APPENDIX 4-9

CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN

Appendix 4-9 - Construction and Environmental Management Plan

Proposed Seven Hills Wind Farm, Co. Roscommon - EIAR

DOCUMENT DETAILS

Client:	**Energia Renewable ROI Ltd.**
Project Title:	**Proposed Seven Hills Wind Farm, Co. Roscommon - EIAR**
Project Number:	**190907**
Document Title:	**Appendix 4-9 - Construction and Environmental Management Plan**
Document File Name:	**CEMP - F - 2022.06.03 - 190907**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author(s)	Approved By
01	Draft	26/04/2022	KM	OC
02	Draft	25/05/2022	KM	OC
03	Draft	02/06/2022	KM	OC
03	Final	02/06/2022	KM	OC

Table of Contents

TABLE OF TABLES

TABLE OF PLATES

TABLE OF FIGURES

1. INTRODUCTION

This Construction and Environmental Management Plan (CEMP) has been developed by McCarthy Keville O' Sullivan Ltd (MKO) on behalf of Energia Renewables ROI Ltd who intend to apply to An Bord Pleanála for planning permission to construct the proposed Seven Hills Wind Farm (the Proposed Development) in County Roscommon.

This CEMP has been prepared in accordance with the mitigation measures and commitments made with the Environmental Impact Assessment Report (EIAR) and by the Natura Impact Statement (NIS) which will accompany the planning application for the Proposed Development to be submitted to the competent authorities. 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. Upon the Proposed Development securing 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 construction.

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

This CEMP identifies the key planning and environmental considerations that must be adhered to and delivered during site construction and operation. This report is intended as a single, amalgamated document that can be used during all phases of the Proposed Development, as a single consolidated point of reference relating to all construction, environmental and drainage requirements for the planning authority, developer and contractors alike.

1.1 Scope of the Construction and Environmental Management Plan

This report is presented as a guidance document for the construction and operational phases of the Proposed Development as detailed in Chapter 4 of this EIAR.

Where the term 'site' is used in the CEMP it refers to all works associated with the Proposed Development, including construction of turbines, hardstanding, grid connection, new access junctions and 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 and to protect

the surrounding environment from the possibility of any significant negative impacts arising from the Proposed Development.

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 anticipated construction methodologies that will be adopted throughout the project.

Section 3 sets out details of the environmental controls on site which looks at noise and dust controls. Site drainage measures, spoil management and a waste management plan are also included in this section.

Section 4 sets out a fully detailed implementation plan for the environmental management of the project outlining the roles and responsibilities of the project team. A water quality monitoring plan is also included in this section.

Section 5 outlines the Emergency Response Plan 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 implementation of the project, categorised into three separate headings, 1) pre-commencement measures; 2) construction-phase measures, 3) Operational-phase measures and 4) Decommissioning phase measures.

Section 7 consists of a summary table of all monitoring requirements and proposals to be adhered to during the implementation of the project, categorised into the following three separate headings; 1) Pre-commencement measures, 2) Construction-phase measures, 3) Operational-phase measures and 4) Decommissioning phase measures.

Section 8 sets out an anticipated 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 in the townland of Cuilleenoolagh and other adjacent townlands, Co. Roscommon. The Proposed Development will encompass 20 No. wind turbines, with a maximum ground to top blade tip height of up to 180m, upgrading of existing and provision of new internal access roads, construction of a new 110kV substation in the townland of Cam, along with 2 control buildings, a new grid connection to an existing substation at Monksland via underground 38 kV cable, and all associated infrastructure.

The Proposed Development EIAR Site Boundary measures approximately 588 hectares in total. The approximate location for the centre of the site is E587977, N745843. The Proposed Development will be located approximately 1.5 kilometres away northeast and southeast of the village of Dysart, and approximately 11 kilometres northwest/west of the town of Athlone, Co. Roscommon.

The proposed Grid Connection forms part of the planning application and its likely significant effects are assessed within the EIAR. It is proposed to construct a 110kV substation within the site and to connect from here to the existing Athlone 110kV substation, located approximately 11.3km to the east/southeast of the southern cluster, via underground cabling.

2.1.1 Description of the Development

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

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

The key components of the wind farm include the following:

i. *20 no. wind turbines with an overall ground to blade tip height of 180 metres, a rotor dimeter of 162m and a hub height of 99m, associated foundations, hard-standing areas*
ii. *15 no. spoil storage areas at hardstands of turbines no. 1, 2, 3, 4, 5, 6 and 7 (in the townlands of Turrock, Gortaphuill, Cronin, and Tullyneeny) and turbines no. 8, 10, 11, 13, 14, 17, 19 and 20 (in the townlands of Milltown, Cuilleenoolagh, Cloonacaltry, Feacle and Tawnagh)*
iii. *Provision of 1 no. permanent meteorological mast with a maximum height of 100 metres for a period of 30 years from the date of commissioning of the entire wind farm*
iv. *Provision of 1 no. 110kV onsite substation in the townland of Cam, along with associated control buildings, MV switchgear building, associated electrical plant, associated security fencing, and equipment and wastewater holding tank*
v. *All underground electrical and communication cabling connecting the proposed wind turbines to the proposed onsite substation and associated control buildings and plant*
vi. *All works associated with the connection of the proposed wind farm to the national electricity grid via underground 110kV cabling from the site to the existing Athlone 110kV substation located in the townland of Monksland. Cabling will be placed within the public road corridor of the R362, R363 and L2047, or on private land*
vii. *Upgrade works to the existing 110kV Athlone substation consisting of the construction of an additional dedicated bay to facilitate connection of the cable*
viii. *Provision of 2 no. new site accesses north and south from the R363 and upgrade of 1 no. junction south of the R363*
ix. *Provision of new access tracks/roads and upgrade of existing access tracks/roads*

x. *7 no. overburden storage areas*
xi. *2 no. temporary construction compounds*
xii. *Site drainage works*
xiii. *Operational stage site signage*
xiv. *All associated site development works, apparatus and signage*

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

2.2 Targets and Objectives

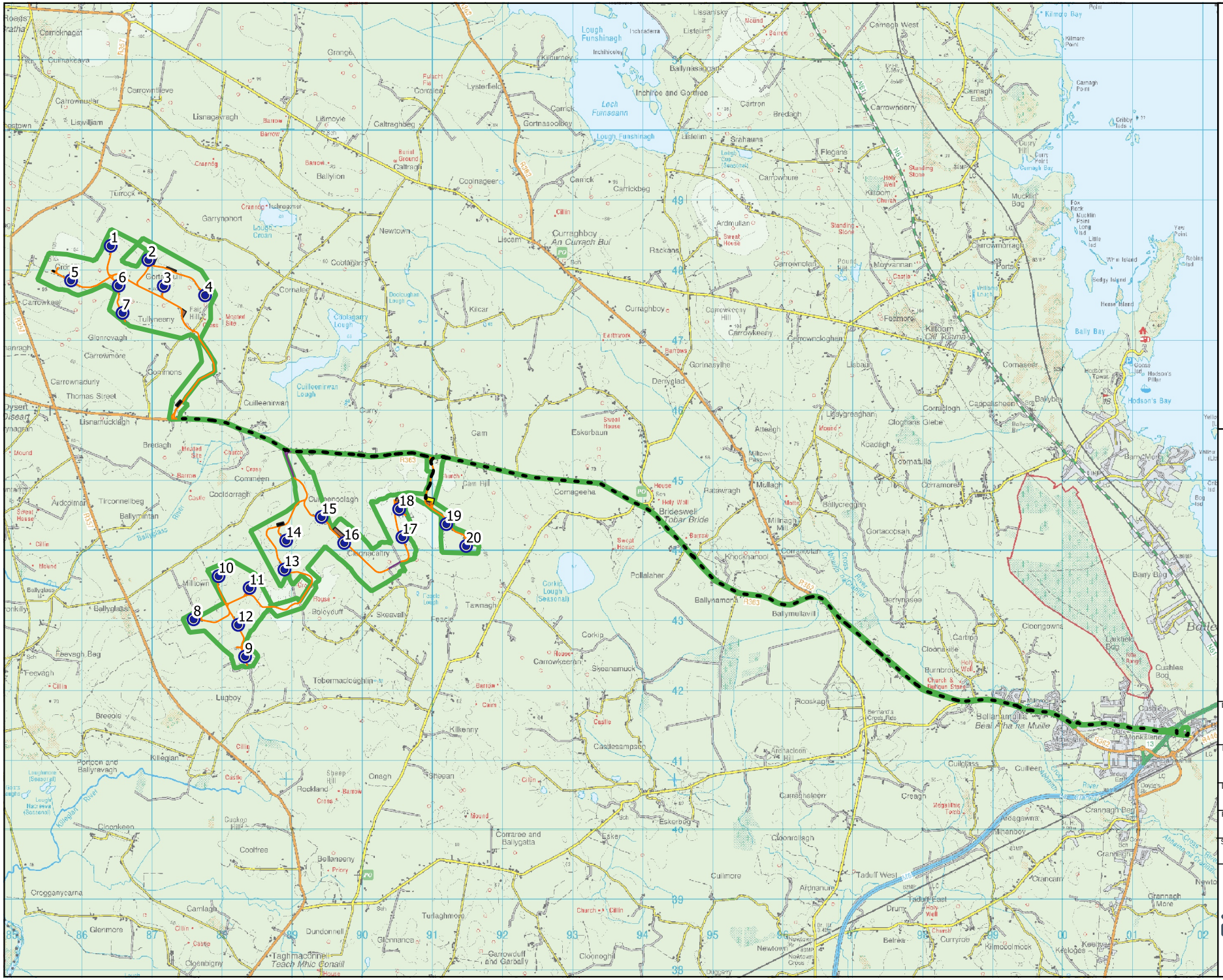
In so far as they have been completed to date, or are to be further completed in future, the construction phase works are designed to approved standards, which include specified materials, standards, specifications, and codes of practice. The design of the project has considered environmental issues,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

The key site targets are as follows:

- Ensure construction works and activities are completed in accordance with mitigation and best practice approach presented in the Environmental Impact Assessment Report (EIAR) and associated planning documentation;
- Ensure construction works and activities are completed in accordance with all planning documents for the development;
- Ensure construction works and activities have minimal impact/disturbance to local landowners and the local community;
- Ensure construction works and activities have minimal impact on the natural environment;
- Adopt a sustainable approach to construction; and,
- Provide adequate environmental training and awareness for all project personnel.

The key site objectives are as follows:

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



Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout
- Proposed Hardstands
- Proposed Access Roads
- Proposed Upgrades to Existing Access Roads
- Proposed 110kV Substation Location
- Proposed Construction Compounds
- Proposed Met Mast Location
- Proposed Overburden Storage Areas
- Infrastructure Overburden Storage Areas
- Proposed Connector Cabling and Grid Connection

N

Drawing Title

Proposed Layout

Project Title: Seven Hills Wind Farm, Co. Roscommon	
Drawn By: DN	Checked By: ÓM
Project No.: 190907	Drawing No.: Figure 2-1
Scale: 1:70500	Date: 01.06.2021

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

2.3 Overview of the Proposed Construction Methodology

2.3.1 Introduction

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

2.3.2 Overview of Proposed Construction Methodology

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

- Temporary Construction Compound;
- Drainage System;
- Upgrade of Existing Roads;
- New Site Access Roads;
- Turbine Foundations and Meteorological Mast Foundations;
- Crane Hardstands;
- Electricity Substation and Control Building;
- Overburden Storage Areas;
- Cable Trenching;
- Grid Connection;
- Watercourse Crossings – Grid Connection Cable Route;
- General Construction Measures
- Transport Route Accommodation Works;
- Decommissioning

2.3.2.1 Temporary Construction Compound

Two temporary construction compounds are proposed as part of the Proposed Development. Temporary construction compound No. 1 is located in the Northern Cluster, approximately 150m to the north of the northern site entrance. Temporary construction compound No. 2 is located in the Southern Cluster, approximately 200 meters north of Turbine no. 14. Both temporary construction compounds measure approximately 100 metres by 40 metres, with a footprint of 4,000 m^2 each, or a combined footprint of 8,000 m^2 for both compounds.

The location of the construction compounds is shown on the site layout drawings in Figure 2-1. The construction compounds will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors.

The compound will typically be constructed as follows:

- The area to be used as the compound will be marked out at the corners using ranging rods or timber posts. Drainage runs, and associated settlement ponds will be installed around the perimeter (refer to Section 3.2 below & EIAR Section 4.6);
- The compound will be established using a similar technique as the construction of the excavated site tracks as discussed below;
- Where required, a layer of geogrid will be installed, and compacted layers of well graded granular material will be spread and lightly compacted to provide a hard area for site offices and storage containers;

- Areas within the compound will be constructed as site roads and used as vehicle hard standings during deliveries and for parking;
- A bunded containment area will be provided within the compound for the storage of lubricants, oils and site generators etc.;
- If necessary the compound will be fenced and secured with locked gates, although fencing would only be utilised where significant risk of danger to third parties or vandalism is envisaged;
- Upon completion of the project the compound will be decommissioned by backfilling the area with the material arising during excavation, landscaping with topsoil as required;
- During the construction phase, a temporary toilet block unit will located within the temporary construction compound for use during the construction phase. Elsewhere on site, self-contained port-a-loo with an integrated waste holding tank will be used on site for toilet facilities. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by an appropriately consented waste collector to wastewater treatment plants, and;
- The water supply to the site will be from a temporary water storage tank which will be filled using a mobile water tank which will source water locally as required.

2.3.2.2 Drainage System

The drainage design for the Proposed Development has been prepared by Malachy Walsh and Partners (MWP). The drainage design has been prepared based on the extensive experience of the project team of wind farm sites, and the number of best practice guidance documents referred to in the References section of the EIAR.

The early establishment of temporary drainage facilities will reduce the risk of pollution problems during construction. In addition, construction operations will adopt best working practices. The development of the site will need to be phased accordingly. The Proposed Development's drainage design has therefore been proposed specifically and ensures minimal impact with regards the existing flow regime across the site, in particular having no negative impact on the water quality of the site and consequently no impact on downstream catchments and ecological ecosystems. The construction of the drainage will start from the downstream sections and progress upstream, connecting conveyance systems with other drainage features as each development phase progresses. They will therefore need to be designed with sufficient flexibility to respond to an early phase of limited incoming flow during the construction phase.

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

2.3.2.3 Upgrade of Existing Roads

It is proposed to utilise the existing road network as much as possible with approximately 635m of existing roadway requiring upgrade. These roads will require upgrading which will entail widening of the roadway with wider sections at corners and the laying of a new surface dressing on the existing section of roadway where necessary. The road widening will generally be undertaken as follows:

- The edge of existing tracks will be cut back by 1m. and a Combi grid placed over the proposed widened area. The cutting back of the existing track allows an anchorage of the Combi grid under the existing track.

- Granular fill to be placed in layers in accordance with the designer's specification and to match the depth of stone on the existing track. A geogrid will be applied at this level across the existing/widened road.
- The surface of the existing/widened access track will be overlaid with up to 300mm of selected granular fill.
- A layer of geogrid/geotextile may be required at the surface of the existing access road and in the widened section of road, where excessive rutting is anticipated (to be confirmed by onsite engineer).
- Where excavations in spoil are required, side slopes shall be not greater than 1 (v): 2. This slope inclination will be reviewed during construction, as appropriate.
- The finished road width will be approximately 5m.
- If required, interceptor drains will be installed upslope of the access road alignment to divert any surface water away from the construction area. (Typically, interceptor drains preserve existing watercourses as a 'clean water drainage system / network'; see Section 4.6 of the EIAR under Drainage Design for further details.)
- A final capping layer shall be placed over the existing access track, as per design requirements, to provide a suitable road profile and graded to accommodate wind turbine construction and delivery traffic.
- Prior to any works commencing on the upgrade of existing roads, the requirement for additional roadside drainage will be considered by the Project Hydrologist in line with the proposals outlined in Section 4.2.3 below;

2.3.2.4 New Site Access Roads

New roadway will be required in areas where existing roads are not already present, or where existing sections are too steep or otherwise unsuitable for the required purpose in the case of the Proposed Development. There are approximately 18.7 km of new access roads to be constructed at the site. The construction of the Wind Farm will not require the crossing of any existing streams or watercourses. The Grid Connection will however require the crossing of 5 existing streams or watercourses.

The new access roads will be constructed as follows:

- Establish alignment of the new site roads from the construction drawings and mark out the centre lines with ranging rods or timber posts;
- The road layout has been designed to follow a logical route working towards the proposed overburden storage areas.
- The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
- Excavators will first remove any topsoil / vegetative layer which may be present if deemed required. This is of relevance more for hardstands as roads will be constructed on grade where possible. This material will be transported to an agreed storage area and maintained for re-use during the restoration phase of the Wind Farm construction. Material to be reused will generally be kept adjacent to the location for reuse where possible. Topsoil / vegetation removal will be kept to a minimum in order to prevent any runoff of silt during heavy rainfall.
- Excavators will continue to strip and excavate the soft subsoil where required which will be temporarily stored adjacent to the works in accordance with approved methods with the use of an articulated dumper truck. Excavated material will only be temporarily stored on slopes under 10° and to a maximum height of under 1.0m at the required setback from streams until they are transported to the selected deposition areas where they will be permanently stored if not reused.
- All excavations to be carried out will be battered back to a safe angle of repose (maximum slope angle of 45°).
- Once a section of the excavated infrastructure is exposed to formation a layer of geogrid or geotextile material will be placed along its formation depending on ground conditions, which will be covered with imported aggregate stone as required.

- The stone will be delivered to the required work area and spread out locally with the use of excavators and compacted with the use of a roller which will roll the stone aggregate in maximum 250mm layers on top of the geogrid / geotextile material in order to achieve the required design strength.
- Drains as outlined in the relevant civil drawings will be constructed to manage clean and dirty water runoff in sensitive areas.
- The final running surface of the new excavated access roads will be capped with a layer of hard wearing Cl 804 stone or similar using a road grader.
- Any surplus spoil material generated from the excavated infrastructure will be transported back to the deposition areas. Excavated topsoil and subsoil will be kept separate at the excavation and storage areas.
- The appointed contractor will ensure that on-site personnel are aware of environmental constraints / sensitive areas within the Wind Farm site in which works are to be avoided.
- Interceptor drains will be installed upslope of the access road alignment to divert any surface water away from the construction area. (Typically, interceptor drains preserve existing watercourses as a 'clean water drainage system / network'; see Section 4.6 of the EIAR under Drainage Design for further details.)
- Excavation will take place to a competent stratum beneath the topsoil (as agreed with the site designer and resident engineer).
- Road construction will be carried out in sections of approximately 50m lengths i.e. no more than 50m of access road to be excavated without re-placement with stone fill.
- The surface of the excavated access roads will be overlaid with minimum 250mm of selected granular fill. Granular fill to be placed in layers in accordance with the designer's specification.
- Access roads to be finished with a layer of capping across the full width of the road.
- A final surface layer shall be placed over the excavated road, as per design requirements, to provide a suitable road profile and graded to accommodate wind turbine construction and delivery traffic.
- All rock won from the excavations onsite or imported from local quarries that are to be used in road construction on site will be tested in accordance with the relevant standard (*BS 812-111:1990 Testing aggregates. Methods for determination of ten percent fines value.*)

2.3.2.5 Turbine and Meteorological Mast Foundations

The wind turbines and met mast foundations will be a reinforced concrete base designed to the appropriate standards (*BS EN 1992-1-1:2004+A1:2014 Eurocode 2: Design of Concrete Structures*). Foundation loads will be provided by wind turbine and mast supplier, and factors of safety will be applied to these in accordance with European design regulations. The turbine will be anchored to the foundation using a bolt assembly which shall be cast into the concrete. The meteorological mast is a free-standing structure which is also anchored to the reinforced concrete foundation. It is anticipated that the foundations for both the turbines and the meteorological mast will be either ground bearing foundations and that the formation level of the turbine foundations will be on the lower mineral subsoil or bedrock. Turbine bases will measure 29 m in diameter. They will likely be formed 1 m below the base of the soil layer on stiff subsoil material or bedrock, or at a suitable level directed by the Geotechnical Engineer/Designer. The foundations will be constructed as follows:

- The extent of the excavation will be marked out and will include an allowance for trimming the sides of the excavation to provide a safe working area and slope batter;
- Where practical, the topsoil will be stripped over the area of the excavation and stored growing side up for reuse, the subsoil will be excavated and stored to one side for reuse during the landscaping around the finished turbine;
- No material will be removed from site and storage areas will be stripped of vegetation prior to stockpiling in line with best working practices;

- All groundwater and surface water arising from turbine base excavation will be pumped to the dirty water system and treated in settlement ponds, and/or specialist treatment systems, prior to discharge from the works area;
- Soil excavation shall be observed by a qualified archaeologist in accordance with a scheme of archaeological monitoring, in order to identify any significant remains as they come to light;
- At excavated turbine bases the 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; and,
- Where an excavated turbine base cannot be used due to the depth of soil, a piled foundation using reinforced concrete piles will be installed.

Ground bearing reinforced concrete bases will be completed as follows:

- A layer of concrete blinding will be laid approximately 75 mm thick directly on top of the newly exposed formation, tamped and finished with a screed board to leave a flat level surface. The concrete should be protected from rainfall during curing and all surface water runoff from the curing concrete should be prevented from entering surface water drainage directly;
- High tensile steel reinforcement will be fixed in accordance with the designer's drawings and schedules. The foundation anchorage system will be installed, levelled and secured to the blinding using steel box section stools;
- Ductwork will be installed as required, and formwork erected around the steel cage and propped from the backside as required;
- The foundation anchorage system will be checked both for level and line prior to the concrete being installed in the base. These checks will be passed to turbine manufacturer for their approval;
- Concrete will be placed using a concrete pump and compacted when in the forms using vibrating pokers to the levels and profile indicated on the drawings. Upon completion of the concreting works the foundation base will be covered and allowed to cure;
- Steel shutters will be used to pour the circular chimney section;
- Earth wires will be placed around the base;
- The foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation and landscaped using the vegetable soil set aside during the excavation. A gravel footpath will be formed from the access track to the turbine door and around the turbine for maintenance; and,
- Soil, rock, and other materials excavated during construction shall not be left stockpiled on-site following completion of works. Excavated areas shall be appropriately restored within three months of the date of commissioning of the wind farm.

2.3.2.6 Hardstand Areas

Hard standing areas consisting of levelled and compacted hardcore are required around each turbine base to facilitate access, turbine assembly and turbine erection. The hard-standing areas are typically used to accommodate cranes used in the assembly and erection of the turbine, offloading and storage of turbine components, and generally provide a safe, level working area around each turbine position. The hard-standing areas are extended to cover the turbine foundations once the turbine foundation is in place. The sizes, arrangement and positioning of the proposed hard standing areas have been designed and dictated by site investigation surveys that were undertaken at the site. The proposed hard standing areas measure 25m in width and 59m in length for the proposed turbines. The proposed hard standing areas for each individual turbine are shown on the detailed layout drawings included in Appendix 4-1 to this EIAR.

2.3.2.6.1 *Assembly Areas, Blade Fingers and Crane Assist Pads*

Levelled assembly areas are provided for the turbine erection. These are located on the hard-standing predominantly. In addition, 2 no. temporary blade fingers are provided for temporary storage of the turbine blades, which are located on the opposite side of the road from the hard-standing area. 2 temporary no. crane assist pads will also be provided in front of the hard-standing areas. These serve as set-up locations for the assist cranes to put the main crane together. These assembly areas are required for offloading turbine blades, tower sections and hub from trucks until such time as they are ready to be lifted into position by cranes. The assist crane pads measure approximately 12m in width by 17m in length. The exact arrangement of assembly area around the hardstands will be determined in consultation with the selected turbine manufacturer, however, the areas required will be assessed in this EIAR.

2.3.2.7 Electricity Substation and Control Building

An electricity substation and associated control buildings are proposed to be constructed within the site, located within an area of improved agricultural grassland, approximately 462 meters south of the R363 Regional Road and approximately 360m northeast of the proposed Turbine No. 18. The proposed onsite electrical substation will be served by an access road to the Wind Farm from the R363 which will allow access for maintenance to the substation by ESB / EirGrid without needing to go into the Wind Farm itself, as shown in Figure 2-1. The substation and control buildings will be constructed by the following methodology:

- The area of the onsite electrical substation will be marked out using ranging rods or wooden posts and the soil and overburden stripped and removed to nearby temporary storage area for later use in landscaping. Any excess material will be sent to one of the proposed onsite overburden storage areas.
- The dimensions of the substation area will be set to meet the requirements of the ESB and the necessary equipment to safely and efficiently operate the Wind Farm;
- The foundations will be excavated down to the level indicated by the Project Engineer. The foundations will be shuttered and poured with reinforced concrete. An anti-bleeding admixture will be included in the concrete mix;
- The substation will be constructed with masonry blockwork. The block work walls will be built up from the footings to damp-proof course (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 walls will be built up from the footings to damp proof course level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors;
- The block work will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the building for this operation;
- The timber roof trusses will then be lifted into position using a telescopic load all or mobile crane depending on site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather.
- The electrical equipment will be installed and commissioned.
- Perimeter fencing will be erected.
- The construction and components of the substation have been designed to ESB/Eirgrid specifications.
- The substation and buildings will be accessible from a dedicated access road which will connect to the R363 Regional Road to the north.
- Due to the specific nature of the Proposed Development there will be a very small water requirement for occasional toilet flushing and hand washing, it is proposed to harvest rainwater from the building roofs.

- All wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank which will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying

2.3.2.8 Spoil and Overburden Storage Areas

The total estimated volume of surplus spoil to be stored following excavations during the construction phase of the Proposed Development is 66,900m^3. The quantities of spoil that will be generated during the construction of the proposed Development were calculated in the Spoil Management Plan prepared by Malachy Walsh and Partners in Appendix 4-7 of the EIAR that accompanies this EIAR. Selected areas, within the site have been chosen as overburden storage areas. The Proposed Development includes for the provision of 6 no. overburden storage areas and storage around 15 turbines as shown in Figure 2-1.

The construction of these areas will be carried out as follows:

- Prior to the use of areas for storage an interceptor drain will first be excavated upslope in order to intercept existing overland flow and divert it around the storage area prior to discharge via a buffer zone on the downslope side.
- Drainage swales to intercept and collect drainage water from construction area will be provided on the downhill side of the storage area to surface water run-off and transfer it to a settlement pond prior to discharge via a buffered outfall and swale.
- Inspections of the storage areas will be made by a geotechnical engineer through regular monitoring of the works. The appointed contractor will review work practices at spoil deposition areas when periods of heavy rainfall are expected so as to prevent excessive surface water runoff from being generated.
- The surface of the deposited spoil will be profiled to a gradient to be agreed with the Geotechnical Engineer and vegetated or allowed to vegetate naturally as indicated by the project ecologist. Where there is a risk of inadvertent access into storage areas fencing will be provided.

The volume of excavated spoil and overburden will be managed as outlined below:

- Excavators will remove the spoil from the permanent development footprint areas i.e. excavated roads, hardstanding areas and turbine foundation areas.
- Storage areas, located adjacent to the hardstanding areas and turbine foundation areas, have been determined as detailed in the Planning Drawings and will be utilised for storage.
- The excavators will move the excavated overburden to the designated storage areas within the construction and soft levelled areas.
- The storage areas will be surrounded by silt fences to ensure sediment-laden run-off does not occur.
- Temporary side casting of excavated material will take place during works at permanent development footprint areas across the site dur
- The excavated spoil will remain in these areas over a period of time until the volume of the material has reduced as the water drains out of the mounded spoil.
- The excavators will then load the spoil directly into dump trucks, to transport the overburden to the nearest overburden storage area.
- The material will be backfilled into the overburden storage areas and will be spread evenly across the area.
- It will be compacted to reduce air voids and reduce the migration paths for infiltration by precipitation. This will reduce the amount of potentially silt laden surface water run-off from these overburden storage areas.

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

2.3.2.9 Cable Trenching

The transformer in each turbine is connected to the onsite electrical substation through a network of buried electrical cables. Fibre-optic cables will also connect each wind turbine to the Wind Farm control building in the substation compound. The ground is trenched typically using a mechanical digging machine. The top layer of soil is removed and saved so that it is replaced on completion. The cables are bedded with suitable material unless the ground conditions are such that no bedding is required. The depth of the cables are to meet all national and international requirements and will generally be up to 1.2 m below ground level depending on the ground conditions that are encountered. A suitable marking tape is installed between the cables and the surface (see Plate 2-1 below). On completion the ground will be reinstated. The route of the cables will generally follow the access tracks to each turbine location.

A general construction methodology is summarised as follows:

- The area where excavations are planned will be surveyed and all existing services will be identified.
- All relevant bodies i.e. ESB, Roscommon County Council etc. will be contacted and all drawings for all existing services sought.
- A traffic management plan will be set up prior to any works commencing.
- A road opening license will be obtained where required and all plant operators and general operatives will be inducted and informed as to the location of any services.
- Excavation permit will be completed and all plant operators and general operatives will be inducted and informed as to the location of any services.
- A 13 tonne rubber tracked 360-degree excavator will be used to excavate the trench to the dimensions specified in the ESB Networks document, *Specification for the Installation of Ducts and Structures for Underground Power Cables and Communications Cables*.
- Where rock is encountered and requires removal, it will be done so using a hydraulic rock breaker. Blasting will not be used as a means of rock extraction on the Grid Connection works.
- All excavated material not used for backfilling will be removed to the on-site spoil storage areas, or to an approved landfill, or if suitable, stockpiled and reused where appropriate.
- All excavated material not used for backfilling will be removed from site using trucks.
- The trench depth is specified at 1220 mm and trench support will not be required, however where depths exceed 1250 mm trench support will be installed, or the trench sides will be benched or battered back where appropriate.
- Any ingress of ground water will be removed from the trench using submersible pumps.
- A silt filtration system will be used to prevent contamination of any watercourse.
- Once the trench has been excavated a base layer of lean concrete mix with a tested compression strength of at least 15 Newton per square millimetre (N/mm^2), to cement bound material category 4 (CBM4) will be installed and compacted. All concrete will be offloaded directly from the concrete truck directly into the trench.
- Ducting will then be placed in the trench as per specification, approved cable ties will be used where required to secure the trefoil ducts together (at 3 m centres).
- Once the trefoil ducts have been installed couplers will be fitted and capped to prevent any dirt etc. entering the duct. In poor ground conditions the end of the trefoil ducts will be shimmed up off the bed of the trench to prevent any possible ingress of water dirt. The shims will be removed again once the next length has been connected.

- Extreme care will be taken to ensure that all duct collars (both ends) are clean and in good condition prior to ducts being joined.
- The as-built location of the ducting will be surveyed using a total station/GPS.
- 15 N/mm^2 CBM4 concrete will be carefully installed so as not to displace the ducting to the underside of the communications duct and compacted as per approved detail.
- Spacers will be used to ensure that the correct cover is achieved at both sides of the trefoil ducting.
- ESB red marker board will be fitted above the trefoil ducting.
- The Communication duct will be fitted and kept to one side of the trench ensuring that the minimum cover is achieved and 15 N/mm^2 CBM4 concrete will be placed to the specified cover and compacted, see Plate 2-1.
- ESB red marker board will be installed and the remainder of trench will be backfilled in two compacted layers with approved material (lean mix concrete/clause 804).
- Yellow marker tape will be installed as per approved detail specifications, 300 mm maximum below finished road/ground level.
- Topsoil will be permanently reinstated where required or clause 804 stone used to finish the trench on grass margins where appropriate to give a more trafficable surface.
- Road finish: Where the cable route runs within the carriageway of a road the excavated area will be resurfaced and finished to the requirements of the relevant Roads Authority.

The contractor will ensure that there are no open excavations at the end of each working day with all trenches backfilled accordingly. Any works areas which have to be secured with will be done so using mobile security fencing which will be erected to secure the works and prevent the general public enter the works area during the works as well as outside normal working hours. It is not proposed to use hoarding as a means of securing the works area.

Plate 2-1 Typical Cable Trench View

2.3.2.10 Grid Connection

A proposed connection to the national electricity grid will be made via an underground 110 kV electricity cable originating from the proposed electrical onsite substation to the existing Athlone 110kV substation in the townland of Monksland, Co. Roscommon as outlined in Figure 2-1.

The underground cabling will be a single circuit 110 kV connection, in accordance with the requirements and specifications of ESB. A single circuit connection typically consists of 3 no. 160mm diameter HDPE power cable ducts and 2 no. 125mm diameter HDPE communications duct to be installed in an excavated trench, typically 600mm wide by 1,220mm deep. For trench designs there will be variations on the design to adapt to service crossings and watercourse crossings.

The power cable ducts will accommodate the power cables and the communications duct(s) will also accommodate a fibre cable(s) to allow communications between the Proposed Development substation and existing Athlone 110kV substation. The ducts will be installed, the trench reinstated in accordance with landowner or ESB specification, and then the electrical cabling/fibre cable is pulled through the installed ducts in approximately 600m to 800m sections. Construction methodologies to be implemented and materials to be used will ensure that the underground cabling is installed in accordance with the requirements and specifications of ESB.

2.3.2.10.1 HV Cable Overview

A combination of trefoil trench width 825mm and standard flat formation total trench width 930mm will be used for most of the cable route. A fully flat formation trench width of 1330mm may be utilised on sections of the route where standard vertical trench depths cannot be achieved. Trenchless installation in the form of horizontal directional drilling (HDD) will be used at the following locations two of which are watercourse crossings with the other under the N6 road:

- Cross River Bridge on the R363;
- Cross River Bridge on the R362; and
- Under N6 adjacent to R362 Traffic Bridge.

For proposed cable route, joint bays are required approximately every 600m to 800m where separate cable lengths can be joined together. The joint bays proposed along the cable route will be located either within the existing road or at suitable off-road locations which will be immediately adjacent to roadways to minimise traffic disruption. The selection of joint bay locations involved technical (including existing utilities, traffic management requirements and land ownership) and environmental evaluation of sites to ensure that the area is suitable for construction works and for safe access during any future maintenance. A working area is defined which provides adequate space for cable pulling and jointing around the joint bay. This working area will also provide space for movement of all construction vehicles. The working area will immediately adjoin the public road, as the cable will be diverted from the road to the joint bay.

All road works involving cable and pipe laying e.g., watermains, broadband, television etc., require traffic management procedures when installing within public roads. It may be a temporary requirement that some roads are closed along particular sections of the cable route. This can have a disruptive effect locally on residents over the period of the installation works. In the case of wider roads, one carriageway may be closed with use of the other carriageway restricted and controlled by temporary traffic lights or a “stop and go” traffic management system. The traffic management plan and corresponding works will be carried out with the agreement of the local authority.

2.3.2.10.2 Enabling Works

A preliminary site investigation has been completed to inform overall feasibility of the proposed route. The preliminary investigation included a series of slit trenches at potential conflict points and boreholes at proposed HDD locations.

2.3.2.10.3 Site Preparations

Prior to beginning construction work the contractor will scan the proposed route with a cable avoidance tool (CAT), carry out visual inspection of the area and may carryout out further below ground surveys

if deemed necessary. If any previously unidentified services are discovered the site engineer will inform the design of the issues and possibly recommend a solution that works with the new constraints.

In some instances, it may be necessary to relocate existing underground services such as water mains or existing cables. In advance of any construction activity, the contractor will undertake additional surveys of the proposed route to confirm the presence or otherwise of any services. If found to be present, the relevant service provider will be consulted with in order to determine the requirement for specific excavation or relocation methods and to schedule a suitable time to carry out works.

If existing low voltage underground cables are found be present, a trench will be excavated, and new ducting and cabling will be installed along the new alignment and connected to the network on either end. The trench will be backfilled with suitable material to the required specification. Warning strip and marking tape will be laid at various depths over the cables as required. Marker posts and plates will be installed at surface level to identify the new alignment of the underground cable, the underground cables will then be re-energised.

In the event that water mains are encountered the water supply will be turned off by the utility so work can commence on diverting the service. The section of existing pipe will be removed and will be replaced with a new pipe along the new alignment of the service. The works will be carried out in accordance with the utility standards.

2.3.2.10.4 *Existing Underground Services*

Any underground services encountered along the route will be surveyed for level and the ducting will pass over the service provided adequate cover is available. A minimum clearance of 300 mm will be required between the bottom of the ducts and the service in question. If the clearance cannot be achieved the ducting will pass under the service and again 300 mm clearance between the top of the communications duct and bottom of the service will be achieved. In deeper excavations, an additional layer of marker tape will be installed between the communications layer and yellow top-level marker tape. If the required separation distances cannot be achieved then a number of alternative options are available such as using steel plates laid across the width of the trench and using 35 N/mm^2 concrete surrounding the ESB ducts where adjacent services are within 600 mm, with marker tape on the side of the trench. Back fill around any utility services will be with dead sand/pea shingle where appropriate. All excavations will be kept within the roadway boundaries, i.e. in road or grass margin.

2.3.2.10.5 *Trenching & Ducting*

The proposed cable will be installed in a series of ducts in an excavated trench. Trenching will be achieved using a mechanical excavator. The top layer of soil or road surfacing will be removed and stockpiled separately for reuse or appropriate disposal, subject to validation and waste classification sampling. Material stockpiles should be stored at least 15 m back from drains and watercourses on level ground with a silt fence inserted at the base to prevent runoff.

The trench base will be graded and smoothed once the required depth and width is achieved. A layer of bedding material will be placed and compacted to the required specification on the trench floor prior to laying the ducts in trefoil formation.

The ducting surrounds will be carefully backfilled and compacted in accordance with the required specification. Cable protection strips will be placed on compacted material directly above the ducting. A secure cap will be placed at the end of each duct to prevent the ingress of dirt or water.

Ground water and surface water accumulating in the base of trenches will not be pumped directly to roadside drains or watercourses unless it is clean and free from solids. Contaminated water will be either treated onsite prior to discharge or tankered offsite to a suitably licensed disposal facility.

For concrete and asphalt/bitumen road sections, surfaces will be permanently reinstatement in accordance with the specification and to the approval of the local authority and/or private landowners, unless otherwise agreed with local authorities. All trench works carried out in public roadways will be carried out in accordance with 'Guidelines for Opening, Backfilling and Reinstatement of trenches in Public Roads' and any other conditions imposed by the relevant road authority.

For unsurfaced/grass sections, trenches will be backfilled with suitable excavated material to ground level leaving at least 100 mm topsoil or match existing level at the top to allow for seeding or replace turves as per the specification of the local authority or landowner.

Ducting will be cleaned and tested in accordance with the specification by pulling through a brush and mandrel. A draw rope will be installed in each duct in preparation for cable installation at a later date.

2.3.2.10.6 *Joint Bays*

Joint bays are pre-cast concrete chambers where lengths of cable ducting will be connected. The location of joint bays have been selected to maximise each section length of cable and to satisfy electrical design requirements. The locations chosen by the designer are also determined by the density of existing services, likely disruption to traffic, requirements of utility specifications, space requirements for cable installation equipment.

For proposed cable route, joint bays are required approximately every 600m to 800m. The joint bay dimensions are approximately 6m long x 2.5m wide and 2m deep.

Where off-road joint bay locations are utilised, access tracks from the road to the joint bay locations will be constructed by stripping surface soils, placing geotextile reinforcement at subgrade level followed by a layer of granular material in accordance with the specification to form a working surface for vehicle. This surface will be regularly assessed for damage and additional aggregate added if required. Any roadside drains within the temporary works area will be culverted and check dams made from stone or sandbags covered with terram will be inserted upstream and downstream of these culverts to intercept any solids generated during the insertion or which wash out during the works. Any surplus materials will be stockpiled separately for reuse or appropriate disposal, subject to validation and waste classification sampling.

Joint bay locations will be excavated using conventional mechanical excavators. Joint bay excavations will be advanced to the required depth and width with the excavation floor graded and smoothed. A blinding layer will be placed at the base of the excavation to facilitate the construction of a concrete base and side walls (in-situ or precast).

Ground water and surface water accumulating in the base of excavations will not be pumped directly to roadside drains or watercourses unless it is clean and free from solids. Contaminated water will be either treated onsite prior to discharge or tankered offsite to a suitably licensed disposal facility.

Where joint bays are located under the road surface the joint bay will be backfilled with compacted in accordance with the specification. Road surfaces may be temporarily reinstated as specified by the local authority. Precast concrete covers may be used as temporary reinstatement of joint bays at off road locations. These covers are placed over the constructed joint bay and are then removed at the cable installation stage of the project.

2.3.2.10.7 *Cable Installation*

The installation of cabling normally involves pulling three individual conductors into three separate ducts. The cable pulling winch must be set at a predetermined cut off pulling tension as specified by the designer. The cable will be connected to the winch rope using approved suitably sized and rated cable pulling stocking and swivel or the pulling head fitted by the cable manufacturer. Once the "two

sections" of cable are pulled into the joint bay, a jointing container will be positioned over the joint bay and the cable jointing procedure carried out in this controlled environment.

Following the completion of jointing and duct sealing works in the joint bay, place and thoroughly compact cement-bound sand in approximately 200 mm layers to 100mm above the top of the cable joint base to provide vertical support. A cable protection strip will be installed at this depth and the joint bay backfilled with cement-bound sand and reinstated to match surrounding areas.

2.3.2.10.8 *Trenchless Installation*

Trenchless installation in the form of HDD will be used at the following locations:

- Cross River Bridge on the R363;
- Cross River Bridge on the R362; and
- R362 Traffic Bridge over M6.

HDD uses a special design drilling rig which initially bores a pilot hole through the ground along a pre-determined route.

Once completed, this pilot bore is then expanded as necessary using various sizes and types of back-reamers to enlarge the pilot bore to the required final diameter into which the cable will be installed. Two temporary pits (entry and exit) are excavated at each side of the HDD route, locations are selected based on drilling requirements including angle, depth, diameter, curvature, vertical clearance underneath water courses and structures, etc.).

Access to the entry and exit pits will be via a newly constructed temporary access or existing access road/track. Silt fences will be erected around the entire work area at both entry and exit pits prior to the drilling contractor preparing a laydown area. The works area will be a minimum of 15 m back from the river and within this zone, the natural vegetative cover will not be altered. If areas are overgrown with thick vegetation, a section of it will be removed appropriately and disposed of via a licensed waste contractor. The area is then levelled where required, levelled areas will be overlain with geotextile reinforcement and granular material in accordance with the specification to form access roads and temporary work platform. No material will be stored or stockpiled within 15m of water courses.

A pilot hole will be drilled from the entry pit through the overburden into the bedrock and travel underneath the riverbed before emerging through the overburden in the exit pit. The depth of the drill below the riverbed will be determined from site investigations. The drilled cuttings will be flushed to the surface through a closed loop mud circulation system with recycling capability to minimise the volume of fluids required on site.

Once the pilot hole has been completed, a larger drill bit will be used to ream the pilot hole to the required diameter to facilitate ducting installation. The ducts will be laid out on the exit side in preparation for installation. When the ducts are ready and the drill hole diameter has been proven, a towing assembly will be used to pull the ducts into the bore. The HDD ducts will be connected to the ducts which will have been installed in trenches at the entry and exit pits.

All excess drilling fluids and cuttings will be transported offsite to a suitably licensed disposal facility.

On completion of the installation of the ducts, disposal of material and backfilling of trenches, the site will be restored as agreed with the landowners while silt fences remain in place. Geotextile reinforcement and granular material in accordance with the specification will be removed and disposed of to a licensed facility. Where necessary, topsoil will be imported, and the area reseeded.

2.3.2.11 Watercourse Crossing – Grid Connection Cable Route

There are a total of 5 no. existing crossings will be crossed along the R363 Regional Road by cabling as part of the proposed underground IPP cable and external Grid Connection towards the existing Monksland 110 kV substation. The locations of the watercourse crossings are shown on Figure 4-6 and in the layout drawings in Appendix 4-1 of the EIAR. The watercourse crossing methodologies for the provision of the underground Grid Connection component of the proposed development at these locations is set out below with the most appropriated option being selected for each crossing. Instream works are not required at any watercourse crossing along the proposed underground IPP cable route or Grid Connection route.

2.3.2.11.1 *Crossing Using Standard Trefoil Formation – Option 1*

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

2.3.2.11.2 *Flatbed Formation over Bridges/ Culverts – Options 2*

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

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

2.3.2.11.3 *Horizontal Directional Drilling – Option 3*

The horizontal directional drilling method of duct installation is carried out using Vermeer D36 x 50 Directional Drill (approximately 22 tonnes), or similar plant. The launch and reception pits will be approximately 0.55m wide, 2.5m long and 1.5m deep. The pits will be excavated with a suitably sized excavator. The drilling rig will be securely anchored to the ground by means of anchor pins which will be attached to the front of the machine. The drill head will then be secured to the first drill rod and the operator shall commence to drill into the launch pit to a suitable angle which will enable him to obtain the depths and pitch required to the line and level of the required profile. Drilling of the pilot bore shall continue with the addition of 3.0m long drill rods, mechanically loaded and connected into position.

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

to the reception pit and the next size reamer is attached to the drill rods and the process is repeated until the required bore with the allowable tolerance is achieved.

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

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

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

In addition to the above, a crossing is proposed beneath the N6 National Road to access the connection at the Athlone 110kV substation. This will involve horizontal directional drilling (HDD) as a means of cable installation.

Table 2-1 Grid Connection Stream Crossing Methodology

Crossing no.	Type and size	Cover from road level to top of culvert/bridge	Parapet Wall Height Above Road	Width, Height of Bridge	Description	Watercourse Crossing Option	Extent of In-stream Works
WC1	1,500mm Ø concrete pipe	2,000mm	720mm and 880mm	n/a	The culvert consists of a concrete pipe with large stone parapets above it on either side. Due to the existing cover over the pipe (c.2,000mm), there is sufficient separation distance to accommodate the standard trefoil cable passing over the watercourse crossing without any amendment to the trench or ducting profile. Alternatively, should sufficient cover between the culvert and existing road level not be achieved, the cable ducts will be laid in a flatbed formation.	Option 1 / Option 2	None. No in-stream works required.
WC2	1.5m stone arch bridge (Bridge considered of local cultural heritage merit).	2,000mm	1,000mm	3,000mm wide and 1,500mm in height	The existing cover over the stone arch bridge allows for the standard trefoil cable passing over the watercourse crossing to be laid without any amendment to the trench or ducting profile.	Option 1 / Option 3	None. No in-stream works required.

					Alternatively, Option 3 would allow for the laying of the ducts to be completed using directional drilling. This crossing methodology will also ensure that no contact will be made with the watercourse during the works		
WC3	1,500mm Ø concrete pipe	5,000mm	500mm	n/a	The culvert consists of a concrete pipe with large stone parapets above it on either side. Due to the existing cover over the pipe (c.5,000mm), there is sufficient separation distance to accommodate the standard trefoil cable passing over the watercourse crossing without any amendment to the trench or ducting profile.	Option 1	None. No in-stream works required.
WC4	>500mm Ø concrete pipe	1,500mm	n/a	n/a	The culvert consists of a concrete pipe. Due to the lack of cover over the existing culvert, the cable ducts will be laid in a flatbed formation. Alternatively, the laying of the ducts can be carried out using a standard trefoil trench. To provide the required cover over the cabling ducts in this scenario,	Option 1 / Option 2	None. No in-stream works required.

					it may be necessary to raise the existing road level.		
WC5	2.5m stone arch bridge	800mm		7.5m wide and 2.5m in height	Due to the lack of cover over the existing bridge, the cable ducts will be laid in a flatbed formation. To provide the required cover over the cabling ducts, it may be necessary to raise the existing road level. Another option would allow for the laying of the ducts to be completed using directional drilling. This crossing methodology will ensure that no contact will be made with the watercourse during the works	Option 2 / Option 3	None. No in-stream works required.

2.3.2.12 General Construction Measures – Grid Route

Prior to any works commencing a dilapidation survey will be conducted of the entire route, photographing and noting any existing damage or defects to structure or road surfaces. A copy of this survey will be submitted to Roscommon County Council prior to works commencing.

Communication with the public, local residences and businesses along the route will be an important responsibility of the Project Supervisor. Keeping all affected parties up to date and informed both shortly prior and during the construction period at all times. Two to three weeks before any work commencing reasonable efforts will be made to inform all affected parties of the oncoming works.

Signage will be erected in the weeks prior to any works commencing along and on adjacent roads to the route notifying the public of the forthcoming construction. Contact details for the contractor and details of license will also be posted along the cable route during construction.

Every effort will be made to minimise the impact of the above works on local residences and traffic. Consideration will also be given to the agricultural community and works will be organised and sequenced so as not to inconvenience any such activities. Additional construction health and safety measures include the following:

- All personnel will be inducted and made familiar with the method statements, risk assessments and traffic management plans involved.
- All site-specific safety rules will be adhered to.
- All plant operators will have appropriate Construction Skills Certification Scheme (CSCS) training.
- All personnel on-site will be required to have a current Solas Safe Pass training card.
- Fire extinguishers and first aid supplies will be available in the work area.
- The roadway will be maintained in a clean condition at all times.
- Helmets, high visibility clothing, and safety footwear will be worn at all times.
- A competent foreman will be on site at all times.
- Excavations are back filled at the end of each working day.
- The trench will not be over-crowded.
- Unauthorised access will be monitored and prevented.
- Pipe work will be lifted into position manually.
- Hand dig will be used to expose any services detected during the survey.

2.3.2.13 Transport Route Accommodation Works

The proposed transport delivery route for the Proposed Development has been the subject of a route assessment to determine if any widening works are required along its length; see Section 14.1 of this EIAR and Appendix 14-1 for the Route Access Survey. No permanent road widening or junction accommodation works are required along the turbine delivery route. Some temporary hardcore surfacing will be required at roundabouts or areas off oversail. Some minor modifications to street furniture will also be required along the turbine delivery route such as temporary removal of some street signs, traffic lights, etc.

The construction methodology of the turbine delivery accommodation works is outlined as follows:

- Overburden within the required areas for the accommodation works will be excavated and temporarily stockpiled adjacent to the works area, where possible, until a competent stratum is reached.
- Any excess excavated overburden will be removed from the works area to the on-site overburden storage areas or a licensed tip or, if suitable, stockpiled and reused for backfilling where appropriate.

- A layer of geogrid/geotextile may be required at the surface of the competent stratum to provide further structural formation, if required.
- The competent stratum will be overlain with granular fill sourced from the on-site excavations and local quarries.
- A final surface running layer will be placed over the granular fill to provide a suitable surface to accommodate the turbine delivery/abnormal load vehicles.
- The temporary accommodation areas along the turbine delivery route will only be used by the turbine delivery/abnormal load vehicles and other vehicles associated with the delivery process.
- The temporary accommodation areas when not in use will be cordoned off from the public road, using bollards, where boundary walls, hedgerows or ditches have been removed.
- Upon completion of the turbine delivery phase of the proposed Wind Farm the granular surface of the accommodation works location will remain in place. All kerbing, barriers, street furniture, signage, lighting and boundary fencing will be reinstated.

Leaving the granular fill and final surface running layer in place within the accommodation areas will allow these to be used again in the future should it become necessary (i.e. at decommissioning stage for turbine removal, or in the unlikely event of having to swap out a blade component during the operational phase). Should this be required the boundary treatments will again be temporarily removed and managed as set out above.

2.3.2.14 Decommissioning

The design life of the Wind Farm is 30 years after which time decommissioning will occur, unless planning permission is granted to extend the duration of operation. At the end of the design life of the Wind Farm, or if the operations at the Wind Farm cease for a period of greater than one year, the turbines, met mast and all their associated above ground components will be dismantled and removed from site. The turbine foundations will be covered with soil to facilitate re-vegetation. The management of waste materials arising from the decommissioning of the development is outlined in the Waste Management Plan (Section 3.7 below).

Site roadways could be used for purposes other than operation of the Wind Farm by the time the decommissioning of the project is to be considered, and therefore it may be more appropriate to leave the site roads in-situ for future use. If the roads are not required in the future, they could be removed. Underground cables will be removed, and the ducting left in place. The onsite substation will remain in place as it will be under the ownership of the ESB and will form a permanent part of the electricity grid.

A full reinstatement plan will be submitted to Roscommon County Council three months prior to decommissioning.

A Decommissioning Plan has been prepared as Appendix 4-10 of the EIAR that accompanies this document, the detail of which will be agreed with the local authority prior to any decommissioning. The plan provides details of the methodologies that will be adopted, throughout decommissioning, the environmental controls that will be implemented, the Emergency Response Procedure to be adopted, methods for reviewing compliance and an indicative programme of decommissioning works

3. ENVIRONMENTAL MANAGEMENT

3.1 Introduction

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

3.2 Protecting Water Quality

3.2.1 Environmental Management in the Construction Phase

Timing of civil works (road construction, excavation, rock-breaking, etc.) can significantly influence the potential impact upon the groundwater environment and nearby turloughs at the site. Operations during wetter periods of the year pose a greater risk of causing erosion and siltation, which can be particularly severe following major rainfall or snow events. Traditionally, construction activity undertaken during the drier summer months would result in less erosion and siltation. Construction activities in the hydrological buffer zones shall be avoided during or immediately after a prolonged or intense rainfall event and work will cease entirely near watercourses when it is evident that water quality is being impacted.

3.2.2 Site Drainage Principles

The site drainage features for this site have been outlined in Section 4.6 of the EIAR and are further developed in this section of the CEMP. The protection of turloughs and surface water features across 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. No routes of any natural drainage features will be altered as new watercourse crossings are kept to a minimum to facilitate the proposed development. Turbine locations and associated roadways were originally selected to avoid natural watercourses and existing roads are to be used wherever possible. The proposed development has where possible, been kept a minimum of 50 m from natural watercourses. There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Development.

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

3.2.3 Legislation and Best Practice Guidance

The drainage design has been prepared based on experience of the project team of other wind farm developments in similar environments, and a number of best practice guidance documents.

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

- Institute of Geologists Ireland (2013): *Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements*;
- National Roads Authority (2008): *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;*
- Department of Environment, Heritage and Local Government (2006): *Wind Energy Development Guidelines for Planning Authorities;*
- Institute of Geologists Ireland (2013): *Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;*
- *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters* (Inland Fisheries Ireland, 2016);
- Inland Fisheries Ireland (2016*): Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;*
- Scottish Natural Heritage (2010): *Good Practice During Wind Farm Construction*;
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note);
- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note);
- CIRIA (Construction Industry Research and Information Association) (2006): Guidance on '*Control of Water Pollution from Linear Construction Projects*' (CIRIA Report No. C648, 2006);
- CIRIA 2006: *Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors* (CIRIA C532, 2006).
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, 2018); and,
- Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU), (European Union, 2017).

3.2.4 Site and Drainage Management

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

3.2.4.1 Pre-Construction Drainage

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 competed to ensure ditches are free from debris and blockages that may impede drainage. Where artificial drains are currently in place in the vicinity of proposed works areas, these drains may

have to be diverted around the proposed works areas to minimise the amount of water in the vicinity of works areas. 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 plan before construction commences and will attend the site to set out and assist with micro siting of proposed drainage controls as outlined in Section 4.6 of the EIAR. The drainage system will be excavated and constructed in conjunction with the road and hard standing construction. Drains will be excavated and stilling ponds constructed to eliminate any suspended solids within surface water running off the site. Drainage infrastructure will include:

- Interceptor drains (clean water drains) will be maintained up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader.
- Swales/roadside drains (dirty water drain) will be maintained to intercept and collect runoff from access roads and hardstanding areas of the site, likely to have entrained suspended sediment and channel it to settlement ponds for sediment settling;
- Check dams will be maintained at regular intervals along interceptor drains in order to reduce flow velocities and therefore minimise erosion within the system during storm rainfall events; and,
- Settlement ponds, emplaced downstream of swales and infrastructure, 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 settlement ponds will be sized according to the size of the area they will be receiving water from but will be sufficiently large to accommodate peak flows storm events. Inspection and maintenance of all settlement ponds will be ongoing through the construction period.

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

In relation to decisions that are made on site it is important to stress that these will be implemented in line with the associated drainage controls and mitigation measures outlined in Section 4 below and to ensure protection of all watercourses.

3.2.4.3 Operational Phase Drainage

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

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

3.2.4.4 Preparative Site Drainage Management

The materials and equipment necessary to implement the drainage measures outlined above will be brought on-site in advance of any works commencing.

An adequate quantity of straw bales, clean stone, terram, wooden stakes, etc. will be kept on site at all times to implement the drainage mitigation measures as necessary. The drainage measures outlined below 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 element of the construction phase will take account of weather forecasts and predicted rainfall in particular. The site Construction Manager/Site Supervisor is responsible for making the decision to postpone or abandon works. 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 continuously by the Environmental Clerk of Works (ECoW) on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site. The drainage design may have to be modified on the ground as necessary, and the modifications will draw on the various features outlined above in whatever combinations are deemed to be most appropriate to situation on the ground as a particular time.

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

3.2.4.7 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 transported to one of the on-site overburden storage areas or used for landscaping and reinstatements of other areas elsewhere on site.

On steeper slopes, silt fences, as detailed in Section 4.6 of the EIAR will be installed temporarily downgradient of the cable trench works area, or on the downhill slope below where excavated material is being temporarily stored to control run-off.

3.3 Cable Trench Drainage

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

To efficiently control drainage runoff from cable trench works areas, excavated material is stored on the upgradient side of the trench. Should any rainfall cause runoff from the excavated material, the material is contained in the downgradient cable trench. Excess subsoil is removed from the cable trench works area immediately upon excavation, and in the case of the Proposed Development, would be used for landscaping and reinstatements of other areas elsewhere on site.

On steeper slopes, silt fences, as detailed in Section 4.6 of the EIAR will be installed temporarily downgradient of the cable trench works area, or on the downhill slope below where excavated material is being temporarily stored to control run-off.

3.4 Refuelling, Fuel and Hazardous Materials Storage

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

- 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 of machinery will be carried out at dedicated refuelling locations using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site and will be towed around the site by a 4x4 vehicle to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the dumpers, excavators, etc. that will be used during construction. The 4x4 vehicle will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use. Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- 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. The bunded area will be roofed to prevent the ingress of rainwater and fitted with a storm drainage system and an appropriate oil interceptor;
- The electrical substation 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 should be regularly inspected for leaks and fitness for purpose; and, an emergency plan for the construction phase to deal with accidental spillages will be contained within Environmental Management Plan.
- Spill kits will be available to deal with any accidental spillage in and outside the refuelling area.

The emergency response plan for the construction phase has been provided in section 5 of this CEMP which sets out the procedure for dealing with accidental spillages will be maintained throughout the construction phase of the Proposed Development.

3.5 Cement Based Products Control Measures

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

- No batching of wet-cement products will occur on site;
- Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place. Where possible pre-cast concrete elements will be used;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- Where concrete is delivered on site, only the chute need be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed;
- 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. Two examples are shown in Plate 3-1 below. The areas are generally covered when not in use to prevent rainwater collecting. In periods of dry weather, the areas can be uncovered to allow much of the water to be lost to evaporation. At the end of the concrete pours, any of the remaining liquid contents is taken 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.
- During the near stream construction work (along the Grid Connection route) 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.
- 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.
- Any guidance/mitigation measures proposed by the OPW or the Inland Fisheries Ireland will be incorporated into the design of the proposed watercourse crossings

Plate 3-1 Typical concrete wash out areas

3.6 Traffic Management

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

3.6.1 Turbine and Construction Materials Transport Route

The proposed turbine transport route from the M6 Motorway to the Proposed Development site is shown Figure 4-23 of the EIAR. Turbines will be transported along the M6 before exiting northwest at Monksland on to the R362 Regional Road. The route then travels northwest on the R362 Regional Road for approximately 5.5km, before merging left on to the R363 Regional Road. The turbine delivery route continues west along the R363 for approximately 6km before arriving at the first proposed primary access road, turning south to the Southern Cluster of the Proposed Development, while the second access road turning south is a further 2km west of the first junction. The access road junction to the northern part of the Proposed Development is located approximately 2km further west along the R363 towards Dysart village, before turning north at the proposed access junction.

While the selection of a precise port of entry can only be determined following appointment of the chosen turbine manufacturer, for the purposes of the assessment, delivery from the Port of Galway is considered in this EIAR. Turbine components may also be imported through other ports including Dublin Port, Port of Waterford or Foynes/Shannon/Limerick Port. The Planning Authority will be advised of the selected port of entry as part of a final Transport/Traffic Management Plan, and that any specific traffic control measures arising from the selected route will be agreed with the Planning Authority prior to the commencement of development. Each of these ports are regularly used in the transportation of turbine components and are readily accessible without the need for significant road upgrade works between their location to the national road network.

The delivery route for general Heavy Goods Vehicles (HGV) construction traffic will be via the R363, with traffic either coming east or west of the site. It is assumed that deliveries of smaller component parts for the wind turbines will follow the same route towards the Proposed Development. In practice the delivery route for these component parts could change, but as the associated traffic volumes are low, as established in Section 14.1.4 of the EIAR, the impacts will be minimal regardless of the route selected.

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

- A delivery schedule.
- A schedule of control measures for exceptional wide and heavy loads.
- Details of temporary works or any other minor alteration identified.
- A dry run of the route using vehicles with similar dimensions.

The deliveries of turbine components to the site will be made in convoys of three to four vehicles at a time, and mostly at night when roads are quietest. Convoys will be accompanied by escorts at the front and rear operating a “stop and go” system. Although the turbine delivery vehicles are large, they will not prevent other road users or emergency vehicles passing, should the need arise. The delivery escort vehicles will ensure the turbine transport is carried out in a safe and efficient manner with minimal delay or inconvenience for other road users. It is not anticipated that any section of the local road network will be closed during transport of turbines, although there will be some delays to local traffic at pinch points. During these periods it may be necessary to operate local diversions for through traffic. All deliveries comprising abnormally large loads will be made outside the normal peak traffic periods to avoid disruption to work and school-related traffic.

Prior to the Traffic Management Plan for turbine delivery being finalised, a full dry run of the transport operation along the route will be completed using vehicles with attachments to simulate the dimensions of the wind turbine transportation vehicles. This dry run will inform the final traffic management plan. All turbine deliveries will be provided for in a transport management plan which will have to be prepared in advance of the turbine delivery stage, when the exact transport arrangements are known, delivery dates confirmed and escort proposals in place. Such a transport management plan is typically submitted to the Planning Authority for agreement in advance of any abnormal loads using the local roads, and will provide for all necessary safety measures, including a convoy and Garda escort as required, off-peak turning/reversing movements and any necessary safety controls.

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

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

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

3.7 Dust Control

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

Proposed measures to control dust include:

- Any site roads with the potential to give rise to dust will be regularly watered and dampened down with water taken form onsite stilling ponds, as appropriate, during dry and/or windy conditions;
- The designated public roads outside the site and along the main transport routes to the site will be regularly inspected by the ECoW for cleanliness, and cleaned as necessary;
- Material handling systems and material storage areas will be designed and laid out to minimise exposure to wind;
- Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods;
- Water misting or bowsers will operate on-site as required to mitigate dust in dry weather conditions;
- If necessary, water will be taken from the site's drainage system, and will be pumped into a bowser or water spreader to dampen down haul roads and the temporary site compound to prevent the generation of dust.
- Silty or oily water will not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water

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

3.8 Noise Control

The operation of plant and machinery, including construction vehicles, is a source of potential impact that will require mitigation at all locations within the site. Proposed measures to control noise include:

- Diesel generators will be enclosed in sound proofed containers to minimise the potential for noise impacts;
- Plant and machinery with low inherent potential for generation of noise and/or vibration will be selected. All construction plant and equipment to be used on-site will be modern equipment and will comply with the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations;
- Regular maintenance of plant will be carried out in order to minimise noise emissions. Particular attention will be paid to the lubrication of bearings and the integrity of silencers;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works;
- Compressors will be of the "sound reduced" models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Machines, which are used intermittently, will be shut down during those periods when they are not in use;
- 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 section 11 of the EIAR 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 Friday and 8:00hrs and 13:00hrs on Saturdays. 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
- Training will be provided by the ECoW to drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation; and,
- Local areas of the haul route will be condition monitored and maintained if necessary.

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

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

The methods used to minimise effects may consist of some or all the following:

- Restriction of hours within which blasting can be conducted.
- A publicity campaign undertaken before any work and blasting starts (e.g. 48 hours written notification).
- The firing of blasts at similar times to reduce the 'startle' effect.
- On-going circulars informing people of the progress of the works.
- The implementation of an onsite documented complaints procedure.
- The use of independent monitoring by external bodies for verification of results.
- Trial blasts in less sensitive areas to assist in blast designs and identify potential zones of influence.

3.9 Invasive Species Management

A baseline invasive species survey was carried out at the site to identify the presence and location of any invasive species (listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) by a suitably qualified ecologist. No invasive species listed under the Third Schedule of the European Communities Regulations 2011 were recorded within the Proposed Development Site.

However, should an invasive species be encountered at any stage during the construction phase of the Proposed Development, an Invasive Species Management Plan (ISMP) will be prepared for the site (to prevent the introduction or spread of any invasive species within the footprint of the works). This ISMP will set out the best practice control methods which are summarised in the following sections. The ISMP would be updated during construction.

3.9.1 General Best Practice Control Methods

The following general best practice guidelines in the treatment and control of invasive species during construction works are outlined in Section 3.6.2 below and the site ISMP having regard to guidance document issued by Transport Infrastructure Ireland – Invasive Alien Plant Species on National Roads – Technical Guidance (TII 2020).

3.9.2 Good Practice on Site Management

Careful preparation of the site and planning of the works is crucial for the successful treatment of invasive species. The below 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.

3.9.3 Establishing Good Site Hygiene

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

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

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

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

3.10 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. Disposal of waste will be seen as a last resort.

3.10.1 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*. 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.

3.10.2 Waste Management Hierarchy

The waste management hierarchy sets out the most efficient way of managing waste 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.

3.10.3 Construction Phase Waste Management Plan

3.10.3.1 Description of the Works

The Proposed Development will involve the construction of 20 turbines and all associated infrastructure as detailed above in Section 2.

The proposed turbines will be manufactured off site and delivered to site where on-site assembly will occur.

The turbine and meteorological mast foundations will consist of stone excavated onsite and from 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 onsite electrical substation and control buildings will be constructed on a concrete foundation with the buildings constructed with concrete masonry blocks with a timber roof structure and roof tile or slate covering. The roof structure will be made up of prefabricated roof trusses manufactured off site to minimise timber cutting on site.

The site roads will be constructed with rock, the majority from local quarries.

The waste types arising from the construction phase of the Proposed Development are outlined in Table 3-1 below.

Table 3-1 Expected Waste Types Arising during Construction Phase

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

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

3.10.3.2 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.

3.10.3.3 Waste Arising from Construction Activities

All waste generated on site will be contained in a waste skip at a waste storage area on site. This waste storage area will be kept relatively tidy with the waste skip 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. Therefore, all wastes streams generated on site will be deposited into a single 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 in the on-site skip 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 road as only the quantity of stone necessary will be excavated from the onsite excavations on an 'as needed' basis.

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

3.10.3.4 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 reused 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 Decommissioning

Materials Type	Example	EWC Code
Cables	Electrical wiring	17 04 11
Metals	Copper, aluminium, lead, iron and steel	17 04 07
Inert Materials	Crushed stone	17 05 04

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

3.10.5 Recycling

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

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

3.10.6 Implementation

3.10.6.1 Roles and Responsibilities for Waste Management

Prior to the commencement of the proposed development a member of the on-site construction management staff will be assigned the role of Construction Waste Manager. The Construction Waste Manager will be in charge of the implementation of the objectives of the WMP, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to. The person nominated must have sufficient authority so that they can ensure everyone working on the proposed development adheres to the WMP.

3.10.6.2 Training

It is important for the Construction Waste Manager to communicate effectively with colleagues in relation to the aims and objectives of the WMP. All employees working on site during the construction phases 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.

3.10.6.3 Record Keeping

The WMP will provide systems that will enable all arising, 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 arising 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 of the proposed development. 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
- Weight of Material
- Site Address of Destination Facility

3.10.7 Waste Management Plan Conclusion

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

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

4. ENVIRONMENTAL MANAGEMENT IMPLEMENTATION

4.1 Roles and Responsibilities

The Site Supervisor/Construction Manager and/or ECoW are the project focal point relating to construction-related environmental issues.

In general, the ECoW will maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. The ECoW will act as the point of contact on environmental matters and liaising with Roscommon County Council and other statutory bodies as required.

The ECoW will report directly to the Site Supervisor/Wind Farm Construction Manager. A Project Ecologist, Project Hydrologist and Project Geotechnical Engineer will visit the site regularly and report to the Site ECoW. This structure provides a "triple lock" review/interaction by external specialists. An organogram structure for the construction stage is provided in Figure 4-1 below.

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.

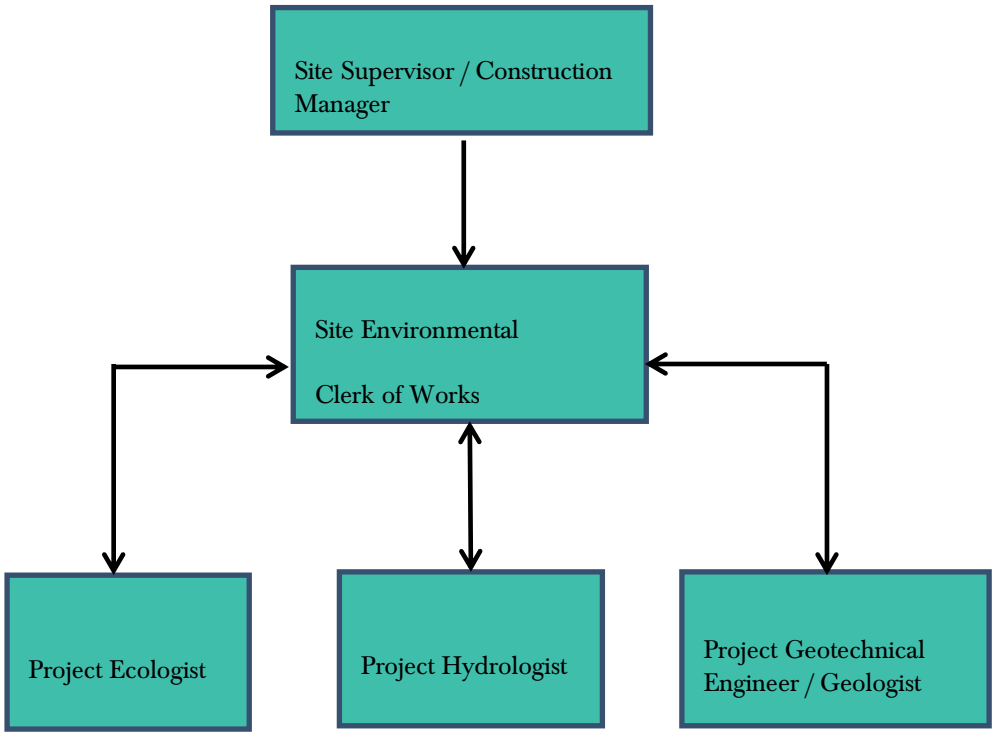


Figure 4-1 Construction Phase Environmental Management Roles

4.1.1 Wind Farm Construction Manager

The 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 Construction Manager will include:

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

4.1.2 Site Engineer

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

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

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

4.1.3 Site Environmental Clerk of Works

The main contractor will be required to engage a qualified Environmental Engineer, Environmental Scientist, or equivalent, with experience in wind farm construction to fulfil the role of Site ECoW, and to monitor all site works and to ensure that methodologies and mitigation are followed throughout construction to avoid negatively impacting on the receiving environment.

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

- Preparation of the CEMP 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 proper mitigation measures are initiated and adhered to during the construction phase;
- Liaise with Project Ecologist, Project Hydrologist and Project Geotechnical Engineer to ensure regular site visits and audits/inspections are completed;
- Ensure adequate arrangements are in place for site personnel to identify potential environmental incidents;
- Ensure that details of environmental incidents are communicated in a timely manner to the relevant regulatory authorities, initially by phone and followed up as soon as is practicable by e-mail;
- Support the investigation of incidents of significant, potential or actual environmental damage, and ensure corrective actions are carried out, recommend means to prevent recurrence and communicate incident findings to relevant parties; and,
- Identify environmental training requirements and arrange relevant training for all levels of site-based staff/workers.

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

4.1.4 Project Ecologist

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

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

- Review and input to the final construction phase CEMP in respect of ecological matters;
- In liaison with ECoW, oversee and provide advice on all relevant ecology mitigation measures set out in the planning documents for the proposed development;
- 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; and,
- Complete a pre-commencement invasive species survey at the site.

4.1.5 Project Hydrologist

The Project Hydrologist will report to the ECoW and is responsible for inspection and review of drainage and water quality aspects associated with construction of the Wind Farm. The Project Hydrologist will not be full time on site but will visit the site at least once a month during construction. A qualified hydrologist with experience working on wind farm projects will perform the role of Project Hydrologist.

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 all relevant planning documents.

4.1.6 Project Geotechnical Engineer / Geologist

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

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 Geotechnical Risk Register and that these are subject to ongoing monitoring;
- Ongoing inspection and monitoring of the development, particularly in areas of karst landscape and at the and overburden storage areas, through all phases of construction (including pre, during and post construction) and ensure construction is carried out as specified in the EIAR, NIS and all relevant planning documents.

4.2 Water Quality and Monitoring

4.2.1 Construction Phase Monitoring

4.2.2 Surface Water Baseline Monitoring

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for each primary watercourse, and specifically following heavy rainfall events. As a minimum the monitoring will be undertaken at the locations outlined in Figure 9-8 of the EIAR

4.2.3 Daily Visual Inspections

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

Inspection sheets and photographic records will be kept on site. Inspection points will include the in-situ field monitoring point locations and the laboratory analysis sampling points. Inspection points will

depend on works being completed within the catchment upstream of the identified monitoring locations. Visual inspections will also be completed after major rainfall events, i.e. after events of >25mm rainfall in any 24-hour period and data including photographs will be collected by visual inspections and independently assessed by the Project Hydrologist who will monitor and advise on the records being received.

The following periodic inspection regime will be implemented:

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

4.2.4 Continuous Turbidity Monitoring

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

4.2.5 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 Proposed Development. This will not be restricted to just these locations around the Proposed Development site with further sampling points added as deemed necessary by the ECoW in consultation with the Project Hydrologist and Site Manager.

4.2.6 Field Monitoring

Field chemistry measurements of unstable parameters, (pH, conductivity, temperature) will be taken at the turloughs and surface waters monitoring locations, as per water monitoring programme for the Proposed Development and each primary watercourse along the Grid Connection route along with 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 Monthly 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.

4.2.7 Monitoring Parameters

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

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

4.2.8 Construction Phase Drainage Inspections & Maintenance

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

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

The ECoW will monitor the effectiveness of the on-site drainage during changing weather, ground or drainage conditions encountered on site, through their regular visual inspections of turloughs and surface waters and water monitoring programme. Where it appears that additional drainage measures will be required to ensure the drainage system remains effective, the ECoW will notify the contractor, the developer and project design team including the Project Hydrologist. The ECoW's role in this regard does not replace the need for the weekly (at least) inspections of the drainage system's measures by the project contractor.

On completion of the civil and excavations works at the site, the frequency of inspections and monitoring of the drainage infrastructure to be undertaken by the contractor can reduce to monthly.

4.2.9 Surface Water Monitoring Reporting

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

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

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

4.2.10 Post Construction Monitoring

4.2.10.1 Monthly Laboratory Analysis Sampling

Monthly sampling for laboratory analysis for a range of parameters adopted during pre-commencement and construction phases will continue for six months after construction, in particular after large excavation and heavy civils works. The Project Hydrologist will monitor and advise on the readings being received from the testing laboratory.

4.3 Environmental Awareness and Training

4.3.1 Environmental Induction

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

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

4.3.2 Toolbox Talks

Toolbox talks will be held by the ECoW/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 proposed work activities that are scheduled for that day. In addition, the necessary work method statements and sub plans would be identified and discussed prior to the commencement of the day's activities. The toolbox talks will include training and awareness on topics including:

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

Site meetings would be held on a regular basis involving all site personnel. The objectives of a site meeting are to discuss the coming weeks proposed activities and identify the relevant work method statements and sub-plans that will be relevant to that week's activities. In the event of any non-compliance identified during the previous week which may not have required immediate action, these would also be discussed to ensure they are closed out in a timely manner as well as confirming the necessary corrective action to remove the potential of any non-compliance reoccurring has been implemented.

5. EMERGENCY RESPONSE MEASURES

An Emergency Response Plan (ERP) is presented in this section of the CEMP. It provides details of procedures to be adopted in the event of an emergency in terms of site health and safety and environmental protection.

5.1 Emergency Response Procedure

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

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

5.1.1 Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Site Manager will lead the emergency response which makes him/her 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 Manager is unavailable or incapable of coordinating the emergency response, the responsibility will be transferred to the next person in the chain of command by the Construction Manager outlined in Figure 5-1. This will be updated throughout the various stages of the project.

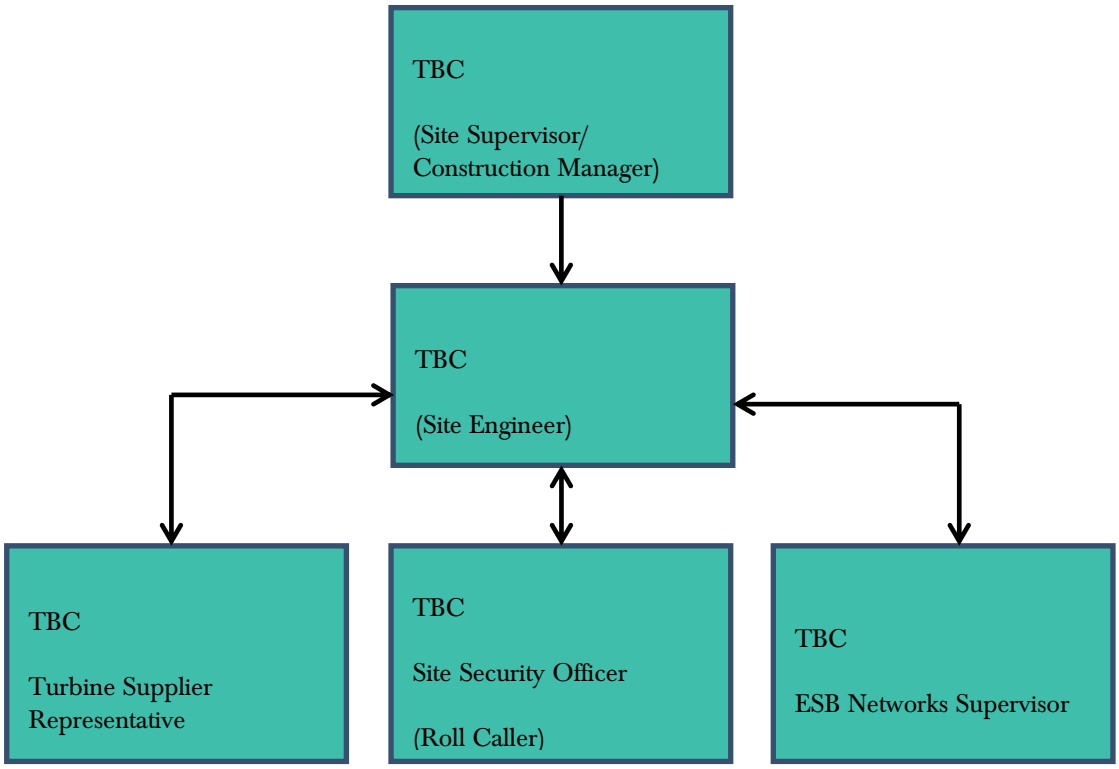


Figure 5-1 Emergency Response Procedure Chain of Command

5.1.2 Initial Steps

In order to establish the type and scale of potential emergencies that may occur, the following hazards have been identified in table 5-1 as being potential situations that may require an emergency response in the event of an occurrence.

Table 5-1 Hazards Associated with Potential Emergency Situations

Hazard	Emergency Situation
Construction vehicles: dump trucks, tractors, excavators, cranes etc.	Collision or overturn which has resulted in operator or third-party injury.
Abrasive wheels/ portable tools	Entanglement, amputation or electrical shock associated with portable tools.
Contact with services	Electrical shock or gas leak associated with an accidental breach of underground services.
Fire	Injury to employee through exposure to fire or smoke.
Falls from heights including falls from scaffold towers, scissor lifts, and ladders.	Injury to employee after a fall from a height.
Sickness	Illness unrelated to site activities of an employee e.g. heart attack, loss of consciousness, seizure.

In the event of an emergency situation associated with, but not restricted to, the hazards outlined in Table 5-1, the Site 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 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 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 he is unable to do so. If delegating the task, ensure that they follow the procedures for contacting the emergency services as set out in Section 5.2.1.
- 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 are provided in Section 5.2.2.
- Contact the next of kin of any injured personnel where appropriate. The procedure for this is outlined in Section 5.2.3.

5.1.3 Site Evacuation/Fire Drill

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

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

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

5.1.4 Spill Control Measures

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

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

Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident must be investigated in accordance with the following steps.

- The ECoW must be immediately notified.

- If necessary, the ECoW will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.
- The details of the incident will be recorded on an Environmental Incident Form which will provide information such as the cause, extent, actions and remedial measures used following the incident. The form will also include any recommendations made to avoid reoccurrence of the incident.
- If the incident has impacted on an ecologically sensitive receptor, such as a sensitive habitat, protected species or designated conservation site e.g. Special Protection Area (SPA) or Special Area of Conservation (SAC), the ECoW will liaise with the Project Ecologist.
- If the incident has impacted on a sensitive receptor such as an archaeological feature the ECoW will liaise with the Project Archaeologist.
- A record of all environmental incidents will be kept on file by the ECoW and the Main Contractor. These records will be made available to the relevant authorities if required.

The ECoW will be responsible for any corrective actions required as a result of the incident e.g. an investigative report, formulation of alternative construction methods or environmental sampling, and will advise the Main Contractor as appropriate.

5.2 Contacting the Emergency Services

5.2.1 Emergency Communications Procedure

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

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

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

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

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

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

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

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

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

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

5.2.2 Contact Details

A list of emergency contacts is presented in Table 5-2. A copy of these contacts will be included in the Site Safety Manual and in the site offices and the various site welfare facilities.

Table 5-2 Emergency Contacts

Contact	Telephone no.
Emergency Services – Ambulance, Fire, Gardaí	999 / 112
Hospital – St. Vincent's Hospital Athlone	090 648 3100
Doctor – Monksland Medical Centre	090 649 2016
ESB Emergency Services	1850 372 999
Bord Gáis Emergency	1850 20 50 50
Gardaí – Athlone Garda Station	090 649 8550
Project Health and Safety Officer –TBC	TBC
Health and Safety Authority (HSA)	1890 289 389
Project Supervisor Construction Stage (PSCS): TBC	TBC
Project Supervisor Design Stage (PSDP): TBC	TBC
Developer / Client – Galetech Energy Developments Ltd	049 555 5050

5.2.3 Procedure for Personnel Tracking

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

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

5.2.4 Induction Checklist

Table 5-3 provides a list of items highlighted in this ERP which must be included or obtained during the mandatory site induction of all personnel that will work on the site. This will be updated throughout the various stages of the project.

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

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

6. MITIGATION PROPOSALS

All mitigation measures relating to the pre-commencement, construction and operational phases of the Proposed Development were set out in the relevant chapters of the Environmental Impact Assessment (EIAR) and Natura Impact Statement (NIS) as part of the planning permission application to An Bord Pleanála.

This section of the Construction and Environmental Management Plan groups together all of the mitigation measures presented in the above documents. The mitigation measures are presented in Table 6-1 below.

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

Table 6-1 Site Preparation and Mitigation Measures

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
Pre-Commencement Phase				
MM1	EIAR Section 4	The removal and disposal of wastewater from the site will be carried out by a fully permitted waste collector holding valid Waste Collection Permits as issued under the Waste Management (Collection Permit) Regulations, 2007. Information on the appointed permitted contractor and evidence of a maintenance contract will be submitted to the Planning Authority prior to any construction works taking place.		
MM2	EIAR Section 4	All site activities will be provided for in an Environmental Management Plan, prepared prior to the commencement of any operations onsite. The environmental management plan 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.		
MM3	EIAR Section 4 CEMP Section 4	An ECoW will oversee the site works and implementation of the Environmental Management Plan and provide on-site advice on the mitigation measures as necessary to ensure the project proceeds as intended. The level, detail and frequency of reporting expected from the ECoW for the Construction Manager, developer's project manager, and any Authorities or other Agencies, will be agreed by all parties prior to commencement of construction, and may be further adjusted as required during the course of the project.		
MM4	CEMP Section 4	Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of construction at the site. The		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		baseline monitoring programme will be subject to agreement with Roscommon County Council. Analysis will be for a range of parameters with relevant regulatory limits along with Environmental Quality Standards (EQSs) and sampling will be undertaken As a minimum the monitoring will be undertaken at the locations outlined in Figure 9-8 of the EIAR		
MM5	EIAR Section 4	The arrangements for concrete deliveries to the site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout and discussing emergency procedures.		
MM6	CEMP Section 3	The Project Hydrologist will assist in preparing a site drainage plan before construction commences.		
MM7	EIAR Section 4 CEMP Section 3	All materials and equipment necessary to implement the drainage mitigation measures will be brought on-site in advance of any works commencing. The drainage measures outlined in the EIAR will be installed prior to, or at the same time as the works they are intended to drain. An adequate amount of clean stone, silt fencing, stakes, etc. will be kept on site at all times to implement the drainage design measures as necessary.		
MM8	EIAR Section 4 CEMP Section 3	The works programme for the groundworks part of the construction phase of the project will also take account of weather forecasts and predicted rainfall in particular.		
MM9	CEMP Section 3	Prior to commencement of works in sub-catchments across the site main drain inspections will be competed to ensure ditches and streams are free from debris and blockages that may impede drainage.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM10	EIAR Section 4	An inspection and maintenance plan for the drainage system on site will be prepared in advance of commencement of any works. Regular inspections of all installed drainage systems will be necessary, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water at parts of the systems where it is not intended. The inspection of the drainage system will be the responsibility of the site Environmental Clerk of Works or the supervising hydrologist.		
MM11	EIAR Section 4	Existing artificial drains in the vicinity of existing site roads will be maintained in their present location where possible. If it is expected that these artificial drains will receive drainage water from works areas, check dams will be added (as specified below) to control flows and sediment loads in these existing artificial drains		
MM12	EIAR Section 4	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		
MM13	EIAR Section 4 CEMP Section 3	The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site.		
MM14	EIAR Section 4 CEMP Section 3	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		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		additional drainage measures such as those outlined above will be installed in advance of works recommencing.		
MM15	EIAR Section 4 CEMP Section 3	The site Construction Manager/Site Supervisor is responsible for making the decision to postpone or abandon works. Large excavations, large movements of overburden or large-scale overburden or soil stripping will be suspended or scaled back if heavy rain is forecast		
MM16	EIAR Section 6	Removal of trees, uncultivated vegetation and hedgerows will commence outside the bird nesting season (1st of March to 31st of August inclusive).		
MM17	EIAR Section 6	The footprint of the Proposed Development will be clearly marked out using post and rope prior to works commencing by a qualitied ecologist. There will be no access to the wider woodland area. All machinery will work from the existing access road corridor. Vegetation removal will be conducted in line with the provisions of the Wildlife Act.		
MM18	EIAR Section 6 CEMP Section 3	An Invasive Species Management Plan will be required if invasive species are found within the site prior to construction.		
MM19	EIAR Section 4 CEMP Section 9	The procedures for the implementation of the mitigation measures outlined in such an EMP and their effectiveness and completion is typically audited by way of an Environmental Management Plan Audit Report. The EMP Audit Report effectively lists all mitigation measures prescribed in any of the planning documentation and any further mitigation measures proposed during the detailed design stage and allows them to be audited on a systematic and regular basis.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM20	EIAR Section 13	› Written and photographic records will be created of any monuments which will be impacted on, in advance of groundworks commencing on site; › All areas where the monuments will be impacted on will be removed by hand (under licence from the National Monuments Service), in advance of groundworks commencing on site; › Archaeological test trenching in the area of land take associated with the monument, in advance of groundworks commencing on site;		
MM21	EIAR Section 13	› Archaeological monitoring of all groundworks (under licence from the National Monuments Service) in the area of the monument. 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). › The National Monuments Service will be informed of such findings to discuss how best to proceed. Once the project is completed, a report on the results of the monitoring will be compiled and submitted to the relevant authorities; › A highly visible buffer zone will be established around all parts of the monument area located outside the proposed access roads.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
Construction Phase				
Construction Management				
MM22	EIAR Section 4 CEMP Section 3 NIS Section 6	On-site refuelling will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double axel custom-built refuelling trailer, will be re-filled off site and will be towed around the site by a 4x4 jeep to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the cranes, excavators, etc. that will be used during the construction of the Proposed Development. The 4x4 towing vehicle will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction when not in use.		
MM23	EIAR Section 4 CEMP Section 3 NIS Section 6	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. Only ready-mixed concrete will be used during the construction phase, with all ready-mixed concrete being delivered from local batching plants in sealed concrete delivery trucks. Sand blinding, DPM and concrete blinding are to be provided at turbine formation level to create a vertical cut-off barrier and to mitigate the risk of concrete leakage into the ground below the turbine bases		
MM24	EIAR Section 4 CEMP Section 3 NIS Section 6	No washing out of any plant used in concrete transport or concreting operations will be carried out onsite. When concrete is delivered to site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the site. Concrete trucks will be directed back to their batching plant for washout.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM25	EIAR Section 4	No concrete will be transported around the site in open trailers or dumpers so as to avoid spillage while in transport.		
MM26	EIAR Section 4	Clearly visible signs in prominent locations will be placed close to concrete pour areas specifically stating washout of concrete lorries is not permitted on the site		
MM27	EIAR Section 4	All concrete used in the construction of turbine bases will be poured directly into the shuttered formwork from the delivery truck. If this is not practical, the concrete will be poured from the delivery truck into a hydraulic concrete pump or into the bucket of an excavator, which will transfer the concrete to the location where it is needed.		
MM28	EIAR Section 4	Main pours will be planned days or weeks in advance. Large pours will be avoided when prolonged periods of heavy rain are forecast.		
MM29	EIAR Section 4	Concrete pumps and machine buckets will be restricted from slewing over watercourses while placing concrete.		
MM30	EIAR Section 4	Excavations will be sufficiently dewatered before concreting begins. Dewatering will continue while concrete sets.		
MM31	EIAR Section 4	Covers will be available for freshly placed concrete to avoid the surface washing away in heavy rain.		
MM32	EIAR Section 4	Disposing of surplus concrete after completion of a pour in suitable off-site locations away from any watercourse or sensitive habitats.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM33	EIAR Section 4 & 5 CEMP Section 3	If necessary, water will be taken from stilling ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and site compounds to prevent the generation of dust. Silty or oily water will not be used for dust suppression.		
MM34	EIAR Section 5 CEMP Section 3	All construction related traffic will have speed restrictions on un-surfaced roads to 20 kph.		
MM35	EIAR Section 4	A road sweeper will be available if any section of the public roads were to be dirtied by trucks associated with the proposed development.		
MM36	EIAR Section 5	During construction of the proposed development, all staff will be made aware of and adhere to the Health & Safety Authority's *'Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. 291 of 2013), as amended'*. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan		
MM37	CEMP Section 2	Any area where excavations are planned will be surveyed and all existing services will be identified prior to commencement of any works. Liaison will be held with the relevant sections of the Local Authority including all the relevant area engineers to ensure all services are identified. Excavation permits will be completed and all plant operators and general operatives will be inducted and informed as to the location of any services.		
Drainage Design and Management				
MM38	EIAR Section 9	A 50-metre buffer zone will be maintained around watercourses during the windfarm construction. With the exception of road crossings of streams and		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
	CEMP Section 3 NIS Section 6	associated culvert construction, no development infrastructure, vehicle or plant movement, construction activity or stockpiling of construction materials or construction waste will take place within this zone, and no vegetation will be removed from within this zone.		
MM39	EIAR Section 4 CEMP Section 3 NIS Section 6	Swales will be used to intercept and collect run off from relevant construction areas of the site during the construction phase, and channel it to stilling ponds for sediment attenuation.		
MM40	EIAR Section 4 CEMP Section 3 NIS Section 6	Interceptor drains will be installed upgradient of relevant 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.		
MM41	EIAR Section 4 CEMP Section 3 NIS Section 6	Check dams will not be used in any natural watercourses, only artificial drainage channels and interceptor drains. The check dams will be left in place when the interceptor drains are backfilled at the end of the construction phase to limit linear flow in the backfilled drain. 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. The check dams will be installed as the interceptor drains are being excavated. The spacing and frequency of the check dams will be dependent on the gradient of the interceptor drain or swale in which they are being installed.		
MM42	EIAR Section 4	A level spreader will be constructed at the end of each interceptor drain to convert concentrated flows in the drain, into diffuse sheet flow on areas of vegetated ground. The levels spreaders will be located downgradient of any		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		proposed works areas where possible in locations where they are not likely to contribute further to water ingress to construction areas of the site. The water carried in interceptor drains will not have come in contact with works areas of the site, and therefore should be free of silt and sediment. The level spreaders will distribute clean drainage water onto vegetated areas where the water will not be re-concentrated into a flow channel immediately below the point of discharge. The discharge point will be on level or only very gently sloping ground rather than on a steep slope so as to prevent erosion.		
MM43	EIAR Section 4	Vegetation filters are the existing vegetated areas of land that will be used to accept surface water runoff from upgradient areas. The selection of suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions.		
MM44	EIAR Section 4 NIS Section 6	Stilling ponds will be used to attenuate runoff from works areas of the site of the Proposed Development during the construction phase and will remain in place to handle runoff from roads and hardstanding areas of the proposed development during the operational phase. The purpose of the stilling ponds is to intercept runoff potentially laden with sediment and to reduce the amount of sediment leaving the disturbed area by reducing runoff velocity. Reducing runoff velocity will allow larger particles to settle out in the stilling ponds, before the run-off water is redistributed as diffuse sheet flow in filter strips downgradient of any works areas.		
MM45	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. This will not be restricted to just these locations around the proposed development site with further sampling points added as deemed necessary by the ECoW in consultation with the Project Hydrologist and Site Manager		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		In-situ field monitoring will be completed on a Monthly 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		
MM46	EIAR Section 4, 8 & 9 NIS Section 6	› Off-site refuelling will occur at a controlled fuelling station where possible. › On-site refuelling will be carried out using a mobile double skinned, bunded fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site and will be towed around the site by a 4x4 jeep to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the cranes, excavators, etc. that will be used during the construction of the Proposed Development. The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction when not in use. Refuelling operations will be carried out only by designated trained and competent operatives. Mobile anti-pollution measures such as drip trays and fuel absorbent mats will be used during all refuelling operations. › Fuels stored on site will be minimised. Storage areas where required will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor; › The plant used during construction will be regularly inspected for leaks and fitness for purpose;		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		An emergency plan for the construction phase to deal with accidental spillages is contained within section 5 of this CEMP. Spill kits will be available to deal with and accidental spillage in and outside the re-fuelling area.		
MM47	EIAR Section 9	› No surface water will leave the proposed development site. All drainage measures will incorporate water infiltrating back to ground within the site boundary; › Where pumping water from turbine foundation excavations is necessary, the pumping rate will be limited to prevent overuse of the settlement ponds; › Excavations will be limited as much as possible in order to minimise the volume of spoil generated; › Sand blinding, DPM and concrete blinding will be provided at formation level to create a vertical cut-off barrier and to mitigate the risk of concrete leakage into the ground below; › Hardstands will be lined with Terram geotextile to limit direct discharge to the subsoil/bedrock		
MM48	EIAR Section 4	Silt fences will be installed as a series of triple silt fences. The silt fence designs follow the technical guidance document *'Control of Water Pollution from Linear Construction Projects'* published by CIRIA (CIRIA, No. C648, 1996). Each fence will consist of a geotextile fabric such as Terrastop attached by staples to fixed stakes. The Terram sheets will be folded in an L shape with one metre extending horizontally in towards the works area. This horizontal section will be buried at a distance of approximately 150mm beneath the surface. Site 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.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM49	CEMP Section 4 EIAR Section 9	During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for each primary watercourse, and specifically following heavy rainfall events		
MM50	EIAR Section 9	Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses comprised of best practice methods will be implemented. These include: › Subsoil reinstatement areas will be sealed with a digger bucket and vegetated as soon possible to reduce sediment entrainment in runoff. › Construction of the site drainage system will only be carried out during periods of low rainfall, and therefore minimum runoff rates. › Near stream works will only be carried out during the period permitted by Inland Fisheries Ireland		
MM51	EIAR Section 4	Piped drains will be used to convey surface runoff from diversion swales and interceptor drains safely downslope of the infrastructure. From here, water is dispersed through the level spreaders or to settlement ponds. The piped drains will be semi-rigid corrugated pipes with a stabilised entrance and a rock apron at the outlet to trap sediment and dissipate the energy of the water. The base of drains leading into the top of the piped slope drain will be compacted and concavely formed to channel the water into the corrugated pipe. The entrance at the top of the pipe will be stabilised with sandbags if necessary.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		Piped drains will be inspected weekly and following rainfall events. Inlet and outlets will be checked for sediment accumulation and blockage.		
MM52	EIAR Section 4 CEMP Section 3 NIS Section 6	The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the ECoW or supervising hydrologist on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site.		
MM53	EIAR Section 4 NIS Section 3	Material excavated to create the working area will be stored locally for later reuse in backfilling the working area around the turbine foundation. The excavated material will be covered with polythene sheets or sealed with the excavator bucket and surrounded by silt fences to ensure sediment-laden run-off does not occur where appropriate.		
MM54	EIAR Section 4	A berm approximately 600 mm high will be constructed around the perimeter of each turbine base and a fence will be erected to prevent construction traffic from driving into the excavated hole and to demarcate the working area		
MM55	EIAR Section 4 NIS Section 3	The area to be used as the compound will be marked out at the corners using ranging rods or timber posts. Drainage runs and associated settlement ponds will be installed around the perimeter;		
MM56	EIAR Section 4. CEMP Section 3	Where dewatering is required in cable trench excavation, silt laden water will be fully and appropriately attenuated before being appropriately discharged to vegetation or surface water drainage feature		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
	NIS Section 3			
MM57	EIAR Section 8	Mitigation Measures associated with Grid Connection works: › Although no in-stream works are proposed, the directional drilling works will only be done over a dry period between July and September (as required by IFI for in-stream works) to avoid the salmon spawning season and to have more favourable (dryer) ground conditions; › The crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance; › There will be no storage of material / equipment or overnight parking of machinery inside the 15m buffer zone to the watercourse; › Before any ground works are undertaken, double silt fencing will be placed upslope of the watercourse channel along the 15m buffer zone boundary; › Additional silt fencing or straw bales (pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards the watercourse; › Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered; › For HDD method, the area around the bentonite batching, pumping and recycling plant will be bunded using terram (as it will clog) and sandbags in order to contain any spillages; › Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area; › Spills of drilling fluid will be clean up immediately and stored in an adequately sized skip before been taken off-site;		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		› If rainfall events occur during the works, there will be a requirement to collect and treat small volumes of surface water from areas of disturbed ground (i.e. soil and subsoil exposures created during site preparation works); › This will be completed using a shallow swale and sump down slope of the disturbed ground; and water will be pumped to a proposed percolation area at least 50m from the watercourse, or into a tanker for off site disposal; › The discharge of water onto vegetated ground at the percolation area will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing; › Any sediment laden water from the works area will not be discharged directly to a watercourse or drain; › Works shall not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted; › Daily monitoring of the compound works area, the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the watercourse; › If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied; › On completion of the works, the ground surface disturbed during the site preparation works and at the entry and exit pits will be carefully reinstated and re-seeded at the soonest opportunity to prevent soil erosion;		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		› The silt fencing upslope of the watercourse/river will be left in place and maintained until the disturbed ground has re-vegetated; › There will be no batching or storage of cement allowed within 50m of any of the watercourse crossing; › There will be no refuelling allowed within 100m of the watercourse crossing; and, › All plant will be checked for purpose of use prior to mobilisation to the watercourse crossing locations.		
MM58	EIAR Section 8.	Horizontal Directional Drilling Fracture Blow-out (Frac-out) Prevention and Contingency Plan: › The drilling fluid/bentonite will be non-toxic and naturally biodegradable (i.e., Clear Bore Drilling Fluid or similar will be used); › The area around the drilling fluid batching, pumping and recycling plants will be bunded using terram and/or sandbags to contain any potential spillage; › One or more lines of silt fencing will be placed between the works area and the adjacent river; › Spills of drilling fluid will be cleaned up immediately and transported off-site for disposal at a licensed facility; › Adequately sized skips will be used where temporary storage of arisings are required; › The drilling process / pressure will be constantly monitored to detect any possible leaks or breakouts into the surrounding geology or local watercourse;		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		› This will be gauged by observation and by monitoring the pumping rates and pressures. If any signs of breakout occur then drilling will be immediately stopped; › Any frac-out material will be contained and removed off-site; › The drilling location will be reviewed, before re-commencing with a higher viscosity drilling fluid mix; and, › If the risk of further frac-out is high, a new drilling alignment will be sought at the crossing location.		
MM59	EIAR Section 9	Construction stage activities on the access road to T4 and at T4 will only be completed during the Summer Months (May – October) when the turlough is drained and empty		
Subsoils and Bedrock				
MM60	EIAR Section 8	It is proposed that a limited amount of spoil material will be stored around each turbine and hardstand		
MM61	EIAR Section 8	Spoil removed from turbine locations will be transported to the closest designated overburden storage areas.		
MM62	EIAR Section 8	› Excavated soils/subsoils shall be excavated and stored separately to topsoil; this will prevent mixing of materials and facilitate reuse afterwards; › Placement of turbines and associated infrastructure in areas with suitable ground conditions (based on detailed site investigation data); › All materials which require storage will be stockpiled at low angles (< 5-10°) to ensure their stability and secured using silt fencing where necessary. This will help to mitigate		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		erosion and unnecessary additions of suspended solids to the drainage system; › Spoil disposal will take place within a minimal distance of each turbine to avoid excessive transport of materials within the site; › Spoil will be deposited, in layers of 0.50m and will not exceed a total thickness of 1m and 2m as indicated on the drawings; › Spoil will only be deposited on slopes of less than 5 degrees to the horizontal and greater than 10m from the top of a cutting; and, › No turbines or related infrastructure will be constructed near or on any designated sites such as NHAs or SACs		
MM63	EIAR Section 8	Mitigation measures for the Kileglan karst landscape include using the paths of existing cleared tracks within the landscape for site access roads and emplacing the turbines on previously cleared lands where possible. During construction, all vehicle and construction plant operators will be advised of the location of the geological sites and instructed to avoid those areas where possible.		
MM64	EIAR Section 8	As the designated sites are distant to the Wind Farm Site, there can be no direct impacts on the land soils and geology of the designated sites. Indirect effects are considered and mitigated by: › Avoiding physical damage to watercourses, and associated release of sediment; › Avoiding excavations within close proximity to surface water courses;		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		› Avoiding the entry of suspended sediment from earthworks into watercourses › Avoiding 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.		
MM65	EIAR Section 8 CEMP Section 3	The following issues incorporated into the construction phase of the project will assist in the management of the risks for this site (FT, 2020): › Appointment of experienced and competent contractors; › The site should be supervised by experienced and qualified personnel; › Allocate sufficient time for the project; › Prevent undercutting of slopes and unsupported excavations; › Maintain a managed robust drainage system; › Ensure construction method statements are followed or where agreed modified/ developed; and, › Revise and amend the Geotechnical Risk Register as construction progresses.		
Biodiversity				
MM66	EIAR Section	Where the Proposed Development footprint does occur on Annex I listed semi-natural dry grasslands [6210/6210*] habitat, the following measures will be implemented in		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		advance of construction to minimise the area of habitat lost to the Proposed Development footprint: › Prior to any site clearance/enabling works, the required works area, including cut and fill, will be marked out using post and rope by the project engineer and project ecologist, › There will be no temporary storage of materials within areas of Annex I listed semi-natural dry grasslands [6210/6210*] habitat, › There will be no unnecessary tracking/shortcuts taken across areas of Annex I listed semi-natural dry grasslands [6210/6210*] habitat, › During initial vegetation stripping, all topsoil material will be temporarily stored on site and used for "dressing" the edges of the development infrastructure during reinstatement/regrading. This will be particularly important in areas of cut and fill. The stripped topsoil will contain a natural seed source of local provenance and result in the establishment of a species rich grassland.		
MM67		As part of mitigation to protect and preserve bat species, the following is proposed: › Planting of approximately 290m of species indigenous to the local area › 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 2001SI 359/1996).		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		In addition, the applicant commits to the use of lights during construction, operation and decommissioning (such that they are necessary) in line with the following guidance that is provided in the Dark Sky Ireland Lighting Recommendations: › Every light needs to be justifiable, › Limit the use of light to when it is needed, › Direct the light to where it is needed, › Reduce the light intensity to the minimum needed, › Use light spectra adapted to the environment, when using white light, use sources with a "warm" colour temperature (less than 3000K).		
MM68	EIAR Section 6	Best practice Forestry Service Guideline mitigation measures will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses as outlined in the EIAR.		
MM69	EIAR Section 7	Clearance of uncultivated vegetation, i.e. trees and hedgerows, will be undertaken outside the main breeding bird season, from March to August inclusive. If other site clearance and construction activities are required to take place during the main breeding bird season, pre-commencement survey work would be undertaken to ensure that nest destruction and disturbance to sensitive species (i.e., breeding raptors and waders) are avoided. Where applicable, construction would not take place within specified disturbance-free buffer zones for certain sensitive species whilst those species are actively nesting.		
MM70	EIAR Section 7	If bird breeding activity of species of conservation concern are identified during the works, the nest sites will be located, and no works shall be undertaken within a buffer zone in line with industry best practise for each species:		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		› Peregrine falcon – 500-750m › Northern lapwing – 300m › Eurasian curlew – 300m › Common snipe – 300m		
MM71	EIAR Section 6	The implementation of the Biodiversity Management and Enhancement Plan will ensure that any Annex I semi-natural dry grassland (6210/ 6210*) habitat that is lost to facilitate the proposed infrastructure will be replaced within the EIAR Site Boundary		
Noise				
MM72	EIAR Section 11	Measures to control noise levels associated with the works include: › limiting the hours during which site activities likely to create high levels of noise or vibration are permitted; › establishing channels of communication between the contractor/developer, Local Authority and residents; › appointing a site representative responsible for matters relating to noise and vibration; › monitoring typical levels of noise and vibration during critical periods and at sensitive locations; › keeping site access roads even to mitigate the potential for vibration from lorries › selection of plant with low inherent potential for generation of noise and/ or vibration; › placing of noise generating / vibratory plant as far away from sensitive properties as possible within the site constraints, and;		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		› regular maintenance and servicing of plant items		
MM73	EIAR Section 6 & 11	Plant will be selected taking account of the characteristics of noise emissions from each item. The timing of on- and off-site movements of plant near occupied properties will be controlled. Plant machinery will be turned off when not in use and all plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (SI 359/1996).		
MM74	EIAR Section 5, 10 & 11 CEMP Section 3	The operation of plant and machinery, including construction vehicles, is a source of potential impact that will require mitigation at all locations within the site. Proposed measures to control noise include: › Diesel generators will be enclosed in sound proofed containers to minimise the potential for noise impacts; › Plant and machinery with low inherent potential for generation of noise and/or vibration will be selected. All construction plant and equipment to be used on-site will be modern equipment and will comply with the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations; › Regular maintenance of plant will be carried out in order to minimise noise emissions. Particular attention will be paid to the lubrication of bearings and the integrity of silencers; › All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works; › Compressors will be of the “sound reduced” models fitted with properly lined and sealed acoustic covers which will be		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		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; › 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 Section 11 of the EIAR 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 Friday and 8:00hrs and 13:00hrs on 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 › Training will be provided by the ECoW to drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation; and, › Local areas of the haul route will be condition monitored and maintained if necessary.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		Where rock breaking is employed in relation to the Proposed Development, the following are examples of measures that will be employed, where necessary, to mitigate noise emissions from these activities: › Fit suitably designed muffler or sound reduction equipment to the rock breaking tool to reduce noise without impairing machine efficiency. › Ensure all leaks in air lines are sealed. › Use a dampened bit to eliminate ringing. › Erect acoustic screen between compressor or generator and noise sensitive area. When possible, line of sight between top of machine and reception point needs to be obscured. › Enclose breaker or rock drill in portable or fixed acoustic enclosure with suitable ventilation		
MM75	EIAR Section 11	All construction operations shall comply with guidelines set out in British Standard documents British Standard 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.		
Air Quality and Dust				
MM76	EIAR Section 4,5 & 10 CEMP Section 3	Measures to control dust levels associated with the works and activites that cold potentially impact on air quality include: › Truck wheels will be washed to remove mud and dirt before leaving the site where appropriate. › All plant and materials vehicles shall be stored in the dedicated compound area.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		› Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction. › Construction traffic will be restricted to defined routes and a speed limit will be implemented. › Water misting or bowsers will operate on-site as required to mitigate dust in dry weather conditions.		
MM77	EIAR Section 10	All construction machinery will be maintained in good operational order while on-site, minimising any emissions that are likely to arise.		
MM78	EIAR Section 10	In periods of extended dry weather, dust suppression may be necessary along haul roads and around the overburden storage areas to ensure dust does not cause a nuisance. If necessary, water will be taken from settlement ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and site compounds to prevent the generation of dust. Silty or oily water will not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser movements will be carefully monitored, as the application of too much water may lead to increased runoff.		
Landscape and Visual				
MM79	EIAR Section 10	The transportation of dry excavated material from the site to the designated on-site overburden storage areas, which may have potential to generate dust will be minimised. If necessary, excavated material will be dampened prior to transport to the overburden storage areas		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM80	EIAR Section 12	As part of cabling works; › In all circumstances, excavation depths and volumes will be minimised, and excavated material will be re-used where possible. › Where the cable trench is to be located in the road verge, subsoil should be piled on site and re-used after cabling works. Should any medium planting be removed, it should be replaced with the same or similar species whenever it is not possible to salvage and reinstate. New topsoil should be provided should the existing topsoil not be of sufficient standard (to comply with BS 3882:2015). › Any areas of bare soil remaining after the landscaping phase will be seeded as soon as possible with a grass seed mix to minimise sediment run-off		
Traffic				
MM81	EIAR Section 5 & 14	The timing of peak delivery of construction materials to the proposed wind farm site (i.e. during turbine foundation pours and turbine component deliveries) will be carefully scheduled to minimise traffic disruption; particularly along the R363 and R362 which will be utilised for the delivery of materials and components and will accommodate the proposed Grid Connection infrastructure › Prior to commencement of any works, the occupants of dwellings in the vicinity of the proposed works will be contacted and the scheduling of works will be made clear.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		› Access to properties will be maintained throughout any construction works and local residents will also be supplied with the number of the works supervisor in order to ensure that disruption will be kept to a minimum. › Deliveries of concrete and aggregate materials will occur early in the morning to reduce impact to road users. Furthermore, these deliveries will be sourced from local quarries which will reduce the distance of these deliveries, thereby reducing the impact to traffic and transport in the wider area		
Cultural Heritage				
MM82	EIAR Section 13	Buffer zones (Exclusion Zones) will be established around the recorded monuments where practicable within the Proposed Development EIAR boundary utilising the statutory Zones of Notification as the limits for the buffers. Each buffer should comprise durable temporary fencing capable of lasting throughout the construction phase of the development. Keep out signage should be placed on the perimeter of the buffer zone		
Operational Phase				
MM83	EIAR Section 4	The removal and disposal of wastewater from the site will be carried out by a fully permitted waste collector holding valid Waste Collection Permits as issued under the Waste Management (Collection Permit) Regulations, 2007. Information on the appointed permitted contractor and evidence of a maintenance contract having been submitted to the Planning Authority prior to any construction works taking place.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM84	EIAR Section 6	To reduce the value of the habitat for bat species in the areas surrounding the turbines, a buffer of at least 50m between the tip of the blade and any trees or other tall vegetation that could provide high quality foraging habitat for bat species will be implemented.		
MM85	EIAR Section 8 NIS Section 6 CEMP Section 3	The electrical substation 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		
MM86	EIAR Section 5	If required, wind turbine control measures will be implemented (SCADA System). Wind turbines will be fitted with shadow flicker control units to allow the turbines to be controlled to prevent the occurrence of shadow flicker at properties surrounding the Wind Farm. The shadow flicker control units will be added to any required turbines.		
MM87	EIAR Section 5	In the event of an occurrence of shadow flicker at residential receptor locations, mitigation options will be discussed with the affected homeowner, including: › Installation of appropriate window blinds in the affected rooms of the residence; › Planting of screening vegetation; › Other site-specific measures which might be agreeable to the affected party and may lead to the desired mitigation. If agreement can be reached with the homeowner, then it would be arranged for the required mitigation to be implemented in cooperation with the affected		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		party as soon as practically possible and for the full costs to be borne by the wind farm operator.		
MM88	EIAR Section 5	Signs will also be erected at suitable locations across the site as required for the ease and safety of operation of the Wind Farm. These signs include: › Buried cable route markers at 50m (maximum) intervals and change of cable route direction; › Directions to relevant turbines at junctions; › "No access to Unauthorised Personnel" at appropriate locations; › Speed limits signs at site entrance and junctions; › "Warning these Premises are alarmed" at appropriate locations; › "Danger HV" at appropriate locations; › "Warning – Keep clear of structures during electrical storms, high winds or ice conditions" at site entrance; › "No unauthorised vehicles beyond this point" at specific site entrances; and › Other operational signage required as per site-specific hazards		
MM89	EIAR Section 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.		
MM90	EIAR Section 5	An operational phase Health and Safety Plan will be developed to fully address identified Health and Safety issues associated with the operation of the site and providing for access for emergency services at all times.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM91	EIAR Section 9	The operational phase drainage system of the Proposed Development will be installed and constructed in conjunction with the road and hardstanding construction work as described below: › Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean local drainage water, in order to minimise the amount of rainfall reaching areas where suspended sediment could become entrained. Collected drainage water will then be directed to areas where it can be slowly re-distributed over the ground surface and infiltrate through the soil and subsoils; › Swales/road side drains will be used to collect drainage from access roads and turbine hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to settlement ponds for sediment settling; › Check dams will be used along sections of access road drains to attenuate flows and intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock; and, There will be no increase in runoff from the Wind Farm Site as a result of the Proposed Development.		
MM92	EIAR Section 4	Drainage swales and silting ponds will remain in place to collect runoff from roads and hardstanding areas of the Proposed Development during the operational phase.		
MM93	EIAR Section 11	Noise operational modes resulting in curtailment of turbine operation can be implemented for specific turbines in specific wind conditions to ensure		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		predicted noise levels are within the relevant noise criterion curves/planning conditions. Such additional curtailment can be applied using the wind farm SCADA system without undue effect on the wind turbine operation		
MM94	EIAR Section 14	As is standard practice for wind energy developments, the Applicant has entered into a protocol agreement with 2rn to ensure that any complaints received from the local public concerned are appropriately remediated. This is the standard protocol for such development proposals and is enclosed at Appendix 14-5. If, despite the 'mitigation-by-design' precautions undertaken to date, significant television signal interference in any form is identified and is attributed to the proposed development, appropriate remedial measures will immediately be undertaken. A range of technical measures are available to mitigate any instances of interference including signal amplifiers, active deflectors and relay transmitters, repeater stations, booster units, realignment of domestic aerials, installation of higher quality aerials and the installation of suppression equipment. Significant signal interference in relation to mobile phone signal, broadband and other telecommunications are not assessed as likely; however, should any interference occur which is directly attributable to the operation of the proposed development, remedial works will be promptly undertaken to ensure uninterrupted service provision.		
Decommissioning Phase				
MM95	EIAR Section 4	Prior to the end of the operational period the Decommissioning Plan (Appendix 4-10) will be updated in line with decommissioning methodologies		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		that may exist at the time and will agreed with the competent authority at that time.		
MM96	DP Section 3	Prior to decommissioning, a suitably qualified ecologist will complete an invasive species survey of the berms that will be temporarily removed during decommissioning at the turbine delivery accommodation roadway and the junction upgrade adjacent. 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.		
MM97	EIAR Section 4 DP Section 3 NIS Section 6	The effectiveness of drainage measures in the natural drainage regime that will have resumed by the time of decommissioning will be monitored continuously by the ECoW or supervising hydrologist on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site.		
MM98	EIAR Section 7	Good practice measures, similar to those employed during the construction phase, including surveys prior to decommissioning, to inform an up-to-date assessment of potential effects on important bird species, would be implemented during decommissioning		
MM99	EIAR Section 4 DP Section 2	On removal of turbines, the foundations will be covered using local topsoil/soil from the site or imported locally. The soil will be spread and graded over the foundation using a tracked excavator and revegetation enhanced by spreading of an appropriate seed mix to assist in revegetation and accelerate the resumption of the natural drainage management that will have existed prior to any construction		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM100	EIAR Section 4 DP Section 3	The following mitigation measures are proposed to avoid release of hydrocarbons at the site: › 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; › 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 Section 4) Spill kits will be available to deal with and accidental spillage in and outside the refuelling area. A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the decommissioning phase.		
MM101	EIAR Section 7	A Decommissioning Plan has been prepared (see Appendix 4-10) The following measures are proposed for the decommissioning phase: › During the decommissioning phase, disturbance limitation measures will be as per the construction phase (see Section 7 of the EIAR). › Plant machinery will be turned off when not in use.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		› All plant and equipment for use will comply with the Construction Plant and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations 2001 (S.I. No. 632 of 2001). A project ecologist will be appointed to oversee the decommissioning phase, with similar duties to those outlined above during the construction phase.		
MM102	EIAR Section 14 DP Section 3	A Traffic Management Plan will be prepared in advance of any decommissioning works. The removal of turbines from site will be undertaken by a specialist haulier. The traffic management arrangements although similar to those that will be implemented for turbine delivery as outlined in the EIAR will be agreed in advance of decommissioning with the competent authority Roscommon County Council. The Traffic Management Plan for the decommissioning phase will also include provision for the removal of underground cables from the underground cabling along the R363. This will be done by opening the joint bays along the public road.		
MM103	EIAR Section 6	Blade Feathering On a precautionary basis, and in addition to buffers applied to habitat features, it is proposed that 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).		

7. MONITORING PROPOSALS

All monitoring proposals relating to the pre-commencement, construction and operational phases of the Proposed Development were set out in the relevant chapters of the Environmental Impact Assessment Report (EIAR) submitted as part of the original planning permission application, and subsequent responses to further information requests issued by 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 Table 7-1 below.

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

Table 7-1 Monitoring Measures

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
Pre-Commencement Phase					
MX1	EIAR Section 9	An inspection and maintenance plan for the on-site drainage system will be prepared in advance of commencement of any works.	Ongoing	Monthly	ECoW
MX2	CEMP Section 3	Prior to commencement of works in sub-catchments across the site main drain inspections will be competed to ensure ditches and streams are free from debris and blockages that may impede drainage.	As Required	Monthly	Project Hydrologist
MX3	EIAR Section 7	Pre-commencement bird surveys will be undertaken prior to the initiation of works at the Site	Once	As required	Project Ornithologist
Construction Phase					
MX4	EIAR Section 13	Archaeological monitoring of all ground works (to include roads, substation, turbine hardstands, bases and cable trenching) in the area of any monuments will be undertaken at the construction phase of the development.	Once	As required	Project Archaeologist
MX5	EIAR Section 13	A highly visible buffer zone will be established around all areas containing monuments onsite	Once	As required	Project Archaeologist
MX6	EIAR Section 4	Check dams will be inspected and maintained regularly to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.	As Required	As Necessary	ECoW
MX7	EIAR Section 4	A water level indicator such as a staff gauge will be installed in each stilling pond with marks to identify when sediment is at 10% of the stilling pond capacity. Sediment will be cleaned out of the still pond when it exceeds 10% of	As Required	As Necessary	ECoW

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
		pond capacity. Stilling ponds will be inspected weekly and following rainfall events. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows.			
MX8	CEMP Section 4	Daily general visual inspections of site operations and inspections of all watercourses within the site and in the surrounding area by the ECoW or a suitably qualified and competent person as delegated by the ECoW	Weekly / As Required	As Necessary	ECoW
MX9	EIAR Section 4 CEMP Section 3	Inspections of the overburden storage areas will be made by a geotechnical engineer through regular monitoring of the works. The appointed contractor will review work practices at spoil deposition areas when periods of heavy rainfall are expected so as to prevent excessive dirty water runoff from being generated.	Weekly / Monthly	As Necessary	Contractor/ Geotechnical Engineer
MX10	EIAR Section 4 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 or supervising hydrologist on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site.	As Required	As Necessary	ECoW / Project Hydrologist
MX11	EIAR Section 9 CEMP Section 3	The plant used should be regularly inspected for leaks and fitness for purpose.	Before Use	As Necessary	Drivers / ECoW

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX12	EIAR Section 9	Surface water runoff from temporary construction compounds will be collected and drained via silt traps and hydrocarbon interceptors prior to recharge to ground	Weekly/ Monthly	As Necessary	ECoW
MX13	EIAR Section 4	Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended.	Weekly/ Monthly	As Necessary	ECoW
MX14	EIAR Section 9 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. This will not be restricted to just these locations around the proposed 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 Monthly 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.	Weekly, monthly and event based	As Necessary	ECoW / Project Hydrologist
MX15	CEMP Section 3	Training and supervision of drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation.	As Required	As Necessary	ECoW
MX16	CEMP Section 3	The Project Ecologist will report to the ECoW and is responsible for the protection of sensitive habitats and species encountered during the construction phase of the Wind Farm. The Project Ecologist will not be full time on site but will visit the site at least once a month during construction.	As required	As required	Project Ecologist

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
		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 ECoW, oversee and provide advice on all relevant ecology mitigation measures set out in the planning documents for the proposed development; › 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; and, › Complete a pre-commencement invasive species survey at the site.			
MX17	EIAR Section 7	Prior to the start of construction and/or the breeding bird season, contractors would be made aware of the ornithological sensitivities within the Site (particularly with regard to the potential presence of sensitive breeding species) and Undertake surveys for nesting birds throughout the construction period that is within the nesting season and set up and monitor appropriate exclusion areas whilst nests of relevant species are in use.	Prior to the subsequent breeding season	As Necessary	Project Ornithologist
Operational Phase					
MX18	EIAR Section 7	Based on current best-practice guidelines (SNH, 2009), it is proposed that a targeted range of flight activity surveys and collision monitoring (carcass searching) should be undertaken during the non-breeding season in years 1, 2 and 3 post construction, in order to monitor the rate of avian turbine collisions	Monthly or as required	Years 1, 2 and 3 the life of a wind farm	Project Ornithologist

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
		and verify the predictions made in this assessment.This should include bird strikes/fatalities including the impact on any such results of the removal of carcasses by scavengers			
MX19	EIAR Section 6	Ongoing monitoring of bat activity will be undertaken for at least 3 years' post construction of the Wind Farm. This will provide data and information on the actual recorded impact of the wind turbines on the local bat populations and should include bat strikes/fatalities including the impact on any such results by the removal of carcasses by scavengers	Monthly or as required	Years 1, 2 and 3 of the life of a wind farm	Project Ornithologist
MX20	EIAR Section 9	Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. This will be part of the regular maintenance of the on-site drainage system.	As Required	Weekly	ECoW
MX21	EIAR Section 11	Operational phase noise monitoring surveys will be carried out to ensure compliance with any noise conditions applied to the Proposed Development	Once	On completion of Programme	Project Noise Consultant
MX22	EIAR Section 6	The implementation of the Biodiversity Management and Enhancement Plan will ensure that any Annex I semi-natural dry grassland (6210/ 6210*) habitat that is lost to facilitate the proposed infrastructure will be replaced within the EIAR Site Boundary. The Biodiversity Management and Enhancement Plan includes for the management and reversion of 10 hectares of improved – semi-improved agricultural grassland back to a species-rich dry grassland community. In addition, there landowner agreement has been secured that there will be no further land reclamation within areas of Annex I semi-natural dry grassland (6210/ 6210*) habitat for the lifetime of the proposed development, see Appendix 6-5. The farm plans will commence during the	Once	As Necessary	Project Ecologist

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
		construction phase of the Proposed Development and will be maintained for the operational lifetime of the proposed development			
MX23	EIAR Section 5	In order to ensure that the model and SCADA system is accurate and working well a site visit will be carried out to verify the system and a report on the compliance of the Wind Farm with its limits will be compiled.	Once	Within 1 year	EcoW
Decommissioning Phases					
MX24	DP Section 3	Prior to decommissioning, a suitably qualified ecologist will complete an invasive species survey of the berms that will be temporarily removed during decommissioning at the turbine delivery accommodation roadway and the junction upgrade adjacent and 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
MX25	DP Section 3	The Site Manager in consultation with the ECoW will be responsible for employing the services of a suitably qualified ecologist and any other suitably qualified professionals as required throughout the decommissioning works.	As required	As required	Site Manager
MX26	DP Section 3	In general, the ECoW will maintain responsibility for monitoring the decommissioning works and Contractors/Sub-contractors from an environmental perspective. The ECoW will act as the regulatory interface on environmental matters. The Site Manager will be responsible for reporting to and liaising with Roscommon County Council and other statutory bodies as required	As required	As required	ECoW/ Site Manager
MX27	EIAR Section 9	Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended	As Required	Weekly	ECoW

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX28	CEMP Section 3	Training and supervision of drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation during the decommissioning phase.	As Required	As Necessary	ECoW
MX29	CEMP Section 4	Daily general visual inspections of site operations and inspections of all watercourses within the site and in the surrounding area by the ECoW or a suitably qualified and competent person as delegated by the ECoW	Weekly / As Required	As Necessary	ECoW
MX30	EIAR Section 7	Prior to the start of decommissioning and/or the breeding bird season, contractors would be made aware of the ornithological sensitivities within the Site (particularly with regard to the potential presence of sensitive breeding species) and undertake surveys for nesting birds throughout the decommissioning period that is within the nesting season and set up and monitor appropriate exclusion areas whilst nests of relevant species are in use.	Prior to the subsequent breeding season	As Necessary	Project Ornithologist

8. PROGRAMME OF WORKS

The construction phase will take approximately 18-24 months from commencement onsite to the commissioning of the electrical system.

.

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

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

Figure 8-1 Indicative Construction Schedule

9. COMPLIANCE AND REVIEW

9.1 Site Inspections and Environmental Audits

Routine inspections of construction activities will be carried out on a daily and weekly basis by the ECoW and the 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 relevant planning documentation. Only suitably trained staff will undertake environmental site inspections.

9.2 Auditing

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

In contrast to monitoring and inspection activities, audits are designed to shed light on the underlying causes of non-compliance, and not merely detect the non-compliance itself. In addition, audits are the main means by which system and performance improvement opportunities may be identified. Environmental audits will be carried out by the ECoW on behalf of the appointed contractor. It is important that an impartial and objective approach is adopted. Environmental audits will be conducted at planned intervals to determine whether the CEMP is being properly implemented and maintained. The results of environmental audits will be provided to project management personnel.

An audit of compliance with the pre-commencement mitigation measures will be completed by the ECoW prior to the commencement of the construction phase of the development. An audit of compliance with the construction phase mitigation measures will be completed monthly during the construction phase. The findings of each audit will be documented by the ECoW in an audit report within the EMP for the site. The audit report will be made available to Roscommon County council on request.

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

9.3 Environmental Compliance

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

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

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

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

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

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

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

9.4 Corrective Action Procedure

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

- Environmental Audits;
- Environmental Inspections and Reviews;
- Environmental Monitoring;
- Environmental Incidents, Exceedances; 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. The Corrective Action Notice will be held at the site offices.

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

9.5 Construction Phase Plan Review

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