stopping turbines under specific operational conditions.</p>		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
EIAR Chapter 12 Cultural Heritage						
Pre-construction Phase						
MM96		Archaeological Monitoring Licence	EIAR Chapter 12	<p>Application request to national Monuments Service in advance of ground works during the construction phase.</p> <p>Archaeological monitoring (under licence from the National Monuments Service) to monitor any pre-construction geotechnical engineering investigations prior to construction, if required.</p>		
Construction Phase						
MM97		Sub Surface Archaeological Potential	EIAR Chapter 12	<ul style="list-style-type: none"> ➤ Archaeological monitoring (under licence from the National Monuments Service) of any further geotechnical / engineering trial pits or investigations and a report detailing the results of same. ➤ Archaeological monitoring of ground works during construction. This will include all excavation works within the EIAR site boundary as well as any topsoil removal along the haul route. If archaeological finds, features or deposits are uncovered during archaeological monitoring, the developer will be prepared to provide resources for the resolution of such features whether by preservation by record (excavation) or preservation in situ (avoidance). Once the project is completed, a report on the results of the monitoring will be compiled and submitted to the relevant authorities. The National Monuments Service will be informed of such findings and either preservation in situ (avoidance) or preservation by record (archaeological excavation) will be required. 		
Chapter 14 Material Assets - Traffic						
Chapter 14 – Traffic						

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Pre- Construction						
MM98		Traffic		<p>Prior to the commencement of the construction phase of the Proposed Development a detailed Traffic Management Plan will be prepared by the Contractor for agreement with the relevant local authorities and An Garda Síochána . The TMP includes recommendations, which will include the measures below as a minimum requirement, for the following:</p> <ul style="list-style-type: none"> ➤ Traffic Management Coordinator – a competent Traffic Management Co-ordinator will be appointed for the duration of the project and this person will be the main point of contact for all matters relating to traffic management. ➤ Delivery Programme – a programme of deliveries will be submitted to the County Council in advance of deliveries of turbine components to site. Liaison with the relevant local authorities and Transport Infrastructure Ireland (TII) will be carried out where required regarding requirements such as delivery timetabling. The programme will ensure that deliveries are scheduled in order to minimise the demand on the local network and minimise the pressure on the access to the site. ➤ Information to locals – Locals in the area will be informed of any upcoming traffic related matters e.g. temporary lane/road closures (where required) or delivery of turbine components at night, via letter drops and posters in public places. Information will include the contact details of the Project Co-ordinator, who will be the main point of contact for all queries from the public or local authority during normal working hours. An "out of hours" emergency number will also be provided. ➤ A Pre and Post Construction Condition Survey – Where required by the local authority, a pre-condition survey of roads associated 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<p>with the Proposed Development will 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.</p> <ul style="list-style-type: none"> ➤ Liaison with the relevant local authority - Liaison with the County Councils and An Garda Síochána I, will be carried out during the delivery phase of the large turbine vehicles, when an escort for all convoys will be required. Once the surveys have been carried out and “prior to commencement” status of the relevant roads established, (in compliance with the provisions of the CEMP), the Roads section will be informed of the relevant names and contact numbers for the Project Developer/Contractor Site Manager as well as the Site Environmental Manager. ➤ Implementation of temporary alterations to road network at critical locations – at locations highlighted in section 14.1.8. In addition, in order to minimise the impact on the existing environment during turbine component deliveries the option of blade adaptor trailers will also be used where deemed practicable. ➤ Identification of delivery routes – These routes will be agreed with the County Councils and adhered to by all contractors. ➤ Delivery times of large turbine components - The management plan includes the option to deliver the large wind turbine plant components at night in order to minimise disruption to general traffic during the construction stage. ➤ Travel plan for construction workers – While the assessment above has assumed the worst case in that construction workers will drive 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<p>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.</p> <ul style="list-style-type: none"> ➤ Additional measures - Various additional measures will be put in place in order to minimise the effects of the development traffic on the surrounding road network including wheel washing facilities on site and sweeping / cleaning of local roads as required. These are set out in the CEMP which is contained in Appendix 4.3. ➤ Re-instatement works - All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers. 		
Construction Phase						
MM99		Traffic		<p>The construction of this development will require significant coordination and the following comprehensive set of mitigation measures will be put in place before and during the construction stage of the project in order to minimise the effects of the additional traffic generated by the proposed wind farm.</p> <p>Delivery of abnormal sized loads</p> <p>The following are the main points to note for these deliveries. These will take place after peak evening traffic:</p> <ul style="list-style-type: none"> ➤ The delivery of turbine components is a specialist transport operation with the transportation of components carried out at night when traffic is at its lightest and the impact minimised. ➤ The deliveries will be made in consultation with the Local Authority and An Garda Síochána. ➤ The delivery of turbine components is a specialist transport operation with the transportation of components carried out at night when traffic is at its lightest and the impact minimised. 		

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
				<ul style="list-style-type: none"> ➤ The turbine component deliveries will be made in consultation with the Local Authority and An Garda Síochána. ➤ It is estimated that 234 abnormal sized loads will be delivered to the site, comprising 47 convoys of 5 abnormal vehicles and loads, undertaken over 47 separate nights. ➤ These nights will be spread out over an approximate period of 24 weeks and will be agreed in advance with the relevant authorities. ➤ In order to manage each of the travelling convoys, for each convoy there will be two police escort vehicles that will stop traffic at the front and rear of the convoy of 5 vehicles. ➤ There will also be two escort vehicles provided by the haulage company for each convoy. 		
Decommissioning Phase						
MM100		Decommissioning	EIAR Chapter 14	When the Proposed Development is decommissioned, a decommissioning plan will be prepared for agreement with the local authority, as described in Chapter 4. This plan will include a traffic management plan and other similar mitigation measures to those implemented during the construction phase. In terms of traffic effects the decommissioning stage will generally mirror the constructions stage although the effects will be significantly reduced as the volumes of materials removed from the site will be less.		
Chapter 14 Other Material Assets						
Pre- Construction						
Construction Phase						

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM101		Overhead Lines	EIAR Chapter 14	<ul style="list-style-type: none"> ➤ Goal posts will be established under the overhead line for the entirety of the construction phase. They will not exceed a height of 4.2 metres, unless specifically agreed with ESB Networks ➤ The suitability of machinery and equipment for use near power lines will be risk assessed. ➤ All staff will be trained on operating voltages of overhead electricity lines running the site. All staff will be trained to be aware of the risks associated with overhead lines. All contractors that may visit the sites are made aware of the location of lines before they come on to site. ➤ Barriers will run parallel to the overhead line at a minimum horizontal distance of 6 metres on plan from the nearest overhead line conductor wire. ➤ When activities must be carried out beneath overhead lines, e.g. component delivery or substation construction, a site-specific risk assessment will be undertaken prior to any works. The risk assessment must take into account the maximum potential height that can be reached by the plant or equipment that will be used prior to any works. Overhead line proximity detection equipment will be fitted to machinery when such works are required. ➤ Information on safe clearances will be provided to all staff and visitors. ➤ Signage indicating locations and health and safety measures regarding overhead lines will be erected in canteens and on site. ➤ All staff will be made aware of and adhere to the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021'. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan. 	MM91	Overhead Lines

Ref. MM no.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			All health and safety measures as detailed in the Construction Environment Management Plan and Chapter 5 Population and Human Health will be adhered to during the construction, operation and decommissioning phases.		
MM102	Waste Management	EIAR Chapter 14	<ul style="list-style-type: none"> ➤ 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 waste streams generated on site will be deposited into a single waste skip. This waste material will be transferred to a Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal. ➤ The waste generated from the turbine erection will be limited to the associated protective covers which are generally reusable. Considering the specialist nature of this packaging material the majority will be taken back by suppliers for their own reuse. Any other packaging waste generated from the turbine supply will be deposited into the on-site skips and subsequently transferred to the MRF. ➤ It is not envisaged that there will be any waste material arising from the materials used to construct the site roads as only the quantity of stone necessary will be sourced from local quarries and brought on site on an 'as needed' basis. ➤ Site personnel will be instructed at induction that under no circumstances can waste be brought to site for disposal in the on-site waste skip. It will also be made clear that the burning of waste material on site is forbidden. 	MM92	Waste Management

Ref. no.	MM	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Operational Phase						
MM103		Tele-communications	EIAR Chapter 14	In the event of interference occurring to telecommunications, the Department of the Environment, Heritage and Local Government Wind Farm Planning Guidelines (2006) state that these effects can be dealt with by the use of divertor relay links out of line with the proposed wind turbines.		
MM104		Aviation	EIAR Chapter 14	<ul style="list-style-type: none"> ➤ Turbines will be illuminated by high intensity obstacle lights that will allow the hazard to be identified and avoided by aircraft in flight (and in liaison with IAA requirement No.1 below) ➤ Obstruction lights will be incandescent or of a type visible to Night Vision Equipment. ➤ Obstruction lighting fitted to obstacles must emit light at the near Infra-Red (IR) range of the electromagnetic spectrum specifically at or near 850 nanometres (nm) of wavelength. Light intensity to be of similar value to that emitted in the visible spectrum of light ➤ Provide as-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location and <p>Notify the Authority of intention to commence crane operations with at least 30 days prior notification of their erection.</p>		
Decommissioning						
MM105		Decommissioning	EIAR Chapter 14	The measures outlined for the construction phase are considered the same for the decommissioning phase.		

8. **MONITORING PROPOSALS**

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

This section of the Construction and Environment Management Plan groups together all of the monitoring proposals presented in the EIAR. The monitoring proposals are presented in the following pages.

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

Table 8-1 Monitoring Measures for pre commencement, construction, operation and decommissioning phases of the proposed Ballivor Wind Farm

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
Pre-Construction Phase						
MX1	Drainage Maintenance	EIAR Chapter 4	An inspection and maintenance plan for the drainage system on site will be prepared in advance of commencement of any works. Regular inspections of all installed drainage systems will be necessary, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water at parts of the systems where it is not intended. The inspection of the drainage system will be the responsibility of the site ECoW or the Project Hydrologist.	On going	Monthly	Project Hydrologist
MX2	Drainage Inspection		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.	As Required	Monthly	Project Hydrologist
MX3	Surface Water Monitoring	CEMP Section 4	Baseline sampling will be completed on at least two occasions and these will coincide with low flow and high flow stream conditions. The high flow sampling event will be undertaken after a period of sustained rainfall, and the low flow event will be undertaken after a dry spell.	Twice (Minimum)	As Required	Project Hydrologist
MX4	Invasive Species	EIAR Chapter 6	A pre-commencement invasive species survey shall be completed for the site.	Once	As required	Project Ecologist
MX5	Badger-Disturbance/D isplacement	EIAR Chapter 6	A pre-construction badger survey will be undertaken at the location of the identified setts at Carranstown Bog by a qualified ecologist prior to the commencement of any works to determine if the setts are in use and to identify any additional sett entrances that may have been excavated in the intervening period.	Once	Post Survey	Project Ecologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			<p>The outlier sett within the footprint of the proposed substation will be monitored for 2 weeks prior to construction using a camera trap to determine if it is in use.</p> <p>If the outlier sett in the construction footprint is found to be in use exclusion measures will be put in place prior to construction in line with NRA Guidelines³ to ensure that the sett is evacuated.</p> <p>As per NRA guidelines exclusion from an active sett will only be carried out during the period of July to November inclusive in order to avoid the badger breeding season.</p>			
MX6	Bats	EIAR Chapter 6	<p>3-year post-construction monitoring for bats will include:</p> <ul style="list-style-type: none"> • Static surveys • Transect surveys • Carcass searches 	Seasonal	Seasonal	Project Ecologist
MX7	Birds	EIAR Chapter 7	<p>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). Pre-commencement surveys will be undertaken prior to the initiation of works at the wind farm. Any requirement for construction works to run into the subsequent breeding season following commencement will be subject to a repeat of the pre-commencement bird surveys to confirm the absence of</p>	Once	As required	Project Ornithologist

³ National Roads Authority (2006) Guidelines for the treatment of badgers prior to the construction of National Road Schemes.

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			<p>breeding birds of conservation concern. The survey will aim to identify sensitive sites e.g. nests or roosts depending on the season in question.</p> <p>Monitoring will be undertaken by a suitably qualified ornithologist. The survey will include a thorough walkover survey to a 500m radius of the development footprint and/or all works areas, where access allows. If winter roosts or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the construction phase. If the roost/nest is found to be active during the construction phase survey no works shall be undertaken within a species-specific buffer (as per Goodship, N.M. and Furness, R.W. 2022) in line with best practice. No works within the buffer zone shall be permitted until it can be demonstrated that that birds of conservation concern are no longer reliant on the roost/nest site.</p>			
Construction Phase						
MX8	Archaeological Monitoring	EIAR Chapter 12	<p>Archaeological monitoring (under licence from the National Monuments Service) of any further geotechnical / engineering trial pits or investigations and a report detailing the results of same.</p> <p>Archaeological monitoring of ground works during construction. This will include all excavation works within the EIAR site boundary as well as any topsoil removal along the haul route. If archaeological finds, features or deposits are uncovered during archaeological monitoring, the developer will be prepared to provide resources for the resolution of such features whether by preservation by record (excavation) or</p>	As Required	As Required	Project Archaeologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			preservation in situ (avoidance). Once the project is completed, a report on the results of the monitoring will be compiled and submitted to the relevant authorities. The National Monuments Service will be informed of such findings and either preservation in situ (avoidance) or preservation by record (archaeological excavation) will be required.			
MX9	Water Quality and Monitoring	CEMP Section 3	The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the ECoW on-site. The ECoW or Project Hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible.	Daily	As Necessary	ECoW
MX10	Water Quality and Monitoring	EIAR Chapter 9	Daily surface water monitoring forms will be utilised at every works site near any watercourse. These will be taken daily and kept on site for record and inspection.	Daily	As Necessary	ECoW
MX11	Surface Water Quality	CEMP Section 4	Baseline laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken as per water monitoring programme for the Proposed Development and each primary watercourse along the route. This will not be restricted to just these locations around the proposed renewable energy development site with further sampling points added as deemed necessary by the ECoW in consultation with the Project Hydrologist and Site Manager. 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 Project Hydrologist will monitor and advise on the readings collected by in-situ field monitoring.	As Required	Monthly	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX12	Surface water Quality Monitoring	CEMP Section 4	During the construction phase, a field monitoring campaign will be undertaken in local streams where construction activity takes place which can affect water quality. This involves a) visual checks of drainage and streams, and b) daily measurements of field parameters temperature, pH, specific electrical conductivity (SEC), alkalinity and turbidity. Field measurements will be taken once a day, upstream and downstream of the construction activity. The field campaign will begin one week prior to activity and cease one week after activity is completed, unless observations dictate that measurements should continue. If visible impact occurs, works will be suspended at the discretion of the supervising engineer, in which case the problem will be identified and corrective action taken before recommencing works. Refer to Section 9.3.13 of the EIAR.	Daily	As Necessary	EcOW
MX13	Plant and Equipment Inspections	EIAR Chapter 5, Section 9 CEMP Section 4	The plant used should be regularly inspected for fuel leaks, unnecessary noise generation and general fitness for purpose.	As Required	Monthly	ECoW
MX14	Plant and Equipment Inspections	EIAR Chapter 5, Section 9 CEMP Section 4	Local areas of the haul route will be condition monitored and maintained, if necessary.	Daily	Monthly	ECoW
MX15	Flora and Fauna	CEMP Section 4	A Project Ecologist will be appointed. The responsibilities and duties of the Project Ecologist will include the following:	As required	As required	Project Ecologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			<ul style="list-style-type: none"> ➤ Inform and educate on-site personnel of the ornithological and ecological sensitivities within the Proposed Development area. ➤ Oversee management of ornithological and ecological issues during the construction period and advise on ornithological issues as they arise. ➤ Provide guidance to contractors to ensure legal compliance with respect to protected species onsite. ➤ Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress. 			
MX16	Noise and Vibration	Section 11 CEMP	Monitoring typical levels of noise and vibration during critical periods and at sensitive locations will be carried out.	Daily	Monthly	ECoW
Operational Phase						
MX17	Surface Water Quality	CEMP Section 4	Monthly sampling for laboratory analysis for a range of parameters adopted during pre-commencement and construction phases will continue for six months during the operational phase. The Project Hydrologist will monitor and advise on the readings being received from the testing laboratory.	Monthly	Monthly	ECoW
MX18	Drainage Inspections	CEMP Section 3	The drainage system will be monitored in the operational phase until such a time that all areas that have been reinstated become re-vegetated and the natural drainage regime has been restored.	Monthly	Monthly	ECoW
MX19	Ornithology	EIAR Chapter 7	The programme of works will monitor parameters associated with a collision, displacement/barrier effects and habituation during the lifetime of the project. Surveys will be scheduled to coincide with Years 1, 2, 3, 5, 10 & 15 of the life-time of the wind farm. Monitoring measures are broadly based on	Years 1, 2, 3, 5, 10, 15	Monthly	Project Ornithologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			<p>guidelines issued by the Scottish Natural Heritage (SNH, 2009).</p> <p>The following individual components are proposed:</p> <ul style="list-style-type: none"> ➤ Monthly flight activity surveys: vantage point surveys. ➤ Breeding Bird surveys: Adapted Brown & Shepard ➤ Annual kestrel nest box monitoring ➤ Targeted bird collision surveys (corpse searches) will be undertaken with trained dogs. The surveys will include detection and scavenger trials, to correct for these two biases and ensure the resulting data is robust. <p>The proposed programme of monitoring was not proposed in response to any identified significant effect but rather as a best practice measure (SNH, 2009). The monitoring is comprehensive and considered entirely adequate in this regard. The results of this monitoring will be reported to the Planning Authority following each monitoring year and will include recommendations that may inform additional mitigation or adaptation if required.</p>			
MX20	Bats	EIAR Chapter 6 Appendix 6-2	<p><u>Bat Monitoring Plan</u> includes for 3 years of post-construction monitoring is required to assess the effects of construction related habitat modification on bat activity i.e. the 50 metre separation between the proposed turbine blade tips and the nearest landscape feature, or the influence of aviation lighting. Post construction monitoring will include static detector surveys, walked survey</p>	Years 1, 2, 3	Annually	Project Ecologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			<p>transects and corpse searching to record any bat fatalities resulting from collision.</p> <p>The results of post construction monitoring shall be utilised to assess changes in bat activity patterns post construction and to monitor the implementation of the mitigation strategy. At the end of Year 1, and if a curtailment requirement is identified (i.e. significant bat fatalities encountered), a curtailment programme shall be devised around key activity periods and weather parameters in accordance with NIEA Guidance. The performance of any curtailment programme in terms of its ability to respond to the changes in bat abundance based on temperature and wind speed would be analysed to confirm the efficacy of the curtailment during different periods of bat activity. At the end of each subsequent year of monitoring, the efficacy of the curtailment programme will be reviewed, and any identified efficiencies incorporated into the curtailment programme. This approach allows for an evidence-based review of the potential or bat fatalities at the site, post construction, to ensure that the necessary measures, based on a new baseline post-construction, are implemented for the protection of bat species locally.</p>			
MX21	Flora and Fauna	EIAR Chapter 6 Appendix 6-5	<p>The Proposed Development has the potential to result in enhancement of the surrounding areas through habitat rehabilitation management (as described in the Biodiversity Management and Enhancement Plan) that will be implemented during the construction phase of the Proposed Development and maintained during the operational phase. Details of the management that will be undertaken are provided in the Biodiversity Management and Enhancement Plan in Appendix 6-4 of the EIAR. These include:</p>	See Appendix 6-5 for schedule	As required	Project Ecologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			<ul style="list-style-type: none"> > Drain blocking within degraded peatlands > Surface Peat Assessments > Vegetation Sampling > Hydrological Monitoring 			
Decommissioning Phase						
MX22	Decommissioning	DP Section 3	The Site Manager in consultation with the ECoW will be responsible for employing the services of a suitably qualified ecologist and any other suitably qualified professionals as required throughout the decommissioning works.	As required	As required	Site Manager
MX23	Decommissioning	DP Section 3	Prior to decommissioning, a suitably qualified ecologist will complete an invasive species survey of any material proposed for use as part of foundation backfilling. The invasive species survey will also be undertaken along the cable route to identify invasive species at joint bay locations where excavation to expose the cabling for removal will be required.	As required	As required	Project Ecologist
MX24	Birds	EIAR Chapter 7	Taking a precautionary approach, it is proposed that works will commence outside the bird nesting season (1st of March to 31st of August inclusive). Decommissioning monitoring surveys will be undertaken prior to works associated with decommissioning at the wind farm. The surveys will include a thorough walkover survey to a 500m radius of the development footprint and all works areas, where access allows. Any requirement for decommissioning works to run into the subsequent breeding season following commencement will be subject to a repeat of the decommissioning bird surveys to confirm the absence of breeding birds of conservation concern. If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the decommissioning phase. If it is found to be active	As required	As required	Project Ornithologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			during the decommissioning phase survey, no works shall be undertaken within a species-specific buffer (as per Goodship, N.M. and Furness, R.W. 2022), in line with industry best practise. No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied			

9. PROGRAMME OF WORKS

9.1 Construction Schedule

The construction phase will take approximately 30 months to complete from starting on site to the commissioning of the electrical system and export of electricity from site.

The EIAR stipulated that in the interest of breeding birds, construction would not commence during the breeding bird season, which runs from 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.

Construction activities will be carried out during normal daytime working hours (i.e. weekdays 0700 – 1900hrs and Saturdays 0700 – 1400hrs). However, to ensure that optimal use is made of good weather period or at critical periods within the programme (i.e. concrete pours) or to accommodate delivery of large turbine component along public routes it could be necessary on occasion to work outside of these hours. Any such out of hours working will be agreed in advance with the Local Authorities.

The phasing and scheduling main construction task items are outlined in Figure 9.1 below.

Figure 9-1 Indicative Construction Schedule

ID	Task Name	Task Description	Month 1-3	Month 3-6	Month 6-9	Month 9-12	Month 12-15	Month 15-18	Month 18-24	Month 24-30
1	Site Health and Safety									
2	Vertical Realignment of R156									
3	Site Compounds	Site Compounds, site access, fencing, gates								
4	Borrow pits	Access/site roads to borrow pits, borrow pit excavation, landscaping, fencing								
5	Site Roads	Construction/upgrade of roads, install drainage measures, install water protection measures								
6	Turbine Hardstands	Excavate/pile for turbine bases where required								
6	Turbine Foundations	Fix reinforcing steel and anchorage system, erect shuttering, concrete pour								
7	Substation Construction and Electrical Works	Construct substation, underground cabling, grid connection								
8	Backfilling and Landscaping									
9	Turbine Delivery and Erection									
10	Substation Commissioning									
11	Turbine Commissioning									

10. COMPLIANCE AND REVIEW

10.1 Site Inspections and Environmental Audits

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

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

10.2 Auditing

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.

10.3 Environmental Compliance

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

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

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

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

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

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

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

10.4 **Corrective Action Procedure**

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

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

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

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

10.5 **Construction Phase 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.