



APPENDIX 3

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

Construction and Environmental Management Plan

Umma More Renewable
Energy Development -
EIAR





DOCUMENT DETAILS

Client: **Umma More Ltd.**

Project Title: **Umma More Renewable Energy Development - EIAR**

Project Number: **201050**

Document Title: **Construction & Environmental Management Plan**

Document File Name: **CEMP F - 2023.03.10 - 201050**

Prepared By: **MKO
Tuam Road
Galway
Ireland
H91 VW84**



Rev	Status	Date	Author(s)	Approved By
01	Draft	05.01.2023	TM	EC/OC
02	Draft	08.02.2023	TM	EC/OC
03	Draft	16/02/2023	TM	EC/OC
04	Draft	24/02/2023	TM	EC/OC
05	Final	10/03/2023	TM	EC/OC

Table of Contents

1.	INTRODUCTION.....	1
1.1	Scope of the Construction and Environmental Management Plan	2
1.2	Targets and Objectives	3
2.	SITE AND PROPOSED DEVELOPMENT DETAILS.....	4
2.1	Site Location and Description.....	4
2.1.1	Description of the Development.....	5
2.2	Construction Methodology Overview	10
2.2.1	Introduction	10
2.2.2	Overview of Proposed Construction Methodology	10
2.2.2.1	Temporary Construction Compounds	10
2.2.2.2	Tree Felling	11
2.2.2.3	Site Drainage System	11
2.2.2.4	Spoil Management Areas	12
2.2.2.5	New Site Access Roads.....	14
2.2.2.6	Upgrading of Existing Site Access Roads	15
2.2.2.7	Proposed Clear-Span Watercourse Crossing.....	16
2.2.2.8	Turbine Foundations.....	17
2.2.2.9	Meteorological Mast Foundation	19
2.2.2.10	Hard Standing Areas	19
2.2.2.11	Electricity Substation and Control Buildings Construction	20
2.2.2.12	Site Underground Cabling.....	21
2.2.2.13	Grid Connection Underground Electrical Cabling Route.....	21
2.2.2.14	Transport Route Accommodation Works.....	31
2.2.3	Decommissioning	31
3.	ENVIRONMENTAL MANAGEMENT	33
3.1	Introduction.....	33
3.2	Protecting Water Quality	33
3.2.1	Environmental Management in the Construction Phase.....	33
3.2.2	Site Drainage Principles.....	33
3.2.3	Legislation and Best Practice Guidance	34
3.2.4	Site Drainage Design and Management.....	34
3.2.4.1	Pre-Construction Drainage	35
3.2.4.2	Construction Phase Drainage	35
3.2.4.3	Operational Phase Drainage	38
3.2.4.4	Preparative Site Drainage Management	38
3.2.4.5	Pre-emptive Site Drainage Management.....	38
3.2.4.6	Reactive Site Drainage Management.....	38
3.2.4.7	Rainfall Forecasting and Monitoring	39
3.3	Wind Farm Cable Trench Drainage.....	39
3.4	Refuelling, Fuel and Hazardous Materials	39
3.5	Tree Felling	40
3.5.1	Tree Felling Drainage Measures	40
3.6	Cement Based Products Control Measures	42
3.7	Archaeological Management	44
3.8	Traffic Management	44
3.8.1	Turbine and Materials Transport Route	45
3.8.1.1	Wind Farm Site	45
3.8.1.2	Grid Connection.....	46
3.8.2	Traffic Mitigation Measures During the Construction Stage.....	47
3.9	Dust Control	50
3.10	Noise Control.....	50
3.11	Invasive Species Management	52
3.11.1	Site Management.....	52
3.11.2	Establish Good Site Hygiene.....	52
3.12	Waste Management	53

3.12.1.1	Legislation.....	53
3.12.2	Waste Management Hierarchy.....	53
3.12.3	Construction Phase Waste Management.....	54
3.12.3.1	Description of the Works.....	54
3.12.3.2	Waste Arisings and Proposals for Minimisation, Reuse and Recycling of Construction waste	55
3.12.3.3	Waste Arising from Construction Activities.....	55
3.12.4	Waste Arising from Decommissioning.....	56
3.12.4.1	Reuse.....	56
3.12.4.2	Recycling.....	56
3.12.4.3	Implementation.....	57
3.12.4.4	Waste Management Plan Conclusion	58
4.	ENVIRONMENTAL MANAGEMENT IMPLEMENTATION	59
4.1	Roles and Responsibilities.....	59
4.1.1	Construction Manager	60
4.1.2	Site Environmental Clerk of Works	60
4.1.3	Project Ecologist/Ornithologist.....	61
4.1.4	Project Hydrologist.....	61
4.1.5	Project Archaeologist.....	62
4.1.6	Geotechnical Engineer/Civil Engineer.....	62
4.2	Water Quality and Monitoring.....	62
4.2.1	Pre-Construction Baseline Monitoring.....	62
4.2.2	Construction Phase Monitoring	63
4.2.2.1	Daily Visual Inspections	63
4.2.2.2	Continuous Turbidity Monitoring	63
4.2.2.3	Laboratory Analysis.....	64
4.2.2.4	Field Monitoring.....	64
4.2.2.5	Monitoring Parameters	64
4.2.3	Construction Phase Drainage Inspections & Maintenance.....	64
4.2.4	Surface Water Monitoring Reporting.....	65
4.3	Environmental Awareness and Training.....	65
4.3.1	Environmental Induction	65
4.3.2	Toolbox Talks.....	66
5.	EMERGENCY RESPONSE PLAN	67
5.1	Emergency Response Procedure.....	67
5.1.1	Roles and Responsibilities.....	67
5.1.2	Initial Steps.....	68
5.1.3	Site Evacuation/Fire Drill.....	68
5.1.4	Spill Control Measures	69
5.2	Contact the Emergency Services	70
5.2.1	Emergency Communications Procedure	70
5.2.2	Contact Details.....	70
5.2.3	Procedure for Personnel Tracking	71
5.3	Induction Checklist.....	71
6.	MITIGATION PROPOSALS	72
7.	MONITORING PROPOSALS	143
8.	PROGRAMME OF WORKS.....	153
8.1	Construction Schedule.....	153
9.	COMPLIANCE AND REVIEW	154
9.1	Site Inspections and Environmental Audits	154
9.2	Auditing.....	154
9.3	Environmental Compliance	154
9.4	Corrective Action Procedure	155
9.5	Construction Phase Review	155

TABLE OF TABLES

<i>Table 2-1 Townlands within which the Proposed Development is located.....</i>	<i>4</i>
<i>Table 3-1 Minimum Buffer Zone Widths (Forest Service, 2000).....</i>	<i>42</i>
<i>Table 3-2 Expected waste types arising during the Construction Phase.....</i>	<i>54</i>
<i>Table 3-3 Expected waste types arising during the Decommissioning Phase.....</i>	<i>56</i>
<i>Table 5-1 Hazards associated with potential emergency situations.....</i>	<i>68</i>
<i>Table 5-2 Emergency Contacts.....</i>	<i>70</i>
<i>Table 5-3 Emergency Response Plan Items Applicable to the Site Induction Process.....</i>	<i>71</i>
<i>Table 6-1 Site Preparation and Mitigation Measures.....</i>	<i>73</i>
<i>Table 7-1 Monitoring Measures.....</i>	<i>144</i>

TABLE OF PLATES

<i>Plate 2-1 110Kv Cable Trench View.....</i>	<i>22</i>
<i>Plate 3-1 Typical concrete wash out areas.....</i>	<i>43</i>

TABLE OF FIGURES

<i>Figure 2-1 Proposed Development Layout Key Plan.....</i>	<i>7</i>
<i>Figure 2-2 Wind Farm Site Layout.....</i>	<i>8</i>
<i>Figure 2-3 Grid Connection Layout.....</i>	<i>9</i>
<i>Figure 2-4 Grid Connection Watercourse Crossings.....</i>	<i>26</i>
<i>Figure 2-5 Standard Formation Crossing over Culvert – Option A.....</i>	<i>27</i>
<i>Figure 2-6 Standard Formation Crossing under Culvert – Option B.....</i>	<i>28</i>
<i>Figure 2-7 Shallow Formation Crossing over Culverts – Option C.....</i>	<i>29</i>
<i>Figure 2-8 Horizontal Directional Drilling – Option D.....</i>	<i>30</i>
<i>Figure 3-1 Turbine Delivery Route Map.....</i>	<i>49</i>
<i>Figure 4-1 Proposed Development Organogram.....</i>	<i>59</i>
<i>Figure 5-1 Emergency Response Procedure Chain of Command.....</i>	<i>67</i>
<i>Figure 8-1 Indicative Construction Schedule.....</i>	<i>153</i>

1. INTRODUCTION

This Construction and Environmental Management Plan (CEMP) has been developed by MKO on behalf of Umma More Ltd. who intend to apply to An Bord Pleanála for planning permission to construct a renewable energy development which will comprise 9 No. wind turbines and all associated infrastructure in the townland of Umma More, and adjacent townlands in Co. Westmeath (the Wind Farm Site), and a 110kV on-site substation and associated works, including 110kV underground electrical cabling connection to the national grid at Thornsberry 110kV substation in the townland of Derrynagall or Ballydaly, near Tullamore, Co. Offaly (the Grid Connection). Refer to Chapter 4 of the EIAR for a detailed description of the Proposed Development (Wind Farm Site & Grid Connection).

The CEMP has been prepared in conjunction 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 authority. Should the Proposed Development secure planning permission, the CEMP will be updated, in line with all conditions and obligations which apply to any grant of permission. The CEMP should be read in conjunction with the EIAR and planning drawings. The CEMP will also require updating by the selected contractor in order to identify, assess and satisfy the contract performance criteria as set out by the various stakeholders. The CEMP due to its structure and nature will also require constant updating and revision throughout the construction period as set out below. Therefore, this is a working document and will be developed further prior to and during the construction phase of the Proposed Development.

Triggers for amendments to the CEMP will include:

- When there is a perceived need to improve performance in an area of environmental impact;
- As a result of changes in environmental legislation applicable and relevant to the Proposed Development;
- Where the outcomes from auditing establish a need for change;
- Where Work Method Statements identify changes to a construction methodology to address high environmental risk; and
- As a result of an incident or complaint occurring that necessitates an amendment.

This CEMP identifies the key planning and environmental considerations that must be adhered to and delivered during site construction and operation. The Contractor, as appointed by the Project Developer, will be required to implement all of the requirements set out in this CEMP. The CEMP may be updated and revised throughout the construction phase of the Proposed Development, but all future iterations must meet or exceed the standards and requirements set out in this document and the Project Developer must be satisfied that all requirements set out in this document can and will be implemented in full by the appointed contractor.

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

1.1

Scope of the Construction and Environmental Management Plan

This report is presented as a guidance document for the construction of the proposed Umma More Renewable Energy Development which will comprise 9 No. wind turbines, and associated infrastructure in the townland of Umma More, and adjacent townlands, in Co. Westmeath, and a 110kV on-site substation and associated works, including underground 110kV electrical cabling to connect to the national grid at Thornsberry 110kV substation, in the townland of Derrynagall or Ballydaly, near Tullamore, Co. Offaly.

For the purposes of the CEMP:

- Where the 'Proposed Development' is referred to, this relates to all the project components described in detail in Chapter 4 of the EIAR i.e Wind Farm Site and Grid Connection as detailed below.
- Where 'the Site' is referred to, this relates to the primary study area for the EIAR, as delineated by the EIAR Site Boundary in green as shown on Figure 2-1.
- Where the 'Wind Farm Site' is referred to, this refers to turbines and associated foundations and hard-standing areas, meteorological mast, junction accommodation works, access roads, temporary construction compound, underground cabling, spoil management, site drainage, tree felling and all ancillary works and apparatus. The planning application for the Wind Farm Site is made to An Bord Pleanála in accordance with the provisions of Section 37E of the Planning and Development Act 2000, as amended.
- Where 'Grid Connection' is referred to, this refers to the temporary construction compound and 110kV onsite substation, and associated underground 110kV electrical cabling connecting to the existing Thornsberry 110kV substation, subject to a future planning application under Section 182A of the Planning and Development Act, 2000, as amended.
- Where the term 'site' is used in the CEMP it refers to all works associated with the Proposed Development enabling works.

The CEMP outlines clearly the mitigation measures and monitoring proposals that are required to be adhered to in order to complete the works in an appropriate manner.

The report is divided into nine sections, as outlined below:

Section 1 provides a brief introduction as to the scope of the report.

Section 2 outlines the Site and Proposed Development details, detailing the targets and objectives of this plan along with providing an overview of construction methodologies that will be adopted throughout the Proposed Development.

Section 3 sets out details of the environmental controls to be implemented on site. Site drainage principles, traffic management, dust control, invasive species management and a waste management plan are also included in this section.

Section 4 sets out a fully detailed implementation plan for the environmental management of the Proposed Development outlining the roles and responsibilities of the project team.

Section 5 outlines the Emergency Response Procedure to be adopted in the event of an emergency in terms of site health and safety and environmental protection.

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

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

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

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

1.2

Targets and Objectives

The following key targets and objectives will inform the final detailed design should the Proposed Development secure planning permission and proceed to the construction phase. This includes consideration of the buildability of the designs that emerge:

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

The key site objectives are as follows;

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

2.

SITE AND PROPOSED DEVELOPMENT DETAILS

2.1

Site Location and Description

The Wind Farm Site is located approximately 2 kilometres southwest of Ballymore, Co. Westmeath, 6.6 kilometres to the north of Moate, Co Westmeath and 12.2 kilometres northeast of Athlone, Co. Westmeath. It is proposed to access the Wind Farm Site via an existing access track off the L5363 local road to the northwest of the site. The site is served by a number of existing agricultural roads and tracks.

The Grid Connection includes for a 110kV on-site substation and temporary construction compound, and underground 110kV electrical cabling from the proposed onsite 110kV substation within the Wind Farm Site to the existing Thornsberry 110kV substation in the townland of Derrynagall or Ballydaly, County Offaly. The underground electrical cabling route, measuring approximately 31 km in length, is primarily located within the public road corridor.

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

The townlands in which the Proposed Development is located are listed in Table 2-1.

Table 2-1 Townlands within which the Proposed Development is located

Development Works	Townland
Wind Farm Site	
Wind Turbines and Associated Foundations and Hardstanding Areas, Permanent Meteorological Mast, Junction Accommodation Works, Access Roads, Underground Cabling, Temporary Construction Compound, Spoil Management, Site Drainage, Tree Felling, Operational Stage Site Signage and all ancillary works and apparatus	Ballynafearagh, Baskin High, Baskin Low, Lissanode, Raheen, Umma Beg or Moneynamanagh, Umma More
Grid Connection	
Onsite 110kV Substation and Temporary Construction Compound	Umma More
Underground Cabling Route connecting to the existing Thornsberry 110kV substation	Acantha, Aghancarnan, Ardan, Ballinderry Big, Ballinderry Little, Ballinlig, Ballybought, Ballybrickoge, Ballynagrenia, Ballynasrah or Tinnycross, Brackagh, Cappydonnell Little, Cartron Glebe, Curragh, Cloncraft, Custorum, Dunard, Durrow Demense, Derrynagall or Ballydaly, Gormagh, Hallsfarm, Kilcumreragh,, Kilbeg, Kilbeggan, Kilbeggan South, Kilmurragh, Meadowpark, Meeldrum, Newtown, Pallas, Raheen, Rostalla, Shureen and Ballynasuddery, Tonaphort, Umma Beg or Moneynamanagh, Umma More

2.1.1 Description of the Development

The Proposed Development will comprise the construction of 9 No. wind turbines with a blade tip height of 185 metres and all associated works, and a 110 kV substation and associated works, including underground 110kV electrical cabling to connect to the national grid at Thornsberry 110kV substation. The full description of the Proposed Development is detailed in Chapter 4 of the EIAR. The current planning application, relating to the Wind Farm Site, is being made to An Bord Pleanála under Section 37E of the Planning and Development Act, 2000, as amended. Further detail in relation to the dual consenting process is provided in Chapter 1 of the EIAR.

The development description for the current planning application as appears in the public notices is as follows:

The Proposed Development will consist of the provision of the following:

- i. 9 No. wind turbines with an overall ground-to-blade tip height of 185 metres; a rotor blade diameter of 162 metres; and hub height of 104 metres, and associated foundations and hard-standing areas;*
- ii. A thirty-year operational life from the date of full commissioning of the wind farm and subsequent decommissioning;*
- iii. A meteorological mast with a height of 30 metres, and associated foundation and hard-standing area;*
- iv. Junction accommodation works and temporary access roads to facilitate turbine delivery to an existing entrance on L5363.*
- v. Upgrade of existing entrance on L5363 for provision of site entrance;*
- vi. Upgrade of existing tracks/roads and provision of new site access roads, junctions and hardstand areas;*
- vii. Underground electrical (33kV) and communications cabling;*
- viii. A temporary construction compound;*
- ix. Spoil Management;*
- x. Site Drainage;*
- xi. Tree Felling;*
- xii. Operational stage site signage; and*
- xiii. All ancillary works and apparatus.*

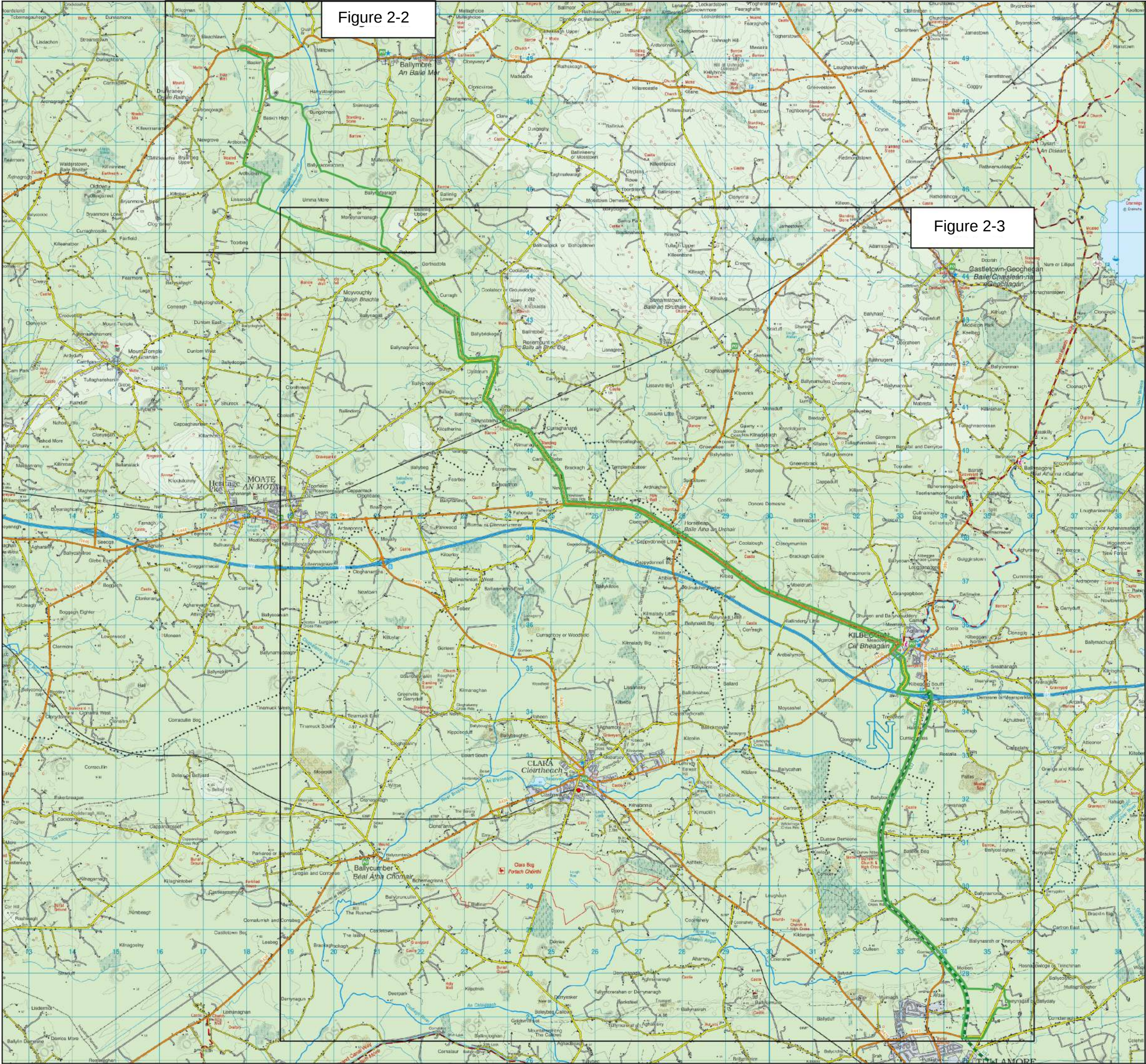
This application is seeking a ten-year planning permission and 30-year operational life from the date of commissioning of the renewable energy development.

The Grid Connection, which will be subject to a separate planning application, includes for a 110kV on-site substation compound (2 no. control buildings with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, waste water holding tank, site drainage and all ancillary works), a temporary construction compound and approximately 31km of underground 110kV electrical cabling connecting the proposed on-site substation to the existing Thornsberry 110kV substation, near Tullamore, Co. Offaly.

The layout of the Proposed Development has been led by consideration of constraints and facilitators, thereby avoiding the environmentally sensitive parts of the Site. The roads layout for the Proposed Development utilises existing onsite access roads and tracks where possible, with approximately 1.1 kilometres of existing roadway/ tracks requiring upgrading and approximately 7.4 kilometres of new access road to be constructed.

As part of the Proposed Development, tree felling will be required within and around development footprint to allow for the construction of the turbine bases, access roads underground cabling, and the other ancillary infrastructure. A small section of the Wind Farm Site is located on commercial forestry, namely Turbine no. 4 and its associated infrastructure. A total of 6.4 hectares of commercial forestry

will be permanently felled within and around Turbine No. 4 and its associated infrastructure, along with existing treeline boundaries as detailed in Chapter 6 of the EIAR. The overall layout of the Proposed Development is shown on Figure 4-1, this includes the Wind Farm Site and Grid Connection. The proposed site layout showing individual elements associated with the Wind Farm Site and Grid Connection along with the EIAR Site boundary are shown in Figure 2-2 and Figure 2-3 respectively. Planning application drawings are provided in Appendix 4-1 and drawings of the proposed Grid Connection are provided in Appendix 4-5 of the EIAR.



Map Legend

 EIAR Site Boundary



© Ordnance Survey Ireland. All rights reserved. Licence number
CYAL50267517

Drawing Title
Proposed Development Layout Key Plan

Project Title
Umma More Renewable Energy Development

Drawn By NMCH	Checked By EC
Project No. 201050	Drawing No. Figure 2-1
Scale 1:85,000	Date 2023-01-31



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



1:2500 scale of Turbine, Hardstand and Foundation

Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout
- Proposed Turbine Hardstands
- Proposed Turbine Foundation
- Proposed Met Mast Location
- Proposed New Roads
- Proposed Upgrades to Existing Roads
- Temporary Construction Compound
- Grid Connection - Subject to a Separate Application



© Ordnance Survey Ireland. All rights reserved. Licence number CYAL50267517

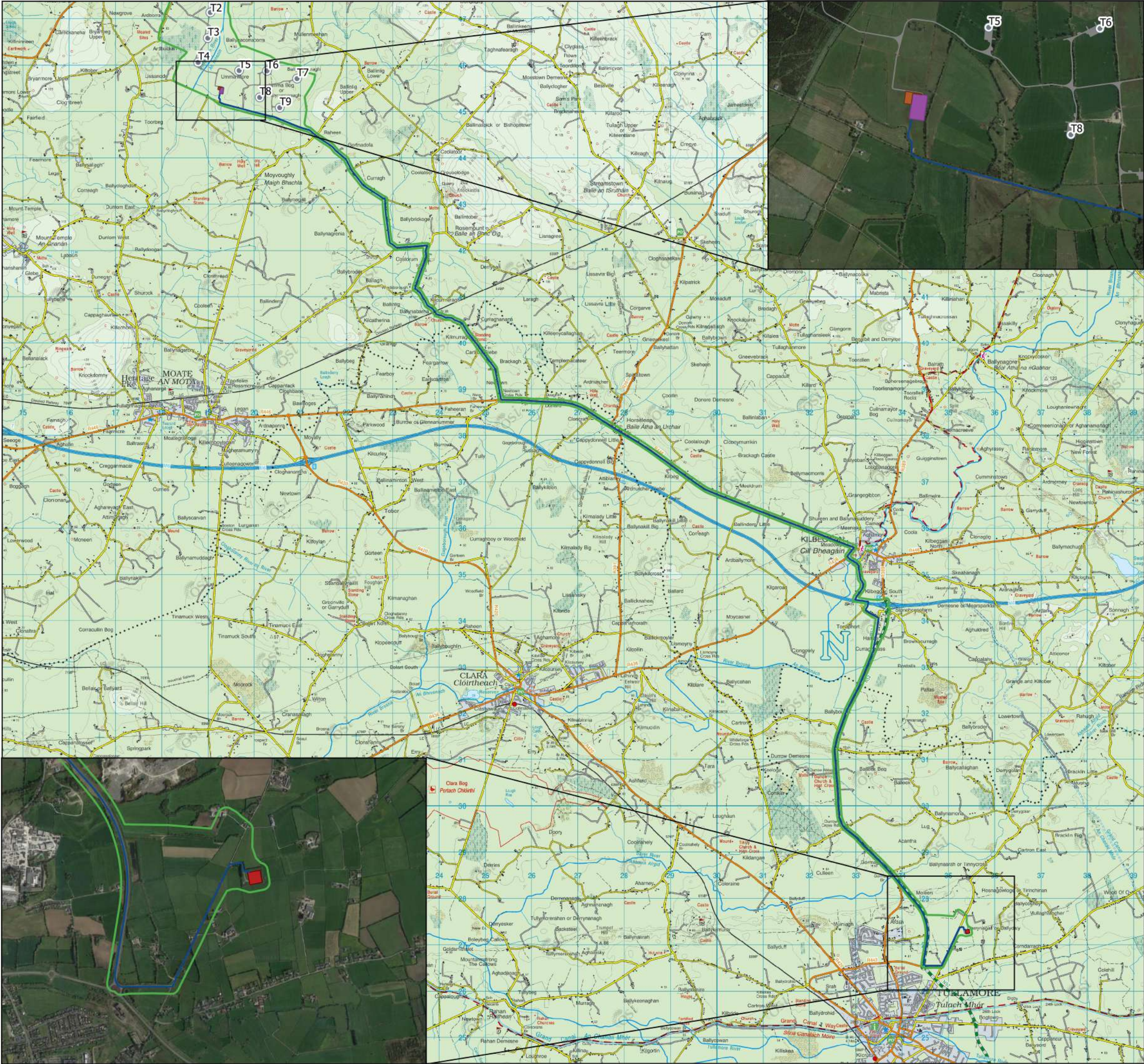
Drawing Title
Wind Farm Site Layout

Project Title
Umma More Renewable Energy Development

Drawn By	BT	Checked By	EC
Project No.	201050	Drawing No.	Figure 2-2
Scale	1:20,000	Date	2023-01-31



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



Map Legend

- EIAR Site Boundary
- Proposed 110kV Onsite Substation
- Proposed Temporary Construction Compound
- Proposed Underground Electrical Cabling Route
- Existing Thornsberry 110kV Substation
- Wind Farm Site Infrastructure - Subject to Separate Application



© Ordnance Survey Ireland. All rights reserved. Licence number CYAL50267517

Drawing Title

Grid Connection Layout

Project Title

Umma More Renewable Energy Development

Drawn By

NMcH

Checked By

EC

Project No.

201050

Drawing No.

Figure 2-3

Scale

1:80,000

Date

2023-01-31



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

2.2

Construction Methodology Overview

2.2.1

Introduction

An experienced main contractor will be appointed to carry 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.

2.2.2

Overview of Proposed Construction Methodology

The EIAR includes construction methodologies for various elements of work to be undertaken as part of the Proposed Development. These construction methodologies are reproduced in the following sub-sections but will be superseded by an appointed contractor's construction method statements, which will form part of the CEMP. The contractor's construction method statements will be prepared to take account of the detailed engineering, geotechnical and detailed drainage design which will be prepared prior to commencement of construction and all requirements of this CEMP.

The EIAR provided construction methodologies for the following Proposed Development elements:

- Temporary Construction Compounds;
- Tree Felling;
- Site Drainage System;
- Spoil Management Areas;
- New Site Access Roads;
- Upgrade of Existing Site Access Roads
- Proposed Clear-Span Watercourse Crossing
- Turbine and Meteorological Mast Foundations;
- Hardstanding Areas;
- Electricity Substation Construction;
- Wind Farm Site Underground Cabling
- Grid Connection Underground Cabling Route
- Watercourse Crossings
- Transport Route Accommodation Works

2.2.2.1

Temporary Construction Compounds

There are two temporary construction compounds proposed as part of the Proposed Development, one for the Wind Farm Site and one for the Grid Connection. The location of the compounds are shown in Figure 2-2 and Figure 2-3, and are both located within the Wind Farm Site.

The construction compound will consist of a bundled refuelling and containment area for the storage of lubricants, oils and site generators etc, and full retention oil interceptor, waste storage area, temporary site offices, staff facilities and car-parking areas for staff and visitors. Temporary port-a-loo toilets and toilets located within a staff portacabin will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. There will also be a water supply on site for hygiene purposes, by way of a temporary storage tank.

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 3.2.2 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.;
- A waste storage area will be provided within the compound;
- 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 construction phase of Proposed Development, the compound will be decommissioned and allowed to re-vegetate naturally, 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

2.2.2.2 Tree Felling

As part of the Proposed Development, tree felling will be required within and around development footprint to allow for the construction of the turbine bases, access roads underground cabling, and the other ancillary infrastructure.

Further details on tree felling required within and around development footprint on the Wind Farm Site is detailed in Chapter 6 of the EIAR.

A small section of the Wind Farm Site is located on commercial forestry, namely Turbine no. 4 and its associated infrastructure. A total of 6.4 hectares of commercial forestry will be permanently felled within and around Turbine No. 4 and its associated infrastructure, along with existing treeline boundaries as detailed in Chapter 6 of the EIAR. Figure 4-12 in Chapter 4 of the EIAR shows the extent of the commercial forestry to be permanently felled as part of the Proposed Development.

The commercial forestry felling activities required as part of the Proposed Development will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments. The policy requires that a copy of the planning permission for the Proposed Development be submitted with the felling licence application; therefore the felling licence cannot be applied for until such time as planning permission is obtained for the Proposed Development.

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

2.2.2.3 Site Drainage System

The early establishment of the drainage system will manage the risk of impacts on watercourses on and adjacent to the site during construction. In addition, construction operations will adopt best working practices and the development of the site will be phased accordingly.

The EIAR (and appended drawings) includes a drainage design required for the purposes of assessing the potential effects of the Wind Farm Site. The drainage design will be developed further with a level of construction detail necessary to implement the measures on site. The detailed (construction phase) drainage design will form part of the updated Main Contractor's CEMP and the effective implementation of the detailed drainage design will be audited by the ECoW.

Surface water management and drainage design principles are outlined in Section 3.2 below and Section 4.6 of the EIAR.

2.2.2.4 Spoil Management Areas

The total estimated volume of spoil to be managed following excavations during the construction phase of the Proposed Development is 112,370m³. It is proposed to manage any excess overburden generated through construction activities locally within the Wind Farm Site, in identified spoil management areas, as shown in Figure 4-20 in Chapter 4, and in linear berms along access roads where appropriate. Tree felling is proposed at various locations across the Site; however this will not involve the excavation of tree stumps outside the Proposed Development infrastructure footprint and as such does not affect the excavation volumes.

The total capacity of the spoil management areas within the Wind Farm Site is 127,500m³, providing enough capacity for the total volume of spoil requiring management for the Proposed Development as detailed in Table 4-2 in Chapter 4 of the EIAR.

The spoil management areas and placement of spoil in linear berms along access roads have been selected based on the locations of spoil generation, areas suitable for spoil management and avoiding environmentally constrained areas such as identified site-specific flood modelled zones as detailed in Chapter 9 of the EIAR.

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

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

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

- Excavators will remove the spoil from the permanent development footprint areas.
- Spoil management 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 management.
- The excavators will move the excavated spoil to the identified management areas within the construction and soft levelled areas.

- The spoil management areas will be surrounded by silt fences where necessary 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.
- 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 spoil management area.
- The material will be backfilled into the spoil management 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 spoil management areas.

The following recommendations/best practice guidelines for the placement of spoil in identified spoil management areas and placement of spoil in linear berms along access roads will be adhered to during the construction of the Proposed Development:

- Placement of spoil alongside access roads will consist of a 3m wide berm on either side of the road as appropriate. Spoil placement alongside access roads will take place outside of watercourse buffers and of the site-specific flood modelled zone within the Wind Farm Site (a 110m section of access road) as detailed in Section 9.3.5 in Chapter 9 of the EIAR.
- At the identified spoil management areas, the vegetative top-soil layer will be removed to allow for spoil to be placed and upon reaching the recommended height, the vegetative topsoil layer will be reinstated.
- The identified spoil management areas will be developed in a phased approach, with the topsoil removed and temporarily stockpiled within the defined area while the spoil is being placed. The stockpiled topsoil will then be reinstated over the placed spoil, and the exercise will continue within the same spoil management area until the area is full.
- In the case of T04 where spoil management areas will be within areas of felled forestry, no topsoil will be excavated. The tree stumps will be left in-situ and the spoil will be placed on top of the existing ground and finished with a layer of topsoil from within the site.
- The placement of spoil will be restricted to a maximum height of 1.0m, subject to confirmation by the Geotechnical Engineer.
- Where practical, it will be ensured that the surface of the placed spoil is shaped to allow efficient run-off of surface water. Where possible, shaping of the surface of the spoil will be carried out as placement of spoil within the area progresses. This will reduce the likelihood of debris run-off and ensure stability of the placed spoil.
- Finished/shaped side slopes of the placed spoil will be not greater than 1 (v): 2 (h) in the dedicated spoil management zones and not greater than 1 (v): 1 (h) alongside access tracks.
- Inspections of the spoil management areas will be made by a geotechnical engineer through regular monitoring of the works. The appointed contractor will review work practices at spoil management areas when periods of heavy rainfall are expected so as to prevent excessive dirty water runoff from being generated.
- An interceptor drain will be installed upslope of the identified spoil management areas to divert any surface water away from these areas.
- Silt fences and double silt-fences will be emplaced down-gradient of spoil management areas and will remain in place throughout the entire construction phase, or until reseeded has been established to a sufficient level.
- The surface of the deposited spoil will be profiled to a gradient to be agreed with the Geotechnical Engineer and vegetated or allowed to vegetate naturally as indicated by the Project Ecologist.

- All the above-mentioned general guidelines and requirements will be confirmed by the Geotechnical Engineer prior to construction.

2.2.2.5 New Site Access Roads

New roadways will be required in areas where existing roads are not already present, or where existing sections are unsuitable for the required purpose in the case of the Wind Farm Site. Use has been made of the existing tracks and roads where practicable. There are approximately 7.4km of new access roads to be installed at the site. The typical make-up of the founded access tracks will be a stone thickness of 500mm. The requirement for a layer of geotextile and geogrid and the necessary stone thickness will be confirmed by the Site Engineer

The new access roads will be constructed as follows using an excavated site road methodology which is summarised below.

- Establish alignment of the new site road from the construction drawings and mark out the centrelines with ranging rods or timber posts;
- All drainage measures prescribed in the detailed drainage design for the Proposed Development will be implemented around the works area;
- The road layout has been designed to avoid crossings of natural watercourses where possible;
- Where existing culverts are to be upgraded or extended, the works will be carried out to follow a method statement to be prepared in consultation with Inland Fisheries Ireland;
- The subsoil will be excavated down to a suitable formation layer of either firm clay or bedrock and managed on-site in the spoil management areas
- The road will be constructed using well-graded imported granular fill, spread and compacted in layers typically of 200mm and a suitable capping layer to provide a homogeneous running surface. The thickness of layers and amount of compaction required will be subject to detailed design by Project Engineer in consultation with the Construction Manager based on the characteristics of the material and the compaction plant to be used;
- A layer of geogrid/geotextile may be required at the surface of the competent stratum.
- 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. This is outlined in further detail in the Chapter 4 of the EIAR.
- The surface of the excavated access roads will be overlaid with approximately 500mm 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 material across the full width of the road.
- The access tracks will be of single-track design with an overall running width of c.5m. There will be some local widening on the bends, junctions and around turbine bases for the safe passage of large vehicles;
- All excavated material will be managed on-site. Some topsoil will be temporarily stockpiled locally for reuse for landscaping purposes.
- All new roadways will be constructed with a camber to aid drainage of surface water;
- For excavations, side slopes will generally be 1(V): 2 (H), respectively. Design slopes will be informed by the Geotechnical Engineer;
- At bends or steep inclines from the roads, reflective snow poles will be erected to warn traffic on dark mornings and evenings that there is a turn in the road or a sharp incline beyond the site road.
- The granular fill used to complete the final running surface of the roads on site will be tested to BS812-111:1990 "Ten percent fines value".

- Interceptor drains will be installed upslope of the access road alignment to divert any surface water away from the construction area.
- The passing bays will be approximately 5m in width and 40m in length where it meets the road network, tapering to 18m in length at the furthest point from the road.
- Soil excavation shall be observed by a qualified archaeologist in accordance with a scheme of archaeological monitoring to identify any significant remains as they come to light;
- No excavated material will be removed from site with excavated spoil being managed within the site

2.2.2.6 Upgrading of Existing Site Access Roads

It is proposed to utilise existing roads at the site where possible (approximately 1.1km will be upgraded). These roads will require upgrading which will comprise widening of the roadway to a total running width of approximately five metres, with wider sections at corners and on the approaches to turbine locations and the laying of a new surface dressing on the existing section of roadway where necessary. The road upgrades will be undertaken as follows:

- If it is considered that the current road formation level is adequate to support required bearing, then no upgrade or widening works will be completed;
- Otherwise, where required, the subsoil in the existing road verge will be excavated down to a suitable formation layer.
- All spoil excavated will be placed alongside access roads with cross slopes of less than 10 degrees. As detailed in Section 4.3.3.2 of the EIAR, placement of spoil alongside access roads will take place outside of the site-specific flood modelled zones within the Wind Farm Site. Spoil placed alongside access roads will be restricted to a maximum height of 1.0m over a 3m wide corridor on both sides of the access roads.
- All drainage measures prescribed in the detailed drainage design for the Proposed Development will be implemented around the works area;
- Well-graded imported granular fill will be spread and compacted in layers up to 200mm to provide a homogeneous running surface. The thickness of layers and amount of compaction required will be decided by the Construction Manager based on the characteristics of the material and the compaction plant to be used. These layers of granular fill will be brought to the same level as the top of the existing road surface;
- Excavations side slopes shall not generally be greater than 1(V): 2 (H), . Design slopes will be informed by the Geotechnical Engineer;
- At bends or steep inclines from the road, reflective snow poles will be erected to warn traffic on dark mornings and evenings that there is a turn in the road or a sharp incline beyond the site road.
- Soil excavation shall be observed by a qualified archaeologist in accordance with a scheme of archaeological monitoring to identify any significant remains as they come to light;

2.2.2.6.1 Construction of New Excavated Roads in Site-Specific Flood Modelled Zone

There is 110 metres of proposed access road within site-specific flood modelled 100-yr and 1000-yr zone within the Wind Farm Site. The new access tracks proposed on the Wind Farm Site are proposed to be founded on competent stratum and the track surface will be built up by at least 500mm above the flood modelled elevation of both the 100-yr and 1000-yr site-specific modelled flood events. The requirement for a layer of geotextile and geogrid and the necessary stone thickness will be confirmed by the Site Engineer.

The general construction methodology for construction of excavated roads is detailed above in Section 2.2.2.5. The new access roads located within site-specific flood-modelled zones will be constructed following the below specific restrictions:

- The surface of the excavated access roads will be overlaid with approximately 500mm of selected granular fill which will be at least 500mm above the modelled 100-yr and 100-yr flood elevation (100-yr event - 55.86 mOD, 1000-yr event - 56 mOD).
- There is an existing field drain which will be culverted under the proposed access track. This culvert will provide a drainage outlet for flood water following a significant flood event. This will prevent any damming effect from the proposed access road within this section.
- The new access roads will be constructed with a camber to aid drainage of surface water;
- Placement of spoil will take place outside of the site-specific flood modelled zones within the Wind Farm Site.

2.2.2.7 Proposed Clear-Span Watercourse Crossing

It is proposed that construct 1 no. new clear span crossing within the Wind Farm Site. The clear-span watercourse crossing methodology presented below will ensure that no instream works are necessary.

The typical construction methodology for the installation of a clear-span bridge is presented below:

- The road on the approach to the watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the watercourse crossing.
- All drainage measures along the track will be installed in advance of the works.
- The foundation will consist of concrete footing which will be installed on a concrete lean mix foundation to provide a suitable base. The base will be excavated to rock or competent stratum with a mechanical excavator with the foundation formed in-situ using a semi-dry concrete lean mix. The base will be excavated along the stream bank with no in- stream works required.
- Access to the opposite side of the watercourse for excavation and foundation installation will require the installation of a temporary pre-cast concrete or metal bridge across the watercourse to provide temporary access for the excavator. Plant and equipment will not be permitted to track across the watercourse. Safe access over the stream for this installation will be via a steel walkway & handrail which will span the stream.
- The concrete footing will be installed as per a design engineers specification to a height appropriate to achieve the necessary clearance above the watercourse.
- The clear span bridge structure which will essentially be a precast concrete slab will be lifted in place using a crane.
- The watercourse edge will be reinforced with rock armour where necessary to avoid any erosion or deterioration of the watercourse bank. This will be carried out in dry conditions and without the use of in-stream (water) works.

The clear-span watercourse crossing will be constructed to the specifications of the OPW bridge design guidelines 'Construction, Replacement or Alteration of Bridges and Culverts - A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945', and in consultation with Inland Fisheries Ireland. Abutments will be constructed from precast units combined with in-situ foundations, placed within an acceptable backfill material.

All other new crossings will be completed using piped culvert system at minor channels or manmade drains, the crossing will be installed as follows:

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

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

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

2.2.2.8 Turbine Foundations

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level. The size of the foundation will be dictated by the turbine manufacturer, and the final turbine selection will be the subject of a competitive tender process. Different turbine manufacturers use different shaped turbine foundations, ranging from circular to hexagonal and square, depending on the requirements of the final turbine supplier. The turbine foundation transmits any load on the wind turbine into the ground. The proposed horizontal and vertical extent of the turbine foundation will be 25m and 4m respectively, which has been assessed in the EIAR.

After the foundation level of each turbine has been formed using piling methods or on competent strata (i.e bedrock or subsoil of sufficient load bearing capacity), the “Anchor Cage” is levelled and reinforcing steel is then built up around and through the anchor cage. The outside of the foundation is shuttered with demountable formwork to allow the pouring of concrete and is backfilled accordingly with appropriate granular fill to finished surface level following completion of the foundation.

It is anticipated that the formation level of the turbine foundations will be on the lower mineral subsoil or bedrock. They will be formed at a suitable level directed by the Geotechnical Engineer/Designer. The foundations will be constructed as follows:

- The extent of the excavation will be marked out and will include an allowance for trimming the sides of the excavation to provide a safe working area and slope batter;

- Where practical, the soil will be stripped over the area of the excavation and stored locally for reuse, the subsoil will be excavated and stored to one side for reuse during the landscaping around the finished turbine;
- No material will be removed from site with excavated spoil being transported and stored in the identified spoil management areas within the Wind Farm Site.
- All groundwater and surface water arising from turbine base excavation will be pumped to the dirty water system prior to discharge from the works area;
- Soil excavation shall be observed by a qualified archaeologist in accordance with a scheme of archaeological monitoring to identify any significant remains as they come to light;
- The foundations excavation will be raised to formation level by compacted layers of well graded granular material will be spread and compacted to provide a hard area for the turbine foundation;

Standard excavated reinforced concrete bases will be completed as follows:

- A layer of lean-mix blinding will be laid approximately 75mm thick directly on top of the newly exposed formation, tamped and finished with a screed board to leave a flat level surface. The concrete should be protected from rainfall during curing and all surface water runoff from the curing concrete should be prevented from entering surface water drainage directly;
- High tensile steel reinforcement will be fixed in accordance with the designer's drawings & schedules. The foundation anchorage system will be installed, levelled and secured to the blinding using steel box section stools;
- Ductwork will be installed as required, and formwork erected around the steel cage and propped from the backside as required;
- The foundation anchorage system will be checked both for level and line prior to the concrete being installed in the base. These checks will be passed to turbine manufacturer for their approval;
- Concrete will be placed using a concrete pump and compacted when in the forms using vibrating pokers to the levels and profile indicated on the drawings. Upon completion of the concreting works the foundation base will be covered and allowed to cure;
- Steel shutters will be used to pour the circular chimney section;
- Earth wires will be placed around the base;
- The foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation or imported material and landscaped using the soil set aside during the excavation; and.
- Any excess overburden excavated during construction shall be managed in line with the recommendations/ best practice guidelines outlined in Section 4.3.3 of the EIAR.

Reinforced concrete piled foundations will be completed as follows:

- The extent of the excavation will be marked out and will include an allowance for trimming the sides of the excavation to provide a safe working area and slope batter;
- No excavated material will be removed from site with excavated spoil being transported and stored in the identified spoil management areas within the Wind Farm Site..
- No material will be removed from site and placement areas will be stripped of vegetation prior to stockpiling in line with best working practices;
- A piling platform for the piling rig will be constructed by excavating to a suitable intermediate mineral subsoil and backfilling to formation level by compacted layers of well graded granular material spread and compacted to provide a hard area for the piling rig;
- The piling rig, fitted with an auger, will then bore through the soft material with a sleeve fitted around the auger to prevent the sidewalls of the soil and overburden

from collapsing. The borehole is then extended to a suitable depth into the subsoil/bedrock.

- When the auger and the sleeve are removed high tensile steel cages will be lowered into the boreholes. These steel cages will extrude above the level of the top of the concrete pile.
- As the auger is removed concrete is pumped into the borehole.
- Reinforcing steel on the top of the pile will tie to the foundation base steel.
- The procedure for standard excavated reinforced concrete bases as outlined above can be applied form here.

2.2.2.9 Meteorological Mast Foundation

The meteorological (met) mast is a free-standing structure which will be constructed on a hardstanding area sufficiently large enough to accommodate the equipment that will be used to erect the mast. It is anticipated that the formation level of the met mast foundations will be on the lower mineral subsoil or bedrock. They will be formed at a suitable level directed by the Geotechnical Engineer/Designer. The foundations will be constructed as follows:

- The extent of the excavation will be marked out and will include an allowance for trimming the sides of the excavation to provide a safe working area and slope batter;
- Where practical, the soil will be stripped over the area of the excavation and stored locally for reuse, the subsoil will be excavated and stored to one side for reuse during the landscaping around the finished met mast;
- No material will be removed from site with excavated spoil being transported and stored in the identified spoil management areas within the Wind Farm Site.
- All groundwater and surface water arising from met mase base excavation will be pumped to the dirty water system prior to discharge from the works area;
- Soil excavation shall be observed by a qualified archaeologist in accordance with a scheme of archaeological monitoring to identify any significant remains as they come to light;
- The foundations excavation will be raised to formation level by compacted layers of well graded granular material will be spread and compacted to provide a hard area for the met mast foundation;

The met mast foundation will then be installed using the standard excavated reinforced concrete bases methodology as detailed above in Section 2.2.2.8.

2.2.2.10 Hard Standing Areas

Hard standing areas consisting of levelled and compacted hardcore are required around each turbine base to facilitate access, turbine assembly and turbine erection. The hard-standing areas are used to accommodate cranes used in the assembly and erection of the turbine, offloading and storage of turbine components, and provide a safe, level working area around each turbine position. The hard-standing areas are extended to cover the turbine foundations once the turbine foundation is in place. All crane hardstand areas will be designed taking account of the loadings provided by the turbine manufacturer and will consist of a compacted stone structure. The crane hardstands will be constructed in a similar manner to the excavated site roads and will measure approximately 35m x 75m. The sizes, arrangement and positioning of hard standing areas are dictated by turbine suppliers. The proposed hard standing areas are illustrated in the detailed drawings included in Appendix 4-1 of the EIAR. The extent of the required areas at each turbine location may be optimised on-site depending on topography, position of the Wind Farm Site access road, the proposed turbine position and the turbine supplier's exact requirements.

2.2.2.11 Electricity Substation and Control Buildings Construction

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

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

- The area of the substation will be marked out using ranging rods or wooden posts and the soil stripped and removed to a temporary placement area for later use in landscaping. A stoned out hardstand area will then be established using locally sourced materials.
- No material will be removed from site and the temporary placement areas will be stripped of vegetation prior to stockpiling within the identified spoil management areas.
- The dimensions of the onsite substation area have been designed to meet the requirements of the EirGrid and the necessary equipment to safely and efficiently operate the Proposed Development.
- 2 no. control buildings will be built within the onsite substation compound;
- The foundations will be excavated down to the level indicated by the designer and appropriately shuttered reinforced concrete will be laid over it. An anti-bleeding admixture will be included in the concrete mix;
- The block work walls will be built up from the footings to DPC level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors;
- The block work will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the building for this operation;
- The roof slabs will be lifted into position using an adequately sized mobile crane;
- The timber roof trusses will then be lifted into position using a telescopic load all or mobile crane depending on site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather.
- The substation plinths, transformer bund and oil interceptor will be shuttered and poured with reinforced concrete. An anti-bleeding admixture will be included in the concrete mix;
- The electrical equipment will be installed on the concrete plinths and commissioned
- Underground cabling connecting the substation to the turbines will also be installed using standard methodology.
- Lightning poles will be erected at appropriate locations adjacent to the substation. All lightning poles will be appropriately earthed.
- Perimeter fencing will be erected around the substation and control buildings compound area.
- The construction and components of the substation are to EirGrid specifications.
- All drainage measures prescribed in the detailed drainage design for the Proposed Development will be implemented around the works area;
- The wind farm control buildings will be set out by an engineer within the substation compound;
- All wastewater from the staff welfare facilities in the control buildings will pass to a sealed storage tank. This tank will be fitted with an automated alarm system that will provide sufficient notice that the tank required emptying. The wastewater will be transported off site by a waste management contractor holding valid waste collection

permits under the Waste Management (Collection Permit) Regulations, 2007 (as amended).

- The construction and components of the substation will be to EirGrid specifications.
- All excavations will be observed by a suitable qualified archaeologist.

2.2.2.12 Site Underground Cabling

Each turbine will be connected to the on-site electricity substation via underground 33 kV (kilovolt) electricity cabling. Fibre-optic cables will also connect each wind turbine and the met mast to the onsite substation. The electricity and fibre-optic cabling connecting to the onsite substation compound will be run in cable ducts approximately 1.2 metres beneath ground level, along the sides of roadways or under the roadways. The route of the cable ducts will follow the access track to each turbine location and are illustrated on the site layout drawings included as Appendix 4-1, the exact number and configuration of cable ducting may vary within the cabling trench. Figure 4-9 in Chapter 4 shows two variations of a typical cable trench, one for off-road trenches and one for on-road trenches. The cabling may be placed on either side of the roads, on both sides of the road or within the road. The exact configuration of the underground cabling will be set by the requirements of the electrical designers at detailed design stage.

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

2.2.2.13 Grid Connection Underground Electrical Cabling Route

It is proposed to construct an onsite 110 kV substation within the Wind Farm Site and to connect from here via a 110 kV underground electrical cable connection to the existing 110 kV Thornsberry substation in near Tullamore, Co. Offaly. The underground electrical cabling route originates at the proposed onsite 110kV substation within the Wind Farm Site and before reaching the 110kV Thornsberry substation property and is illustrated in Figure 4-3 in Chapter 4 of the EIAR. The underground electrical cabling route is approximately 31km in length and is located primarily within the public road corridor, with a short section of underground cabling (approximately 0.2km) within an agricultural field within the Wind Farm Site. A detailed description of the Grid Connection underground cabling route is included in Section 4.3.2.4 of the EIAR.

The underground electrical cabling route is illustrated in Figure 2-1 and 2-3. 110kV grid connection cabling trench cross sections are shown in Figure 4-18 of the EIAR. Further details in relation to the Grid Connection for the Proposed Development are outlined in Appendix 4-5.

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

- Before works commence, updated surveying will take place along the proposed cable route, with all existing culverts identified. All relevant bodies i.e. ESB, Westmeath County Council, Offaly County Council etc. will be contacted and all up to date drawings for all existing services sought.
- When the cable is located on public roads, a traffic management plan will be prepared prior to any works commencing. A road opening licence will be obtained where required and all plant operators and general operatives will be inducted and informed as to the location of any services.
- A tracked 360-degree excavator will then proceed to dig out the proposed trench, typically to a depth of 1200mm, within which the ducts will be laid.

- The cable ducts will be concrete surrounded where they pass under the public road and under drains or culverts.
- Trench supports will be installed, or the trench sides will be benched or battered back where appropriate and any ingress of ground water will be removed from the trench using submersible pumps, fitted with appropriate silt filtration systems, to prevent contamination of any watercourse.
- Once the trench has been excavated, a base-layer will be laid and compacted, comprising Clause 804, or 15 Newton CBM4 concrete as required.
- The ducting will be installed as per specification, with couplers fitted and capped to prevent any dirt etc. entering the duct. In poor ground conditions, the ends of the ducts will be shimmed up off of 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.
- As the works progress, the as-built location of the ducting will be recorded using a total station or GPS.
- As per the associated base-layer (Clause 804 material or 15 Newton CBM4 concrete) will be installed and compacted as per approved detail, with care not to displace the ducting.
- Spacers will be used to ensure that the correct cover is achieved at both sides of the ducting.
- The remainder of the trench will be backfilled in two compacted layers with approved engineer's specified material.
- Yellow marker warning tape will be installed across the width of the trench, at 300mm depth,
- The finished surface is to be reinstated, as per original specification. Off-road cabling may be finished with granular fill to facilitate access to the trench for any potential maintenance that is required during the operational phase of the Proposed Development.
- Marker posts will then be placed at regular intervals (generally at joint bays and any change in direction) to denote the location of the underground power cables.



Plate 2-1 110Kv Cable Trench View

2.2.2.13.1 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 300mm 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 duct and bottom of the service will be achieved. In deeper excavations, an additional layer of marker tape will be installed between the ducting 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 35N concrete surrounding the ESB ducts where adjacent services are within 600mm, 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.

2.2.2.13.2 Joint Bays

Joint bays are typically pre-cast concrete chambers where lengths of cable will be joined to form one continuous cable. They will be located at various points along the ducting route generally between 600 to 1000 metres intervals or as otherwise required by ESB/EirGrid and electrical requirements. Joint Bays are typically 2.5m x 6m x 1.75m pre-cast concrete structures installed below finished ground level.

Where possible, joint bays will be located in areas where there is a natural widening/wide grass margin on the road in order to accommodate easier construction, cable installation and create less traffic congestion. Joint Bays will be located in the non-wheel bearing strip of roadways, however given the narrow profile of local roads this may not always be possible. During construction the joint bay locations will be completely fenced off once they have been constructed they will be backfilled until cables are being installed. Once the cabling is installed the joint bays will be permanently backfilled with the existing surface re-instated and there will be no discernible evidence of the joint bay on the ground.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between the onsite 110kV substation and the existing 110kV Thornsberry substation. Earth Sheath Link Chambers are also required approximately every second joint bay along the cable route. Earth Sheath Links are used for earthing and bonding cable sheaths of underground power cables, installed in a flat formation, so that the circulating currents and induced voltages are eliminated or reduced. Earth Sheath Link Chambers and Communication Chambers are located in close proximity to Joint Bays. Earth Sheath Link Chambers and Communication Chambers will be pre-cast concrete structures with an access cover at finished surface level. The locations of the joint bays and chambers are shown on the Grid Connection Infrastructure in Appendix 4-5.

The precise siting of all Joint Bays, Earth Sheath Link Chambers and Communication Chambers within the planning corridor assessed is subject to approval by ESB and EirGrid.

2.2.2.13.3 Underground Cable Watercourse/Culvert Crossings

There are a total of 34 no. identified watercourse and existing culvert/drain crossings along the proposed Grid Connection underground electrical cabling route, of which 11 no. are EPA/OSI mapped crossings. The remaining crossings are classified as culverts over minor channels or manmade drains. Further detail on the watercourse, drain and culvert crossings of the underground electrical cabling route are included in Appendix 4-5 of the EIAR: Grid Connection Infrastructure.

The construction methodology for the 11 no. EPA/OSI mapped crossings has been designed to eliminate the requirement for in-stream works on these locations requiring a crossing to be constructed to traverse the watercourse with the cabling ducts. A general description of the various construction methods employed at watercourse/ culvert/ drain crossings are described in the following paragraphs below.

A list of the 11 no. EPA/OSI mapped crossings along the underground electrical cabling route and the proposed crossing methodology is provided in Table 4-3 in Section 4 of the EIAR. The EPA/OSI mapped crossing locations are shown in Figure 2-4 below. An illustration of the proposed crossing methodology at each of the 11 no. locations is included in Appendix 4-5 and the associated drawing number is referenced in Table 4-3 within Section 4 of the EIAR.

The crossing methodologies employed at the other culvert and manmade drain crossings along the underground electrical cabling route, will be selected from the suite of watercourse crossing options outlined below, as appropriate, depending on culvert type, depth, size and local ground conditions.

The crossing locations for the culvert and drain crossing locations along the underground electrical cabling route are shown in Appendix 4-5 of the EIAR, along with the details of all identified culvert and drain crossings.

Should an alternative methodology option be required for individual crossings during the construction process this will be agreed with the relevant authorities including Westmeath County Council and Offaly County Council prior to works commencing.

Where culverts require upgrading, the Applicant will commission a survey of culverts, the results of which will inform the exact details of the upgrade works which will be forwarded to the relevant Local Authority. Having regard to the duration of the consent requested (10 years) it is considered best practice that any such surveys be carried out prior to construction to facilitate accuracy and timely reporting of the surveys.

Inland Fisheries Ireland have published guidelines relating to construction works along water bodies entitled “*Requirements for the Protection of Fisheries Habitats during Construction and Development Works at River Sites*”, and these guidelines will be adhered to during the construction of the Proposed Development.

Standard Formation Crossing over Culvert – Option A

Where adequate cover exists above a culvert, the standard aforementioned trench arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course. The cable trench will pass over the culvert in a standard trench as outlined in Figure 2-5 below.

Where no crossing currently exists, the cable will pass over the watercourse in a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement. Where required existing culvert crossings will be extended using appropriately sized corrippe.

Standard Formation Crossing under Culvert – Option B

Where the culvert consists of a socketed concrete or sealed plastic pipe and sufficient depth is not available over the crossing, a trench will be excavated beneath the culvert and cable ducts will be installed in the standard formation 300mm below the existing pipe, as outlined in Figure 2-6 below.

Shallow Formation crossing over Culvert – Option C

Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.

Where sufficient deck cover is not available to fully accommodate the required ducts, it may be necessary to locally raise the footpath level if present, or to locally raise the pavement level. Should the footpath or pavement level be increased, the parapet wall levels will also increase to facilitate the raise

in pavement level if required, any addition of a new pavement will be tied back into the existing road pavement at grade. This method of duct installation is further detailed in Figure 2-7 below.

Directional Drilling – Option D

In the event that none of the above methods are appropriate, directional drilling (DD) will be utilised.

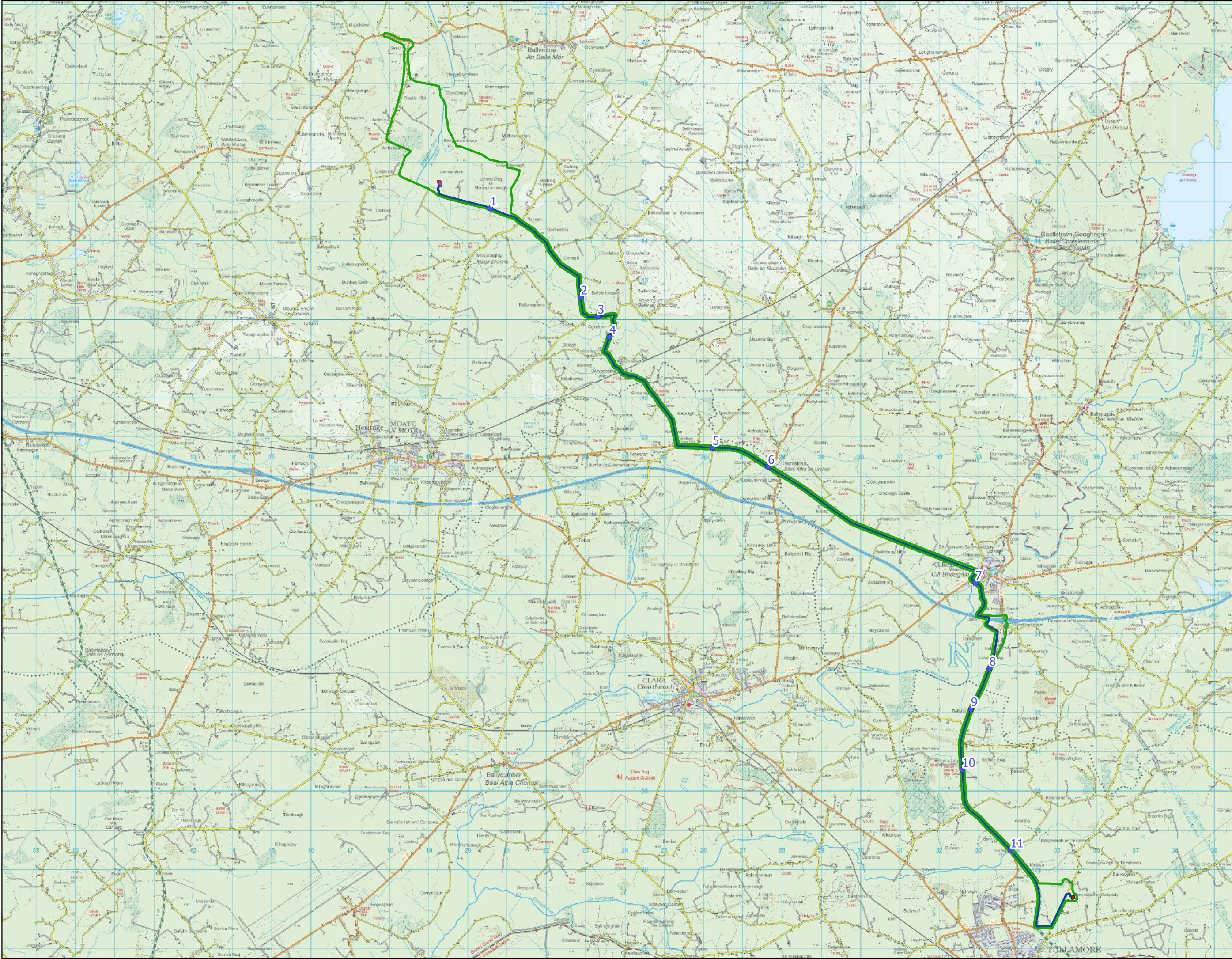
DD is a method of drilling under obstacles such as bridges, culverts, railways, water courses, etc. in order to install cable ducts under the obstacle. This method is employed where installing the ducts using standard installation methods is not possible.

The DD method of duct installation will be carried out using Vermeer D36 x 50 Directional Drill (approximately 22 tonnes), or similar plant, for the directional drilling at watercourse/culvert crossings listed in Table 4-3 in Section 4 of the EIAR. The launch and reception pits will be approximately 0.55m wide, 2.5m long and 1.5m deep. The pits will be excavated with a suitably sized excavator. The drilling rig will be securely anchored to the ground by means of anchor pins which will be attached to the front of the machine. The drill head will then be secured to the first drill rod and the operator shall commence to drill into the launch pit to a suitable angle which will enable him to obtain the depths and pitch required to the line and level of the required profile. Drilling of the pilot bore shall continue with the addition of 3.0m long drill rods, mechanically loaded and connected into position.

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

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

Backfilling of launch & reception pits will be conducted in accordance with the normal specification for backfilling excavated trenches. Sufficient controls and monitoring will be put in place during drilling to prevent frack-out, such as the installation of casing at entry points where reduced cover and bearing pressure exists. The directional drilling methodology is further detailed in Figure 2-8 below.



Map Legend

- EIAR Site Boundary
- Watercourse Crossings
- Underground Electrical Cabling Route
- Proposed Onsite Substation
- Proposed Temporary Construction Compound
- Thornsberry 110kV Substation

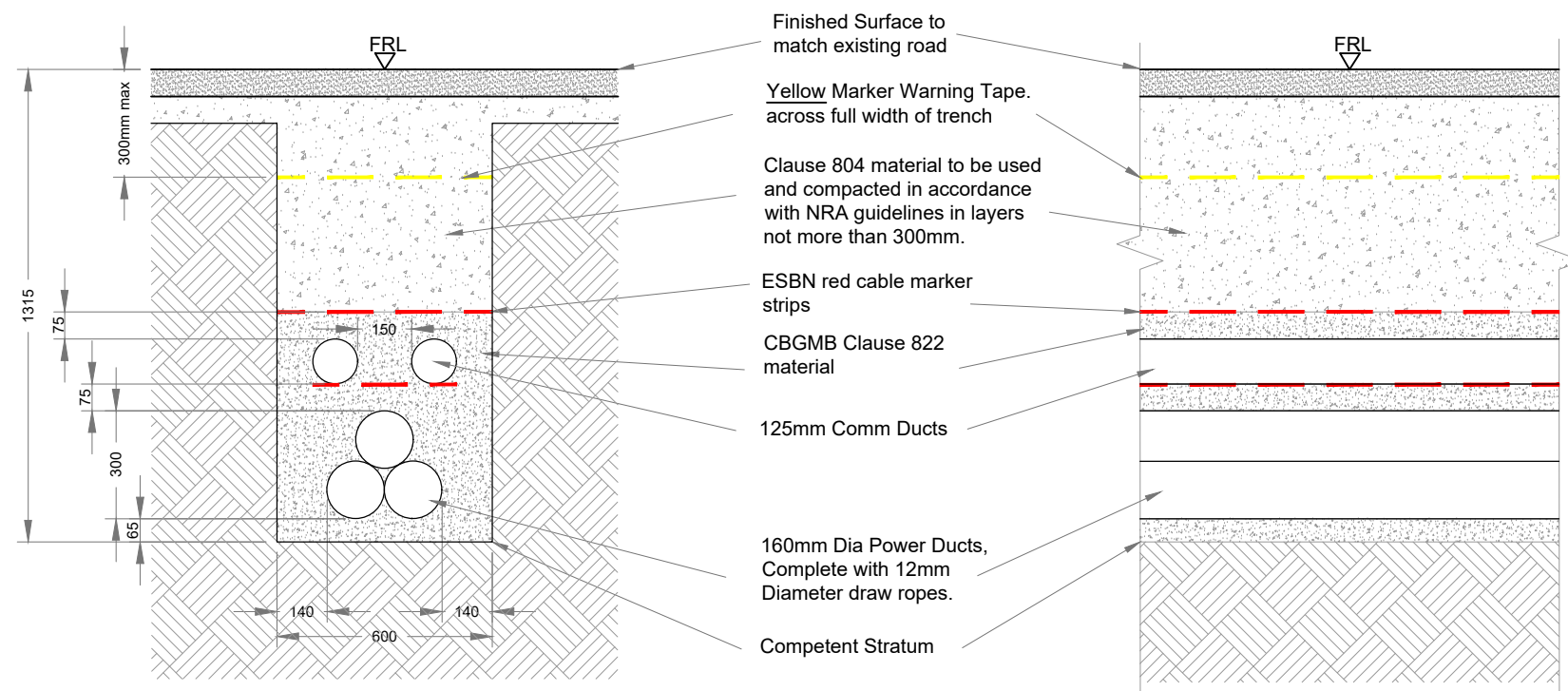
Microsoft product screen shots reprinted with permission from Microsoft Corporation
Ordnance Survey Ireland Licence No. AR 0021822 © Ordnance Survey Ireland/Government of Ireland

Grid Connection Watercourse Crossing Locations

Project Title
Umma More Renewable Energy Development

Drawn By EC	Checked By MW
Project No. 201050	Drawing No. Figure 2-4
Scale 1:85000	Date 2023-03-08

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



Option A
SCALE 1:20

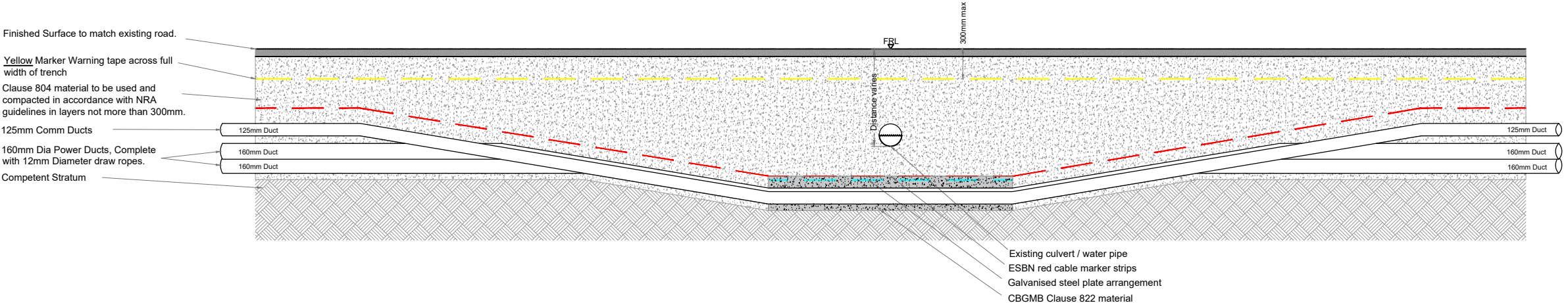
Note:
ALL DIMENSIONS TO BE CHECKED ON SITE AND ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER. FIGURED DIMENSIONS ONLY TO BE USED. DRAWINGS NOT TO BE SCALED.



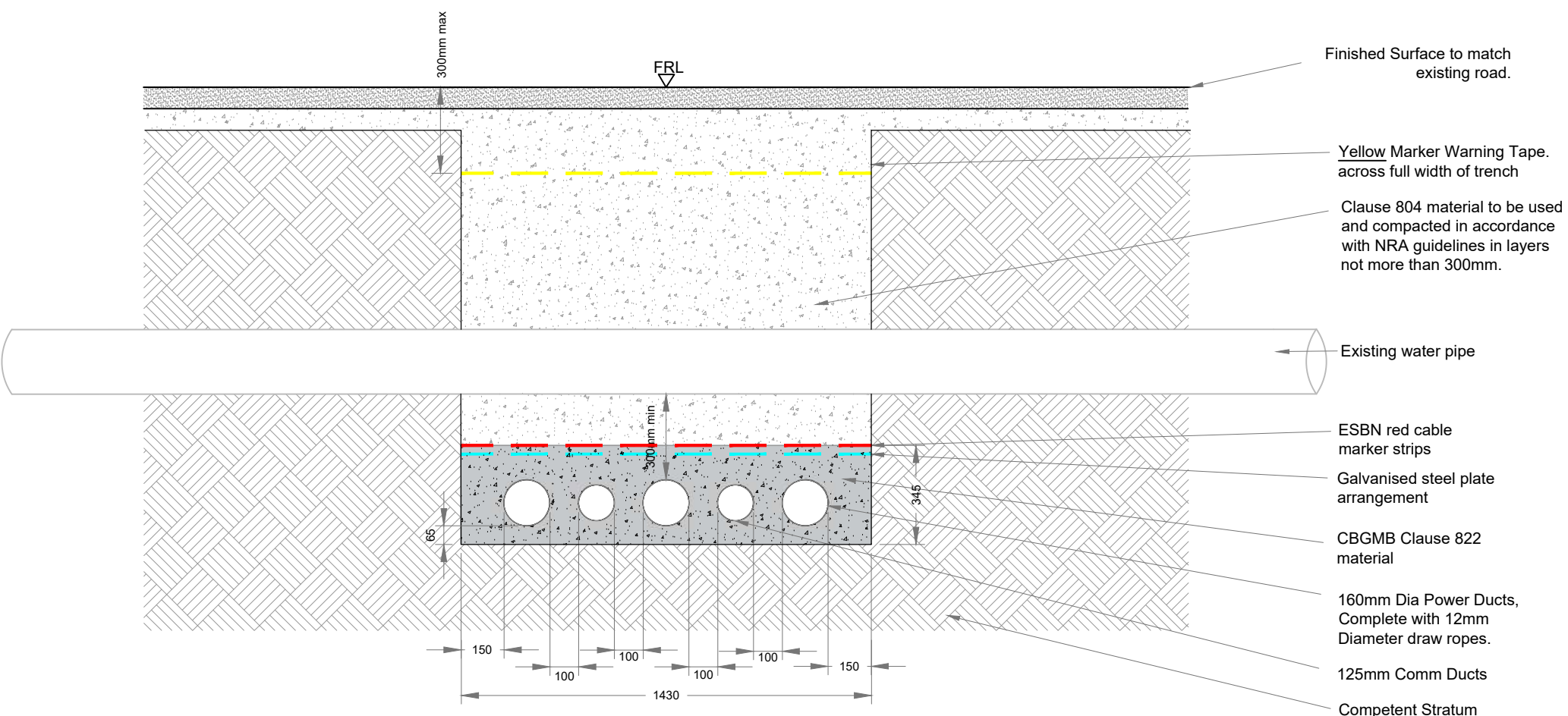
Project:
Umma More

Drawing:
Standard Formation Crossing Over Culvert - Option A

Drawn By: NG	Checked By: WOC	Drawing No. Figure 2-5
Scale: As Shown @ A3		



Option B
SCALE 1:50

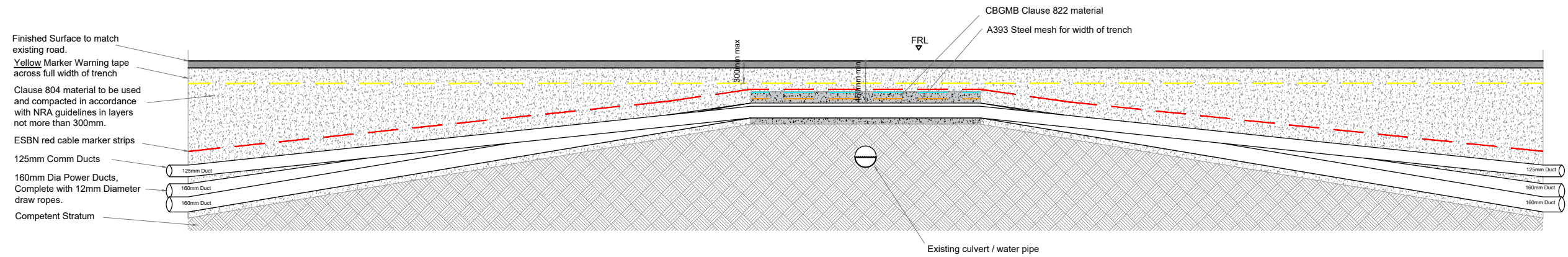


Option B
SCALE 1:20

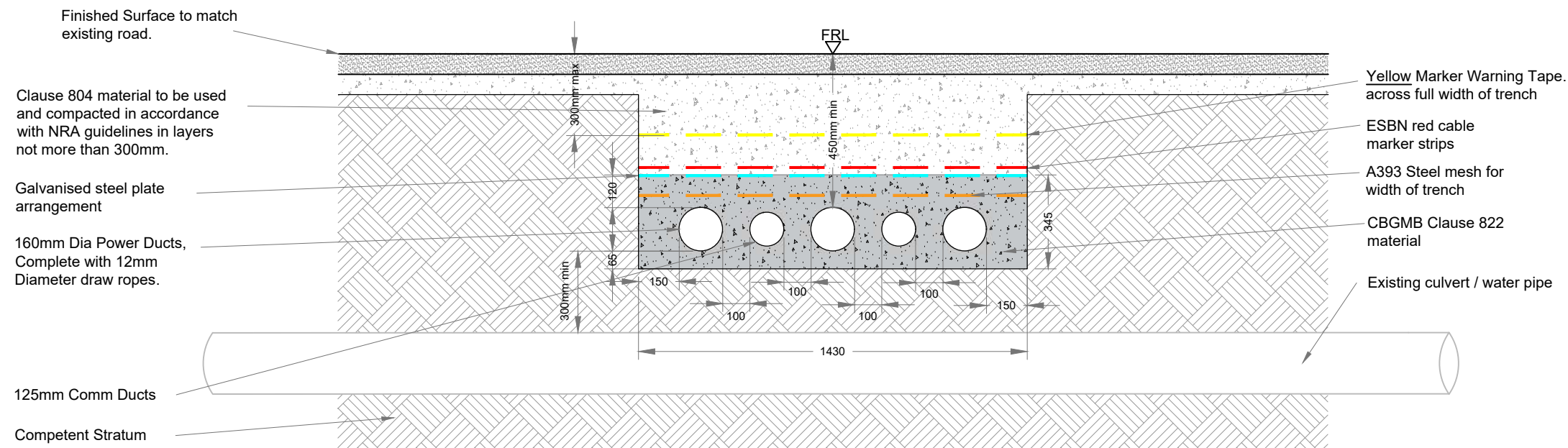
Note:
ALL DIMENSIONS TO BE CHECKED ON SITE AND ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER. FIGURED DIMENSIONS ONLY TO BE USED. DRAWINGS NOT TO BE SCALED.



Project:		
Umma More		
Drawing:		
Standard Formation Crossing Under Culvert - Option B		
Drawn By:	Checked By:	Drawing No.
NG	WOC	Figure 2-6
Scale:		
As Shown @ A3		



Option C
SCALE 1:50



Option C
SCALE 1:20

Note:
ALL DIMENSIONS TO BE CHECKED ON SITE AND ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER. FIGURED DIMENSIONS ONLY TO BE USED. DRAWINGS NOT TO BE SCALED.



Project:

Umma More

Drawing:

Standard Formation Crossing Over
Culverts - Option C

Drawn By:

NG

Checked By:

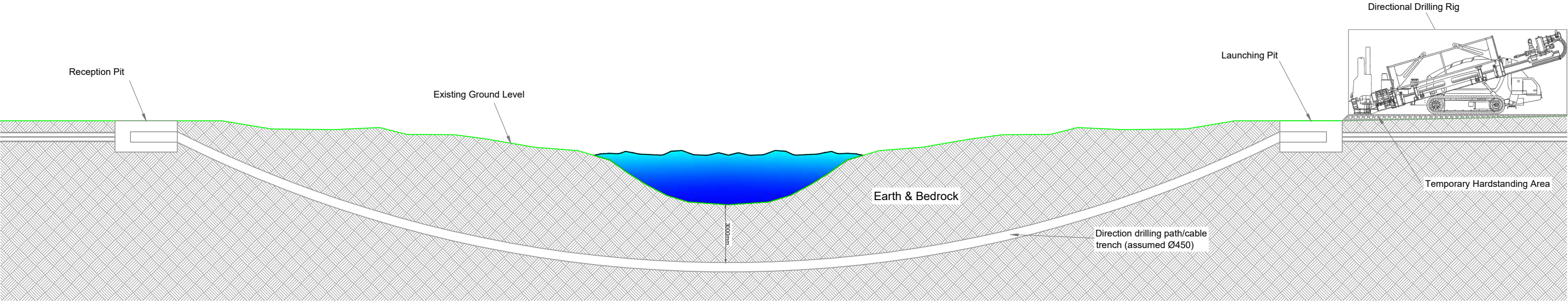
WOC

Scale:

As Shown @ A3

Drawing No.

Figure 2-7



Option D
SCALE: 1:200

Note:
ALL DIMENSIONS TO BE CHECKED ON SITE AND ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER. FIGURED DIMENSIONS ONLY TO BE USED. DRAWINGS NOT TO BE SCALED.



Project:

Umma More

Drawing:

Horizontal Directional Drill - Option D

Drawn By:

NG

Checked By:

WOC

Drawing No.

Scale:

As Shown @ A3

Figure 2-8

2.2.2.14 Transport Route Accommodation Works

Turbine delivery route accommodation works are required at the following locations:

- N55/R916 – Cornamaddy Roundabout;
 - Blade and tower delivery vehicles will be accommodated with a temporary modification to the centre island of the roundabout to provide a temporary over-run area.
- R390/L5363 Junction;
 - A temporary one-way road will be required here in order to accommodate the wind turbine vehicles.
- Access Junction on the L5363;
 - A temporary road and visibility splays will be required at this junction to accommodate wind turbine vehicles.

The above works are outlined in further detail in Section 14.1.9 of the EIAR. Required works along the transport route are minor and are all located within the existing road corridor. The construction methodology of the turbine delivery accommodation works is outlined as follows:

- Overburden within the required areas for the accommodation works will be excavated and temporarily stockpiled adjacent to the works area, where possible, until a competent stratum is reached.
- Any excess excavated overburden will be removed from the works area to the on-site spoil management areas or a licensed tip as 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 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, the granular surface of the accommodation works location will be re-instated to its original condition. All kerbing, barriers and boundary fencing will be reinstated.

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

An outline of the traffic management proposals are presented in Section 3.7 of this CEMP. A detailed Traffic Management Plan, will be provided specifying details relating to traffic management and will be included in the CEMP prior to the commencement of the construction phase of the Proposed Development.

2.2.3 Decommissioning

The wind turbines proposed as part of the Wind Farm Site are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the equipment may be replaced with a

new technology, subject to planning permission being obtained, or the Wind Farm Site may be decommissioned fully.

Upon decommissioning of the Wind Farm Site, the wind turbines will be disassembled in reverse order to how they were erected. The turbines will be disassembled with a similar model of crane that was used for their erection. The turbine will likely be removed from Site using the same transport methodology adopted for delivery to Site initially. The turbine materials will be transferred to a suitable recycling or recovery facility.

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

All above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in unnecessary environment emissions such as noise, dust and/or vibration.

Site roadways could be in use for purposes other than the operation of the Proposed Development by the time the decommissioning of the Wind Farm Site is to be considered, and therefore it may be more appropriate to leave the Site roads in situ for future use. It is envisaged that the roads will provide a useful means of extracting the commercial forestry crop which exists on the Site, and as agricultural roads.

The Grid Connection underground electrical cabling route and onsite substation will remain in place as it will be under the ownership and control of the ESB and EirGrid.

A Decommissioning Plan has been prepared (Appendix 4-6) the detail of which will be agreed with the local authority prior to any decommissioning. The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will be agreed with the competent authority at that time. The potential for effects during the decommissioning phase of the Proposed Development has been fully assessed in the EIAR.

3. ENVIRONMENTAL MANAGEMENT

3.1 Introduction

This CEMP includes all best practice measures required to construct the Proposed 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 principles, dust and noise control measures and a waste management plan for the site.

3.2 Protecting Water Quality

3.2.1 Environmental Management in the Construction Phase

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

3.2.2 Site Drainage Principles

The site drainage features have been outlined in Section 4.6 of the EIAR for the Proposed Development. The protection of the watercourses within and surrounding the site, and downstream catchments that they feed is of utmost importance in considering the most appropriate drainage proposals for the site of the Proposed Development. No routes of any natural drainage features will be altered as part of the Proposed Development. Turbine locations and associated new roadways were originally selected to avoid natural watercourses, and existing roads are to be used wherever possible. The Proposed Development has where possible, been kept a minimum of 50 metres from natural watercourses. There will be no direct discharges to natural watercourses. All discharges from the proposed works areas or from interceptor drains will be made over vegetated ground at an appropriate distance from natural watercourse and lakes. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Development and are indicated on the drainage design drawings

A detailed drainage design for the Proposed Development will be prepared prior to the commencement of construction to be prepared by the Project Hydrologist to incorporate these site drainage principles and carry forward into the construction phase 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 presented in the EIAR and Planning Application documents has been prepared based on experience of the project team of other renewable energy sites in similar environments, and the number of best practice guidance documents.

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

- Institute of Geologists Ireland (2013): *Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements*;
- National Roads Authority (2008): *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*;
- Department of Environment, Heritage and Local Government (2006): *Wind Energy Development Guidelines for Planning Authorities*;
- Institute of Geologists Ireland (2013): *Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements*;
- Forestry Commission (2004): *Forests and Water Guidelines*, Fourth Edition. Publ. Forestry Commission, Edinburgh;
- Coillte (2009): *Forest Operations & Water Protection Guidelines*;
- Forest Services (Draft) *Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures*;
- Forest Service (2000): *Forestry and Water Quality Guidelines*. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford;
- COFORD (2004): *Forest Road Manual – Guidelines for the Design, Construction and Management of Forest Roads*;
- *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters* (Inland Fisheries Ireland, 2016);
- Inland Fisheries Ireland (2016): *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*;
- Scottish Natural Heritage (2010): *Good Practice During Wind Farm Construction*;
- CIRIA (Construction Industry Research and Information Association) (2006): *Guidance on ‘Control of Water Pollution from Linear Construction Projects’* (CIRIA Report No. C648, 2006);
- CIRIA 2006: *Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors* (CIRIA C532, 2006).
- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (DoHPLG, 2018); and,
- *Guidance on the preparation of the EIA Report* (Directive 2011/92/EU as amended by 2014/52/EU), (European Union, 2017).

3.2.4

Site Drainage Design and Management

The proposed site drainage features for this site are outlined in Section 4.6 of the EIAR. As this CEMP is a working document and is presented as an Appendix to the EIAR, the drainage measures are not included in this document. When the final CEMP report is prepared, and presented as a standalone document, all drainage measures will be included in that document. These drainage proposals will be developed further prior to the commencement of construction as part of the detailed drainage design.

The following sections give an outline of drainage management arrangements in terms of pre-construction, construction, operational and decommissioning phases of the Proposed Development.

3.2.4.1 Pre-Construction Drainage

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

Drainage and associated pollution control measures will be implemented onsite before the main construction works commence. Where possible drainage controls will be installed during seasonally dry ground conditions. This will reduce the possibility of impact on surface waters by suspended sediment released during construction and entrained in surface run-off.

The routes of any natural drainage features will not be altered as part of the Proposed Development. Turbine locations have been selected to avoid natural watercourses. It is proposed that 1 no. new watercourse crossing will be required to facilitate the renewable energy development infrastructure.

There will be no direct discharges to natural watercourses. All discharges from the proposed works areas or from interceptor drains will be made over vegetated ground at an appropriate distance from natural watercourse and lakes. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Development and are indicated on the drainage design drawings.

Where artificial drains are currently in place in the vicinity of proposed works areas, these drains may have to be diverted around the proposed works areas to minimise the amount of water in the vicinity of works areas. Where it may not be possible to divert artificial drains around proposed work areas, the drains will be blocked to ensure sediment laden water from the works areas has no direct route to other watercourses. Where drains have to be blocked, the blocking will only take place after an alternative drainage system to handle the same water has been put in place.

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

3.2.4.2 Construction Phase Drainage

The key principles of drainage design that will be implemented and adhered to as part of the Proposed Development are as follows:

- Keep clean water clean by intercepting it where possible, upgradient of works areas, and divert it around the works areas for discharge as diffuse overland flow or for rewetting of land.
- Collect potentially silt-laden runoff from works areas via downgradient collector drains and manage via series of avoidance, source, in-line, treatment and outfall controls prior to controlled diffuse release as overland flow or for rewetting of land.
- No direct hydraulic connectivity from construction areas to watercourses, or drains connecting to watercourses.
- Where possible, maintain 50-metre watercourse buffer zones for the wind turbines.
- No alteration of natural watercourses.
- Maintain the existing hydrology of the Site.
- Blocking of existing manmade drainage as appropriate.

- Daily inspection and recording of surface water management system by on-site clerk of works and immediate remedial measures to be carried out as required and works temporarily ceased if a retained stormwater/sediment load is identified to have the potential to migrate from the Site.
- Use of siltbuster if required.

Runoff control and drainage management are key elements in terms of mitigation against effects on surface water bodies. Two distinct methods will be employed to manage drainage water within the Wind Farm Site. The first method involves ‘keeping clean water clean’ by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations, construction areas and temporary storage areas. The second method involves collecting any drainage waters from works areas within the Wind Farm Site that might carry silt or sediment, and nutrients, to route them towards settlement ponds (or stilling ponds) prior to controlled diffuse release over vegetated surfaces. There will be no direct discharges to surface waters. During the construction phase all runoff from works areas (i.e. dirty water) will be attenuated and treated to a high quality prior to being released. The drawings for the proposed drainage management system is included as Appendix 9-4 of the EIAR.

The Project Hydrologist will complete a detailed drainage design and maintenance plan before construction commences and will attend the site to set out and assist with micro-siting of proposed drainage controls as outlined in Section 4.6 of the EIAR. The drainage system will be excavated and constructed in conjunction with the road and hard standing construction. Drains will be excavated and stilling ponds constructed to eliminate any suspended solids within surface water running off the site. Drainage infrastructure will include:

- Interceptor drains will be maintained up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader.
- Drainage swales will be installed downgradient of any works areas to collect surface flow runoff where it might have come into contact with exposed surfaces and picked up silt and sediment. Swales/roadside drains will be maintained to intercept and collect runoff from access roads and hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to stilling ponds for sediment settling;
- Piped slope drains will be used to convey surface runoff from diversion drains safely down slopes to flat areas without causing erosion. Once the runoff reaches the flat areas it will be reconverted to diffuse sheet flow. Level spreaders will only be established on slopes of less than 6% in grade. Piped slope drains will be used to transfer water away from areas where slopes are too steep to use level spreaders;
- Vegetation filters are the existing vegetated areas of land that will be used to accept surface water runoff from upgradient areas. The selection of suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions;
- Siltbusters or similar equivalent piece of equipment will be available to filter any water pumped out of excavation areas if necessary, prior to its discharge to stilling ponds or swales. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. They are specifically designed for use on construction sites.
- Silt bags, silt fences and sedimats will also be utilised where required. These devices capture silt and remove it from the water stream..
- Check dams will be maintained at regular intervals along interceptor drains and swales/roadside drains in order to reduce flow velocities and therefore minimise erosion within the system during storm rainfall events; and,
- Stilling ponds/settlement ponds, emplaced downstream of swales and roadside drains, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus

reducing the hydraulic loading to watercourses. The stilling ponds will be sized according to the size of the area they will be receiving water from but will be sufficiently large to accommodate peak flows storm events. Inspection and maintenance of all settlement ponds will be ongoing through the construction period.

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

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

The large setback distance from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures (discussed below) to be properly installed and operate effectively. The proposed buffer zone will:

- Avoid physical damage to watercourses, and associated release of sediment;
- Avoid excavations within close proximity to surface watercourses;
- Avoid the entry of suspended sediment from earthworks into watercourses; and,
- Avoid the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone
- Apart from interceptor drains, which will convey clean runoff water to the downstream drainage system there will be no direct discharge (without treatment for sediment reduction, and attenuation for flow management) of runoff from the Wind Farm Site drainage into the existing site drainage network where possible. This will reduce the potential for any increased risk of downstream flooding or sediment transport/erosion
- Silt traps will be placed in the existing drains upgradient of where construction works / tree felling is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area;
- Buffered outfalls which will be numerous over the site which will promote percolation of drainage waters across vegetation and close to the point at which the additional runoff is generated, rather than direct discharge to the existing drains of the site; and,
- Drains running parallel to the existing roads requiring widening will be upgraded. Velocity and silt control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles, silt fences will be used during the upgrade construction works. Regular buffered outfalls will also be added to these drains to protect downstream surface waters.

All of the above works will be supervised by the Environmental Clerk of Works (ECoW) and the Project Hydrologist.

Best practice and practical experience on other similar projects suggests that in addition to the drainage plans that are included in the EIAR, there are additional site based decisions and plans that can only be made in the field through interaction between the Site Construction Manager, the Project Hydrologist and the Project Geotechnical Engineers. The mechanisms for interaction between these are outlined within Section 4.1 of this CEMP.

In relation to decisions that are made on site it is important to stress that these will be implemented in line with the associated drainage controls and mitigation measures outlined in Section 6 below, and to ensure protection of all watercourses.

3.2.4.3 Operational Phase Drainage

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

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

The drainage system will not be altered upon decommissioning. Measures which will be implemented to ensure no impacts upon the drainage system during decommissioning will be outlined within the Decommissioning Plan and fully agreed with the local authority prior to any decommissioning works.

3.2.4.4 Preparative Site Drainage Management

The detailed drainage design will specify all materials and equipment necessary to implement the drainage measures effectively, which will be brought on site in advance of any works commencing.

An adequate quantity of straw bales, clean stone, terram, stakes, etc. will be kept on site at all times to implement the detailed drainage design measures as necessary. The detailed drainage measures will be installed prior to, or at the same time as the works they are intended to drain.

3.2.4.5 Pre-emptive Site Drainage Management

The works programme for the groundworks part of the construction phase of the Proposed Development will also take account of weather forecasts and predicted rainfall in particular, working under a schedule of works operation system (SOWOR). The site Construction Manager is responsible for making the decision to postpone or abandon works. Large excavations and movements of overburden or large-scale overburden or soil stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

3.2.4.6 Reactive Site Drainage Management

In line with the requirements of the EIAR, the final drainage design prepared for the Proposed Development prior to commencement of construction will provide for reactive management of drainage measures. The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the ECoW or supervising hydrologist on-site. The contractor is solely responsible for the implementation of the detailed drainage design on site. The ECoW is responsible for monitoring the effectiveness of the drainage design as it is implemented on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the Proposed Development proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site. The drainage design may have to be modified on the ground as necessary, and the modifications will draw on the various features outlined above in whatever combinations are deemed to be most appropriate to situation on the ground as a particular time.

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

3.2.4.7 Rainfall Forecasting and Monitoring

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

Rainfall forecasts will be obtained for the nearest forecast reference point available via the www.yr.no weather forecasting website. The reference location will be that of Ballymore, Co. Westmeath.

<https://www.yr.no/en/forecast/daily-table/2-2966500/Ireland/Leinster/County%20Westmeath/Ballymore>

Construction personnel will be required to check the forecasted rainfall for the days ahead and plan for or suspend planned works accordingly. The forecasted rainfall should be recorded for reference and comparison with the rainfall levels to be recorded on-site.

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

3.3 Wind Farm 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 Wind Farm Site, would be used for landscaping and reinstatements of other areas elsewhere on site. The same control measures would apply during the excavation of the Grid Connection route.

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

3.4 Refuelling, Fuel and Hazardous Materials

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-axle custom-built refuelling trailer will be re-filled off site and will be towed around the Wind Farm 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 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, spill kits and fuel absorbent mats will be available if necessary, during all refuelling operations

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

- Road-going vehicles will be refuelled off site wherever possible;
- Fuels volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor;
- The electrical substation compound will be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- Oils or fuels stored in turbines will be placed within an appropriately sized bunded unit to prevent leakage to groundwater or surface water;
- The plant used will be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages will be developed (refer to Section 5) Spill kits will be available to deal with and accidental spillage in and outside the refuelling area.
- A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the construction phase.

3.5 Tree Felling

Mitigation measures will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses. These measures are derived from best practice guidance documents as outlined below and in Section 9 of the EIAR. A Harvest Management Plan is included in Appendix 4-4 of the EIAR.

3.5.1 Tree Felling Drainage Measures

As part of the Proposed Development, tree felling will be required within and around Proposed Development footprint to allow for the construction of the turbine bases, access roads underground cabling, and the other ancillary infrastructure. Tree felling to facilitate the Proposed Development will be undertaken prior to construction groundworks in the area of T4 to facilitate construction works within the forestry. A small section of the Wind Farm Site is located on commercial forestry, namely Turbine no. 4 and its associated infrastructure. A total of 6.4 hectares of commercial forestry will be permanently felled within and around Turbine No. 4 and its associated infrastructure, along with existing treeline boundaries as detailed in Chapter 6.

The commercial forestry felling activities required as part of the Proposed Development will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments.

Tree felling to facilitate the Proposed Development will not be undertaken simultaneously with construction groundworks. Keyhole felling to facilitate construction works will take place prior to groundworks commencing. Some further turbulence felling may take place after all groundworks have been completed but while turbines are being commissioned (depending on the requirements of the selected turbine manufacturer). A Harvest Management Plan is included in Appendix 4-4.

Permanent felling will be undertaken in and around the footprint of the Proposed Development, namely Turbine no. 4 and its associated infrastructure. Tree stumps will only be removed in areas around the Proposed Development footprint. During tree felling there is a potential to generate silts and sediments in surface water runoff due to tracking of machinery and disturbance of the ground surface etc, however mitigation is provided in Section 9.5.2.1 of Chapter 9 Water with regard surface water quality protection for this activity which is summarised below. Also, prior to the commencement of tree felling for subsequent road construction the following key temporary drainage measures will be installed:

- All existing dry forestry drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using forestry check dams/silt traps;
- Clean water diversion drains will be installed upgradient of the works areas;
- Check dams/silt fence arrangements (silt traps) will be placed in all existing forestry drains that have surface water flows and also along existing forestry roadside drains; and,
- A double silt fence perimeter will be placed down-slope of works areas that are located inside the watercourse 50m buffer zone.

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

- Attend the Site for the setup period when drainage protection works are being installed and be present on Site during the remainder of the forestry keyhole felling works.
- Prior to the commencement of works, review and agree the positioning by the Operator of the required Aquatic Buffer Zones (ABZs), silt traps, silt fencing (see below), water crossings and onsite storage facilities for fuel, oil and chemicals (see further below).
- Be responsible for preparing and delivering the Environmental Tool Box Talk (TBT) to all relevant parties involved in Site operations, prior to the commencement of the works.
- Conduct daily and weekly inspections of all water protection measures and visually assess their integrity and effectiveness in accordance with the proposals outlined in Section 4.2 of this CEMP.
- Take representative photographs showing the progress of operation onsite, and the integrity and effectiveness of the water protection measures.
- Collect water samples for analysis by a 3rd party accredited laboratory, adhering to the following requirements:
 - Surface water samples shall be collected upstream and downstream of the keyhole felling site at suitable sampling locations.
 - Sampling shall be taken from the stream/river bank, with no in-stream access permitted.
 - The following minimum analytical suite shall be used: pH, EC, TSS, BOD, Total P, Ortho-P, Total N, and Ammonia.
- Review of operator's records for plant inspections, evidence of contamination and leaks, and drainage checks made after extreme weather conditions.
- Prepare and maintain a contingency plan.
- Suspend work where potential risk to water from siltation and pollution is identified, or where operational methods and mitigation measures are not specified or agreed.

To protect watercourses, the following measures will be adhered to during all keyhole/tree felling activities.

- All relevant measures, best practice methods and requirements set out Section 9.5.2.2 in Chapter 9 of the EIAR will be adhered to including Forestry & Water Quality Guidelines, Forest Harvesting & the Environment Guidelines and the Forest Protection Guidelines.
- The extent of all necessary tree felling will be identified and demarcated with markings on the ground in advance of any felling commencing.
- All roads and culverts will be inspected prior to any machinery being brought on Site to commence the felling operation. No tracking of vehicles through watercourses will occur. Vehicles will only use existing road infrastructure and established watercourse crossings.

- Existing drains that drain an area to be felled towards surface watercourses will be blocked, and temporary silt traps will be constructed to ensure collection of all silt within felling areas. These temporary silt traps will be cleaned out and backfilled once felling works are complete. This ensures there is no residual collected silt remaining in blocked drains after felling works are completed. No direct discharge of such drains to watercourses will occur from within felling areas.
- New collector drains and sediment traps will be installed during ground preparation to intercept water upgradient of felling areas and divert it away. Collector drains will be excavated at an acute angle to the contour (0.3%-3% gradient), to minimise flow velocities.
- All silt traps will be sited outside of buffer zones and have no direct outflow into the aquatic zone. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of away from all aquatic zones.
- All new collector drains will taper out before entering the aquatic buffer zone to ensures the discharging water gently fans out over the buffer zone before entering the aquatic zone.
- Machine combinations, such as mechanical harvesters or chainsaw felling will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance.
- Mechanised operations will be suspended during and immediately after heavy rainfall.
- Where brash is required to form brash mats, it is to be laid out at harvesting stage to prevent soil disturbance by machine movement.
- Brash which has not been pushed into the soil may be moved within the Site to facilitate the creation of mats in more demanding locations.
- Felling of trees will be pointed directionally away from watercourses.
- Felling will be planned to minimise the number of machine passes in any one area.
- Extraction routes, and hence brash mats, will be aligned parallel to the ground contours where possible.
- Harvested timber will be stacked in dry areas, and outside any 50-metre watercourse buffer zone. Straw bales and check dams to be emplaced on the down gradient side of timber storage sites.
- Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but removing of natural debris deflectors will be avoided.

Table 3-1 Minimum Buffer Zone Widths (Forest Service, 2000)

Average slope leading to the aquatic zone		Buffer zone width on either side of the aquatic zone	Buffer zone width for highly erodible soils
Moderate	(0 – 15%)	10 m	15 m
Steep	(15 – 30%)	15 m	20 m
Very steep	(>30%)	20 m	25 m

3.6

Cement Based Products Control Measures

Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills.

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

- No batching of wet-cement products will occur on the Wind Farm Site/along the underground electrical cabling route works or near other ancillary construction activities.
- Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place;
- Where possible pre-cast elements for culverts and concrete works will be used;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- Where concrete is delivered on Site, only the chute will need to be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water is to be directed into a dedicated concrete wash out pit. Decommissioning of this pit will occur at the end of the construction phase and water and solids will be tanked and removed from the site to a suitable, non-polluting, discharge location;
- All concrete will be placed in shuttering and will not be in contact with soils or groundwater until after it has set;
- Use weather forecasting to plan dry days for pouring concrete; and,
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event.
- The arrangements for concrete deliveries to the site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout of trucks and discussing emergency procedures.
- Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place. Where possible pre-cast elements for culverts and concrete works will be used;

The 50 m wide watercourse buffer zone and 10 m existing artificial drainage buffer will be in place for the duration of the construction phase. No construction activity will occur within the buffer zone with the exception of clear span crossing and culvert construction. The buffer zone will:

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



Plate 3-1 Typical concrete wash out areas

3.7

Archaeological Management

This section of the CEMP provides an outline of the Archaeological, Architectural and Cultural Heritage mitigation measures for the construction phase of the Proposed Development.

Four recorded monuments are located within the Wind Farm Site (WM024-131, WM023-077, WM024-135 & WM023-067). Groundworks at the construction stage has the potential to directly impact the monuments thereby having a direct negative and permanent effect. The monuments are located an adequate distance from the proposed groundworks however, buffers will be maintained around each monument in order to ensure their protection during the construction phase.

Proposed mitigation measures include:

- 30m buffer zones will be maintained around the monuments.
- No ground works or storage of materials or tracking of machinery will take place within the buffer zones

Umma House is located 295m west of the proposed turbine T8. The house is derelict and has been modernised with a slate roof and boarded windows. The structure and outbuildings are located an adequate distance from any Proposed Development infrastructure and will not be impacted at the construction stage. In order to avoid accidental damage by machinery the following mitigation will be implemented during construction.

Proposed mitigation measures include:

- An exclusion zone will be established around the house and associated outbuildings prior to construction

Twelve Record of Protected Structures (RPS) structures and eleven monuments are located within 100m of either side of the underground electrical cabling route, The excavation of the trench for the underground electrical cabling route has the potential to impact directly on some structures. The majority, however, consist of houses and buildings and will not be directly impacted by cabling works.

Proposed mitigation measures include:

- Archaeological Monitoring will be carried out along the underground electrical cabling route adjacent to those structures identified in Table 13-15 where the cable route traverses the ZAPs as shown on Figure 13-17 and Figure 13-18 in Chapter 13.
- A report on the monitoring should be compiled on completion of the work and submitted to the relevant authorities.
- Further mitigation such as preservation in situ (avoidance), preservation by record (excavation) may be required depending on the results of the monitoring.
- Fencing off the structure 038-064 NIAH 15403808 Milestone at Ballinderry Big prior to construction.
- Protective traffic barriers will be placed around the structure 031-019 NIAH 15403124 Water pump at Ballybrickoge during construction

3.8

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.

3.8.1 Turbine and Materials Transport Route

3.8.1.1 Wind Farm Site

It is proposed that large wind turbine components will be delivered to the Wind Farm Site, from Galway Port, via the M6 National Road (other ports such as Shannon Port or Dublin Port could also be used). The proposed turbine transport route from Galway Port via the M6 National Road, N6, N55 and R390 to the Wind Farm Site is shown on Figure 4-22. From Galway Port in Galway City, the turbines will be transported via the M6 and N6 at Athlone, turning northeast along the N55 for approximately 2.7km, before turning east onto the R390 Regional Road. The route continues along the R390 Regional Road for 13.5km before turning south onto the L5363 local road where the route continues south along this road for approximately 1km before turning east into the Wind Farm Site entrance.

Construction materials such as concrete, steel and construction materials will follow the same transport route as the wind turbines from the National Road network to the Wind Farm Site, along with three additional potential routes:

- M6 from the east,
- N55 from the south, and,
- the R390 from the east.

All deliveries of turbine components and other construction materials to the site will only be via the proposed transport routes outlined in Figure 4-22 in Chapter 4. All deliveries will access the site via this haul route for the duration of construction as per the programme outlined in Section 8 below. All deliveries of construction materials to the site will take place within the defined working hours of 7am – 7pm. It may be necessary on occasion, to commence works before 7am where concrete pours will be required to start earlier due to the volume of concrete required and the location of the concrete pour relative to the concrete supplier's batching plant. Main pours will be planned days and weeks in advance and will ensure disruption to work and school related traffic is avoided. The locations of all turbine foundations where large concrete pours will take place are off the public road and will be accessed by the internal site roads and will therefore eliminate the potential for queuing of trucks on the adjoining public road network. The typical vehicle type for delivery of construction materials to site with the exception of the wind turbines will be with standard heavy goods vehicles (HGV).

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

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

The deliveries of turbine components to the Wind Farm Site may be made in convoys of three to four vehicles at a time, and at night when roads are quietest. Convoys will be accompanied by escorts at the front and rear operating a "stop and go" system. Although the turbine delivery vehicles are large, they will not prevent other road users or emergency vehicles passing, should the need arise. The delivery escort vehicles will ensure the turbine transport is carried out in a safe and efficient manner with minimal delay or inconvenience for other road users.

It is not anticipated that any section of the public road network will be closed during transport of turbines, 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 where required will be made outside the normal peak traffic periods, usually at night, to avoid disruption to work and school-related traffic.

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

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

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

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

3.8.1.2 Grid Connection

Deliveries of materials for the construction of the Grid Connection underground electrical cabling route will be completed on an as needed basis via the public road network along the identified route. Due to the nature of the Grid Connection underground electrical cabling route, the proposed works will be transient in nature along the public road network in which the underground electrical cabling route is proposed. As such, deliveries of construction materials will utilise the surrounding road network along the underground electrical cabling route as it moves along the public road network in which it's proposed.

A detailed description of the Grid Connection is provided in Section 4.3.2 of the EIAR. It is proposed that the 110kV onsite electrical substation in the townland of Umma More is connected by means of an underground 110kV electricity cable to the existing 110kV Thornsberry substation located in the townland of Derrynagall or Ballydaly, near Tullamore, Co. Offaly. Delivery of construction of the substation will follow the designated haul route for the Wind Farm Site as outlined above. The proposed underground electrical cabling route is approximately 31km in length and is located predominately within the public road corridor. The various sections of the Grid Connection underground electrical cabling route are outlined in Appendix 4-5 and Section 14.1.7 of the EIAR.

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

The construction methodology of providing a Grid Connection underground electrical cabling route under and along local road networks is well established and accepted nationwide. There are in excess

of 300 wind farms currently operational in Ireland and the majority of these are connected to the national grid via underground cable connections predominantly along the public road networks.

Illustrations for the traffic arrangements and diversion routes identified for the Grid Connection works are included in Appendix 14-2 of the EIAR and identifies sections along the Grid Connection underground electrical cabling route where there will be road and pedestrian footpath closures, diverted traffic, and Stop/Go or traffic lights.

3.8.2 **Traffic Mitigation Measures During the Construction Stage**

The successful completion of the Proposed Development will require significant coordination and planning and a comprehensive set of mitigation measures will be put in place before and during the construction stage of the Proposed Development in order to minimise the effects of the additional traffic generated by the Proposed Development. The range of measures will include the following which are also set out in the Section 14.1.11 of the EIAR.

A detailed **Traffic Management Plan (TMP)**, incorporating all the mitigation measures set out within this CEMP along with Chapter 14 of the EIAR, will be finalised and detailed provisions in respect of traffic management agreed with the roads authority and An Garda Síochána prior to construction works commencing on Site. Illustrations for the traffic arrangements and diversion routes identified for the Grid Connection works are included in Appendix 14-2: Grid Connection Traffic Arrangements and Diversion Routes, and identifies sections along the Grid Connection underground electrical cabling route where there will be road and pedestrian footpath closures, diverted traffic, and Stop/Go or traffic lights. The detailed TMP will include the following:

Traffic Management Coordinator – a competent Traffic Management Co-ordinator will be appointed for the duration of the construction of the Proposed Development and this person will be the main point of contact for all matters relating to traffic management.

Delivery Programme – a programme of deliveries will be submitted to Westmeath County Council and other relevant authorities in advance of deliveries of turbine components to the Wind Farm Site. Liaison with the relevant local authorities including the roads sections of local authorities that the delivery routes traverse and An Garda Síochána, during the delivery phase of the large turbine vehicles, when an escort for all convoys will be required.

Information to locals – Locals in the area will be informed of any upcoming traffic related matters e.g. delivery of turbine components at night, via letter drops and posters in public places. Information will include the contact details of the Contract Project Co-ordinator, who will be the main point of contact for all queries from the public or local authority during normal working hours. An "out of hours" emergency number will also be provided.

A Pre and Post Construction Condition Survey – A pre-condition survey of roads associated with the Proposed Development will be carried out prior to construction commencement to record the condition of the road. A post construction survey will be carried out after works are completed. Where required the timing of these surveys will be agreed with the local authority.

Implementation of temporary alterations to road network at critical junctions – At locations where required highlighted in Section 14.1.8 of the EIAR and 2.2.2.13 of this CEMP.

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

Travel plan for construction workers to Wind Farm Site– While the assessment above has assumed the worst case that construction workers will drive to the Wind Farm Site, the construction company will be

required to provide a travel plan for construction staff, which will include the identification of a routes to / from the site and identification of an area for parking.

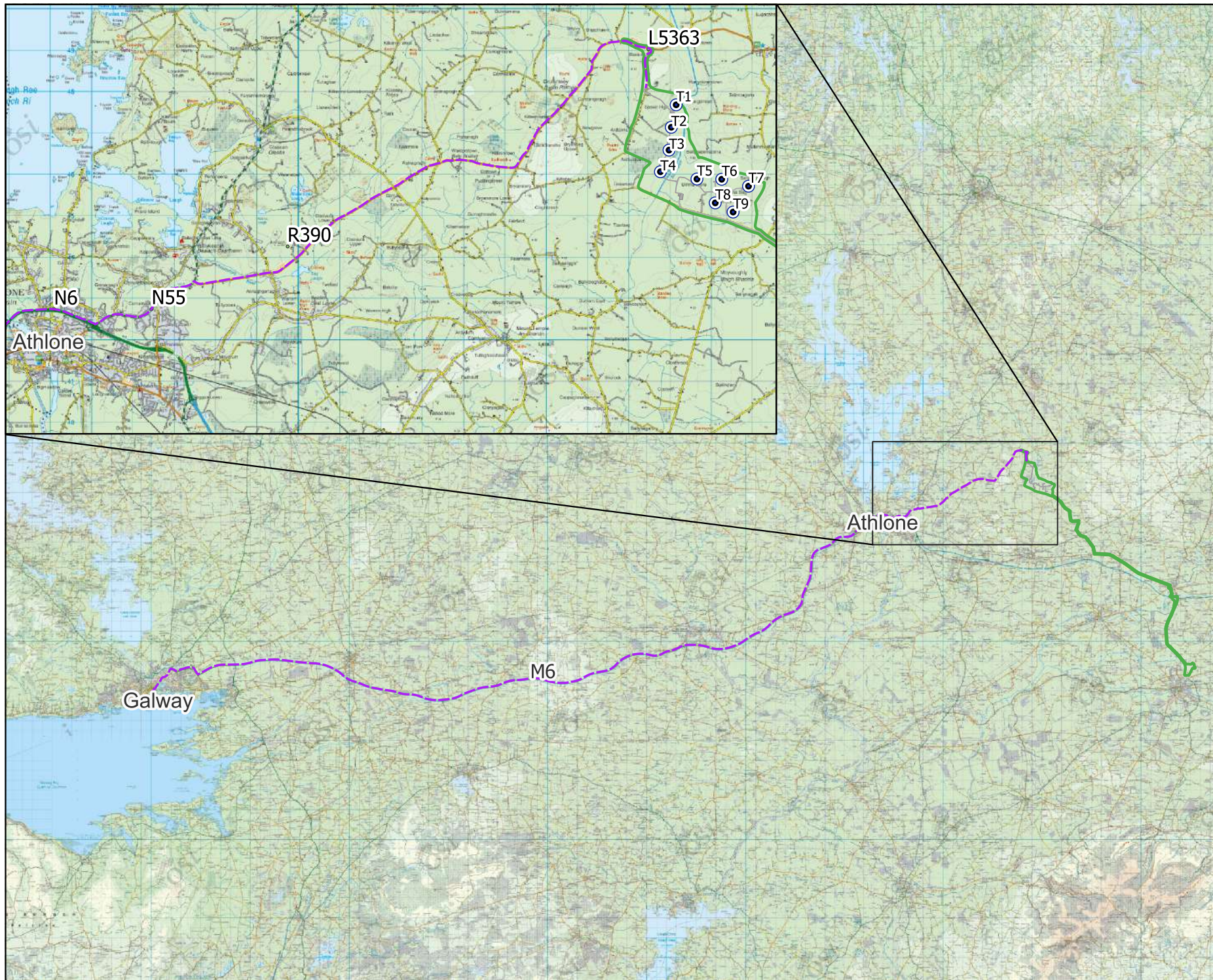
Travel plan for construction workers to underground electric cabling route – Due to the transient nature of the underground grid connection construction site which will generally be on a section of the public road, construction workers will be transported to and from the site by the construction company at the beginning and end of each shift.

Temporary traffic signs – As part of the traffic management measures temporary traffic signs will be put in place at all key junctions, including the access junction on the L5363. All measures will be in accordance with the “Traffic Signs Manual, Section 8 – Temporary Traffic Measures and Signs for Road Works” (DoT now DoTT&S) and “Guidance for the Control and Management of Traffic at Roadworks” (DoTT&S). A member of construction staff (flagman) will be present at key junctions during peak delivery times.

Delivery times of large turbine components - The management plan will include the delivery of large wind turbine plant components at night in order to minimise disruption to general traffic during the construction stage.

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

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



Map Legend

- EIA Site Boundary
- Proposed Turbine Delivery Route
- Proposed Turbine Layout
- Proposed Development Footprint



© Ordnance Survey Ireland. All rights reserved.
Licence number CYAL50267517

Drawing Title
Turbine Delivery Route and Construction Haul Route

Project Title
Umma More Renewable Energy Development

Drawn By BT	Checked By EC
Project No. 201050	Drawing No. Figure 3-1
Scale 1:500,000	Date 2023-02-01

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

3.9

Dust Control

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

In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling/settlement ponds in the Wind Farm Site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and temporary construction compounds to prevent the generation of dust. Silty or oily water will not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser movements will be carefully monitored, as the application of too much water may lead to increased runoff.

Proposed measures to control dust include:

- Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions;
- The designated public roads outside the site and along the main transport routes to the site will be regularly inspected by the ECoW for cleanliness, and cleaned as necessary;
- Material handling systems and material storage areas will be designed and laid out to minimise exposure to wind;
- Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods;
- Water misting or bowsers will operate on-site as required to mitigate dust in dry weather conditions;
- The transport of soils or other material, which has significant potential to generate dust, will be undertaken in tarpaulin-covered vehicles where necessary;
- All construction related traffic will have speed restrictions on un-surfaced roads to 15 kph;
- Daily inspection of construction sites to examine dust measures and their effectiveness.
- The site access roads will be checked weekly for damage/potholes and repaired as necessary.

When necessary, sections of the haul route will be swept using a truck mounted vacuum sweeper. It is not anticipated that vehicle or wheel washing facilities will be required as part of the construction phase of the Proposed Development because site roads will be formed before road-going trucks begin to make regular or frequent deliveries to the site (e.g. with steel or concrete). The site roads will be well finished with compacted hardcore, and so the public road-going vehicles will not be travelling over soft or muddy ground where they might pick up mud or dirt. A road sweeper will be available if any section of the public roads requires cleaning due to construction traffic associated with the Proposed Development.

3.10

Noise Control

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

- Diesel generators will be enclosed in sound proofed containers to minimise the potential for noise impacts;

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

Section 8 of BS5228-1:2009+A1:2014 as outlined in Chapter 11 of the EIAR: Noise and Vibration, further recommends a number of simple control measures as summarised below that will be employed onsite:

- Keep local residents informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and be subject to programmed maintenance;
- Select inherently quiet plant where appropriate - all major compressors will be ‘sound reduced’ models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use;
- All ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers;
- Machines will be shut down between work periods (or when not in use) or throttled down to a minimum;
- Regularly maintain all equipment used on site, including maintenance related to noise emissions;
- Vehicles will be loaded carefully to ensure minimal drop heights so as to minimise noise during this operation; and
- All ancillary plant such as generators and pumps will be positioned so as to cause minimum noise disturbance and if necessary, temporary acoustic screens or enclosures will be provided.

Where the BS5228 threshold levels are anticipated to be exceeded due to directional drilling activities along the underground electrical cabling route, the following are examples of measures that will be considered, where necessary, to mitigate noise emissions from these activities are as follows:

- Temporary boarding alongside the drilling rig or use of ‘acoustic blanket panels’ to hang from heras fencing or similar. Installation will be as close to the drilling rig as is practicable and fitted so as to interrupt any direct line of site between the drilling rig and the closest residential receptors.
- Examples of appropriate products include Echo Noise Defender and Soundex DeciBloc. It is anticipated that this will be required should directional drilling be used for water crossings 3, 7 and 11, which are in close proximity to sensitive receptors.

3.11 Invasive Species Management

A baseline invasive species survey will be carried out at the site to identify the presence and location of any invasive species (listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011)) by a suitably qualified ecologist. If the presence of such species is found at or adjacent to the site, particularly in areas where its excavation may be required, an invasive species management plan will be prepared for the site to prevent the introduction or spread of any invasive species within the footprint of the works. An invasive species management plan, if required, will set out best practice control methods as summarised in the following sections.

3.11.1 Site Management

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

3.11.2 Establish Good Site Hygiene

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

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

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

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

3.12

Waste Management

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

3.12.1.1 Legislation

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

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

The Department of the Environment provides a document entitled, '*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects*' (2021). It is important to emphasise that no demolition will take place at this site, however, this document was referred to throughout the process of completing this WMP.

3.12.2

Waste Management Hierarchy

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

Prevention and Minimisation:

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

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.

3.12.3 Construction Phase Waste Management

3.12.3.1 Description of the Works

The construction of the Proposed Development will involve the construction of:

- Wind Farm Site: 9 no. turbines and associated foundations and hard-standing areas, meteorological mast, junction accommodation works, access roads, temporary construction compound, underground cabling, spoil management, site drainage, tree felling and all ancillary works and apparatus.
- Grid Connection: temporary construction compound and 110kV onsite substation, and associated underground 110kV electrical cabling connecting to the existing Thornsberry 110kV substation.

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

The turbine and meteorological mast foundations will consist of stone from the local quarries and a concrete base which will contain reinforcing steel. These concrete foundations will be shuttered with steel formwork specifically designed for the works and re-usable off site on similar projects.

The site roads will be constructed with rock sourced from local quarries. The onsite electrical substation and control buildings will be constructed on a concrete foundation with the buildings constructed with concrete masonry blocks with a timber roof structure and roof tile or slate covering. The roof structure will be made up of prefabricated roof trusses manufactured off site to minimise timber cutting on site. The construction of the Grid Connection underground electrical cabling route will consist of excavating sections of a trench, laying the ducting and cabling and backfilling.

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

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

Material Type	Example	LOW Code
Cables	Electrical wiring	17 04 11
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

Material Type	Example	LOW Code
Tarmac/Bitumen	Road surfacing along Grid Connection underground connection cabling route	17 03 02

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

3.12.3.2 Waste Arisings and Proposals for Minimisation, Reuse and Recycling of Construction waste

Construction waste will arise on the Proposed Development 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.

3.12.3.3 Waste Arising from Construction Activities

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

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

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

Waste associated with the installation of the Grid Connection underground electrical cabling route is anticipated to be minimal and will be primarily in the form of packaging (plastic or timber) for the various ducting and cabling used, and will be disposed of at a MRF. All materials excavated from the

trench where the ducting/cabling will be laid will be removed to a licenced facility or to the Wind Farm Site spoil management areas as appropriate.

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

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

3.12.4 Waste Arising from Decommissioning

The design life of the proposed renewable energy development is 30 years after which time a decision will be made to determine whether or not the turbines will be replaced by new turbines or if decommissioning will occur. The lengthy time frame between the completion of the construction phase and decommissioning will result in the only materials remaining on site at that time will be infrastructural material such as the turbine foundations, turbines and the granular material used to construct roads. If the site is decommissioned, cranes will disassemble each turbine tower and all equipment. The associated components will be removed from site for re-use, recycling or waste disposal. Any structural elements that are not suitable for recycling will be disposed of in an appropriate manner. All lubrication fluids will be drained down and put aside for appropriate collection, storage, transport and disposal. Any materials which cannot be re-used or recycled will be disposed of by an appropriately licenced contractor.

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

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

Material Type	Example	LOW Code
Cables	Electrical wiring	17 04 11
Metals	Copper, aluminium, lead, iron and rebar	17 04 07
Inert materials	Crushed stone, concrete	17 01 07
Lubricating Oils/Fluids	Oils used within wind turbines	13 02 04

3.12.4.1 Reuse

Many construction materials can be reused a number of times before they have to be disposed of:

- Concrete can be reused as aggregate for roads cable trench backfilling material.
- Plastic packaging etc. can be used to cover materials on site or reused for the delivery of other materials.
- Excavated material can be reused for reinstatement of the areas around turbine foundations and adjacent to site roads.

3.12.4.2 Recycling

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

All waste that is produced during the construction phase of the Proposed Development including dry recyclables will be deposited in a skip initially and sent for subsequent segregation at a remote facility. The anticipated volume of all waste material to be generated is low which provides the justification for adopting this method of waste management.

3.12.4.3 Implementation

3.12.4.3.1 Roles and Responsibilities

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

3.12.4.3.2 Training

It is important for the Construction Waste Manager to communicate effectively with colleagues in relation to the aims and objectives of the waste management plan. All employees working on site during the construction phase of the Proposed Development 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.

3.12.4.3.3 Record Keeping

The WMP will provide systems that will enable all arisings, movements and treatments of construction waste to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated. It will highlight the areas from which most waste occurs and allows the measurement of arisings against performance targets. The WMP can then be adapted with changes that are seen through record keeping.

The fully licensed waste contractor employed to remove waste from the site will be required to provide documented records for all waste dispatches leaving the site. Each record will contain the following:

- Consignment Reference Number
- Material Type(s) and EWC Code(s)
- Company Name and Address of Site of Origin
- Trade Name and Collection Permit Ref. of Waste Carrier
- Trade Name and Licence Ref. of Destination Facility
- Date and Time of Waste Dispatch
- Registration no. of Waste Carrier vehicle
- Weight of Material
- Signature of Confirmation of Dispatch detail
- Date and Time of Waste Arrival at Destination
- Site Address of Destination Facility

3.12.4.4 **Waste Management Plan Conclusion**

The WMP will be properly adhered to by all staff involved in the Proposed Development 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 Project Developer will appoint a design team to prepare the detailed design for the Proposed Development prior to the commencement of construction and ensure all planning and environmental obligations are met. The developer will appoint a Project Contractor who will be responsible for the construction of the Proposed Development in accordance with this CEMP which will be updated by the contractor as required during the construction phase of the Proposed Development. Any updated CEMP must meet or exceed the standards and requirements set out in this document.

The Environmental Clerk of Works (ECoW) will be nominated by the Project Developer to oversee the Project Contractor's effective implementation of the Proposed Developments environmental requirements and obligations, as captured in the CEMP. The ECoW will be responsible for monitoring the works of the Project Contractor from an environmental perspective on behalf of the Project Developer. For the sake of expediency, the ECoW will report their ongoing audit findings, monitoring results and site observations to both the Project Developer and the Project Contractor, having been nominated by the developer to fulfil the role.

The ECoW will have the power to halt the works, should the need arise and will be supported by the developer to ensure the contractor adheres to such an instruction.

The ECoW will also have to call upon the Project Ecologist, Project Hydrologist, or other members of the Project Developer's design team, as required, to oversee the contractor's works on-site.

An organogram structure for the construction stage roles is as outlined below.

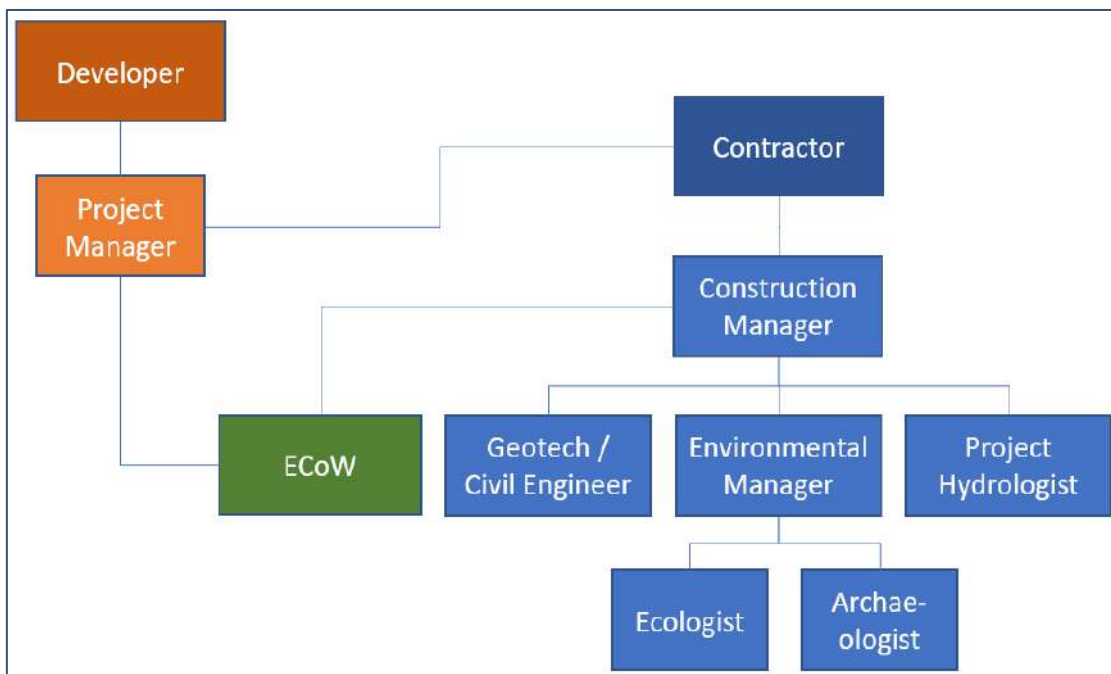


Figure 4-1 Proposed Development Organogram

Any requirement of the granted permission, for the works to be supervised by an engineer with professional indemnity insurance, who upon completion of the works, 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 Proposed Development.

4.1.1 Construction Manager

The Project Contractor will be required to nominate a Construction Manager who will have responsibility for the organisation and execution of environmental requirements outlined in this CEMP or any further versions thereof. The Construction Manager will have an assigned deputy who will fulfil the role of Environmental Manager. To implement the CEMP, the Construction Manager with the assistance of the Environmental Manager will be required to:

- Implement all Proposed Development design requirements to minimise environmental risk;
- Implement all CEMP requirements and measures to minimise environmental risk;
- Ensure any site personnel responsible for directing works on site are familiar with all requirements of the CEMP;
- Propose revisions to the Proposed Developments CEMP for approval of the Project Developer, project design team and ECoW, only where any such revisions meet or exceed the standards and requirements set out in this document;
- Ensure that all environmental standards are achieved during the construction phase of the Proposed Development;
- Promptly implement any remedial action required to rectify and close-out any non-compliant items identified by ECoW;
- Ensure immediate notification of environmental incidents are issued to the ECoW, the Project Developer and the relevant authorities, initially by phone and as soon as is practicable by e-mail;
- Identify environmental training requirements and arrange relevant training for all levels of site-based staff/workers.
- Ensure that all construction activities are planned and performed such that minimal risk to the environment is introduced.

4.1.2 Site Environmental Clerk of Works

The Project Developer will be required to engage a qualified Environmental Engineer, Environmental Scientist, or equivalent, with experience in wind farm construction to fulfil the role of Environmental Clerk of Works (ECoW) to oversee the construction works and audit the implementation of the CEMP. The ECoW will report to the Project Developer and Project Contractor but will liaise closely with the Construction Manager in relation to the Project Contractor's day-to-day implementation of the CEMP on site. The responsibilities and duties of the ECoW will include the following:

- Review/approval of the CEMP and supporting environmental documentation and review/approval of contractor method statements;
- Undertake environmental monitoring, inspections and reviews to ensure the works are carried out in compliance with the CEMP by the Project Contractor;
- Manage the water quality monitoring programme and turbidity monitors;
- Maintain a live Actions List and accompanying map outlining any corrective actions across the site requiring attention or action by the contractor;
- Confirm for the Project Contractor that pre-commencement requirements have been met to allow construction activities to commence;
- Highlight for the contractor, any abandonment triggers that are occurring and inform the contractor that works are to cease;
- Generate environmental reports as required to show environmental data trends and ensure environmental records are maintained throughout the construction period;
- Advise site management/contractor/sub-contractors on:

- Prevention of environmental pollution and improvement to existing working methods;
- Changes in legislation and legal requirements affecting the environment;
- Suitability and use of plant, equipment and materials to prevent pollution;
- Environmentally sound methods of working and systems to identify environmental hazards;
- Assist the contractor in coordinating the required inputs and site visits from the Project Ecologist or Project Hydrologist to support the ECoW role;
- Ensure immediate notification of any environmental incidents are issued to the Construction Manager and Project Developer;
- Support the investigation of incidents of significant, potential or actual environmental damage and ensure corrective actions are carried out, recommend means to prevent recurrence and communicate incident findings to relevant parties.
- Liaise with the Project Design Team and attend meetings to report on audit findings
- Support the contractor who will be responsible for providing toolbox talks and site induction content to ensure the requirements of the CEMP are delivered on site.
- The geotechnical design requirements of the Proposed Development are not within the remit of the ECoW.

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

4.1.3 Project Ecologist/Ornithologist

The Project Ecologist will be available to support the ECoW on matters relating to the protection of sensitive habitats and species encountered prior to or during the construction phase of the Proposed Development. The Project Ecologist will not be full time on site but will undertake pre-commencement surveys and visit the site as required. The responsibilities and duties of the Project Ecologist/Ornithologist will include the following:

- Undertake a pre-construction transect/walkover bird survey to ensure that significant effects on breeding birds will be avoided.
- Inform and educate on-site personnel of the ornithological and ecological sensitivities within the Proposed Development area.
- Oversee management of ornithological and ecological issues during the construction period and advise on ornithological issues as they arise.
- Provide guidance to contractors to ensure legal compliance with respect to protected species onsite.
- Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress.

4.1.4 Project Hydrologist

The Project Hydrologist is part of the design team that will prepare the detailed drainage design for the construction phase of the Proposed Development, but will also support the ECoW in monitoring, overseeing and auditing the effective implementation of the detailed drainage design by the Project Contractor. The Project Hydrologist will not be full time on site but will be required to visit as necessary to oversee the implementation of their drainage design.

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

- Preparation of detailed drainage design before construction commences;
- Input to the CEMP in respect of drainage design and water quality management

- Attend site to support ECoW and oversee and audit the effective implementation of the detailed drainage design.
- Complete ongoing inspection and monitoring of the development, particularly in areas of drainage control in support of the ECoW in monitoring the effectiveness of the drainage design as it is implemented on-site.

4.1.5 **Project Archaeologist**

The Project Archaeologist will report to the Environmental Manager and is responsible for archaeological monitoring of the site during the construction phase. This will include monitoring of site investigations and excavation works as well as the monitoring and metal detection of spoil during construction.

If new archaeological material is detected, during the pre-construction re-inspection, testing or monitoring, the project archaeologist will be responsible for ensuring they are preserved by record (archaeologically excavated) and therefore permanently removed with a full record made.

4.1.6 **Geotechnical Engineer/Civil Engineer**

The Geotechnical Engineer will report to the Construction Manager and is responsible for inspection and review of geotechnical aspects associated with construction of the Proposed Development. The Geotechnical Engineer will not be full time on site but will visit site at least once a month during the construction phase civil works and on a weekly basis during site preparation/groundworks.

The responsibilities and duties of the Geotechnical Engineer will include the following:

- Visit site regularly, or at least once a month during the construction phase, to complete geotechnical audits and reviews and report any issues to the Construction Manager;
- Ensuring that identified hazards are listed in the Geotechnical Risk Register and that these are subject to ongoing monitoring; and,
- Ongoing inspection and monitoring of the Proposed Development, particularly in temporary stockpile areas, through all phases of construction (including pre, during and post construction) and ensure construction is carried out as specified in the EIAR, NIS and in relevant planning conditions.

4.2 **Water Quality and Monitoring**

4.2.1 **Pre-Construction Baseline Monitoring**

Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of felling and construction at the site. The baseline monitoring programme will be subject to agreement with Westmeath 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 at designated locations as outlined in Figure 9-5 of the EIAR.

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

4.2.2 Construction Phase Monitoring

4.2.2.1 Daily Visual Inspections

An inspection and maintenance plan for the on-site drainage system will be prepared in advance of commencement of any works. Inspections will also be undertaken after tree felling. Daily visual inspections of drains and outfalls will also be performed during the construction period to ensure suspended solids are not entering streams and rivers on site, to identify any obstructions to channels and to allow appropriate maintenance of the drainage regime. Should the suspended solids levels measured during construction be higher than the existing levels, the source will be identified and additional mitigation measures implemented. Any excess build up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs should be undertaken for each primary watercourse, and specifically following heavy rainfall events (i.e. weekly, monthly and event based).

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

The following periodic inspection regime will be implemented:

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

4.2.2.2 Continuous Turbidity Monitoring

Turbidity monitors or sondes can be installed where required at locations surrounding the Proposed Development site. The sondes will provide continuous readings for turbidity levels in the watercourse.

This equipment will be supplemented by daily visual monitoring at their locations as outlined in the sections below.

4.2.2.3 Laboratory Analysis

Baseline laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken as per water monitoring programme for the Proposed Development. This will not be restricted to just these locations around the proposed renewable energy development site with further sampling points added as deemed necessary by the ECoW in consultation with the Project Hydrologist and Site Manager.

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs should be undertaken for each primary watercourse, and specifically following heavy rainfall events (i.e. weekly, monthly and event based).

4.2.2.4 Field Monitoring

Field chemistry measurements of unstable parameters, (pH, conductivity, temperature) will be taken at the surface water monitoring locations, as per water monitoring programme for the Proposed Development and each primary watercourse along the route. These analyses will be carried out by either the ECoW or the Project Hydrologist. In-situ field monitoring will also be completed after major rainfall events, i.e. after events of >25mm rainfall in any 24-hour period. The Project Hydrologist will monitor and advise on the readings collected by in-situ field monitoring.

4.2.2.5 Monitoring Parameters

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

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

4.2.3 Construction Phase Drainage Inspections & Maintenance

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

maintenance to ensure they continue to function effectively, and the Project Contractor is entirely responsible for this maintenance.

Regular inspections of all existing and installed drainage measures should be undertaken by the Project Contractor, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water within the system. The contractor will devise a system of recording the findings of these inspections. Any excess build-up of silt levels at check dams, the settlement ponds, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. For this reason, the drainage measures installed on-site should be inspected at least weekly by the contractor and maintained as required during the construction phase of the Proposed Development 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 on-site watercourses and water monitoring programme. Where it appears that additional drainage measures will be required to ensure the drainage system remains effective, the ECoW will notify the contractor, the developer and project design team including the Project Hydrologist. The ECoW's role in this regard does not replace the need for the weekly (at least) inspections of the drainage system's measures by the Project Contractor.

4.2.4 Surface Water Monitoring Reporting

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

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

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

4.3 Environmental Awareness and Training

4.3.1 Environmental Induction

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

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

4.3.2

Toolbox Talks

Toolbox talks would be held by the ECoW or Construction Manager at the commencement of each day, or at the commencement of new activities. The aims of the toolbox talks are to identify the specific work activities that are scheduled for that day or phase of work. In addition, the necessary work method statements and sub plans would be identified and discussed prior to the commencement of the day's activities. The toolbox talks will include training and awareness on topics including:

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

Site meetings would be held on a regular basis involving all site personnel. The objectives of site meetings is to discuss the coming weeks activities and identify the relevant work method statements and sub plans that will be relevant to that week's activities. Additionally, any non-compliance identified during the previous week would also be discussed with the aim to reduce the potential of the same non-compliance reoccurring.

During construction of the Proposed Development, all staff will be made aware of and adhere to the Health & Safety Authority's '*Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013*'. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan.

5.

EMERGENCY RESPONSE PLAN

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

5.1

Emergency Response Procedure

The Emergency Response Plan (ERP) is presented in this section of the CEMP. It provides details of procedures to be adopted in the event of an emergency. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. The ERP will require updating and submissions from the contractor/PSCS and suppliers as the Proposed Development 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 Proposed Development.

5.1.1

Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Construction Manager will lead the emergency response which makes him responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response are presented in Figure 5-1. In a situation where the Construction Manager is unavailable or incapable of coordinating the emergency response, the responsibility will be transferred to the next person in the chain of command outlined in Figure 5-1. This will be updated throughout the various stages of the Proposed Development.

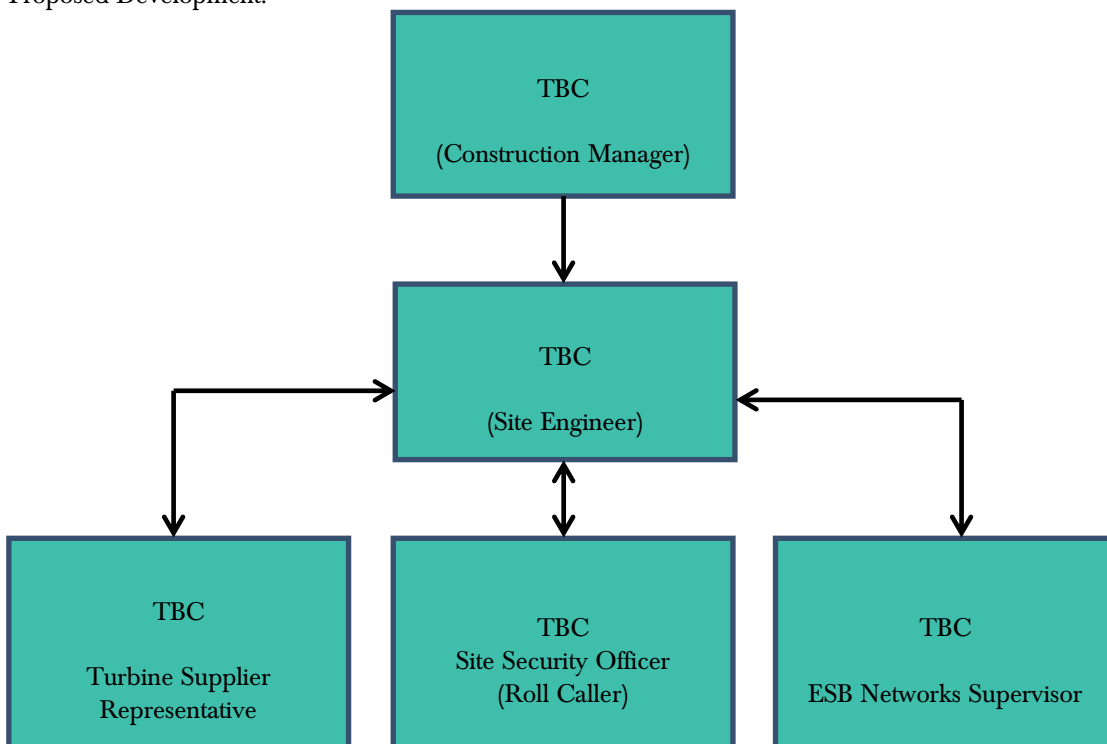


Figure 5-1 Emergency Response Procedure Chain of Command

5.1.2 Initial Steps

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

Table 5-1 Hazards associated with potential emergency situations

Hazard	Emergency Situation
Site Evacuation / Fire Drill	Injury to operative through exposure to fire
Excessive soil and overburden movement or excavation collapse	Injury to operative through engulfment in an excavation
Siltation of watercourses, Fuel Management and Spill Control	Run-off to a watercourse causing pollution

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

- 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 as 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 Construction Manager when all personnel have been accounted for. The Construction Manager will decide the next course of action, which be determined by the situation that exists at that time and will advise all personnel accordingly.

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

5.1.4 Spill Control Measures

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

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

The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident must be investigated in accordance with the following steps.

- The ECoW must be immediately notified.
- If necessary, the Construction Manager will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.
- The details of the incident will be recorded on an Environmental Incident Form which will provide information such as the cause, extent, actions and remedial measures used following the incident. The form will also include any recommendations made to avoid reoccurrence of the incident.
- If the incident has impacted on an ecologically sensitive receptor, such as a sensitive habitat, protected species or designated conservation site (pSPA or cSAC), the ECoW will liaise with the Project Ecologist.
- If the incident has impacted on a sensitive receptor such as an archaeological feature the ECoW will liaise with the Project Archaeologist.

A record of all environmental incidents will be kept on file by the ECoW and the Project Contractor. These records will be made available to the relevant authorities such as Westmeath County Council, Offaly County Council, IFI, NPWS, etc. if required. The ECoW will be responsible for any corrective actions required as a result of the incident e.g. an investigative report, formulation of alternative construction methods or environmental sampling, and will advise the Main Contractor as appropriate.

5.2 Contact 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, an emergency. The dispatcher or call-taker knows that and will try to move things along quickly, but under control.

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

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 Proposed Development 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
Doctor – Moate Medical Centre	090 648 1206
Hospital – Midland Regional Hospital - Mullingar	044 934 0221
ESB Emergency Services	1850 372 999

Contact	Telephone no.
Gas Networks Ireland Emergency	1850 20 50 50
Gardaí – Glasson Garda Station	090 648 5102
Health and Safety Co-ordinator - Health & Safety Services	TBC
Health and Safety Authority	1890 289 389
Inland Fisheries Ireland (IFI)	1890 347 424
Project Supervisor Construction Stage (PSCS): TBC	TBC
Project Supervisor Design Stage (PSDS): TBC	TBC
Client: Umma More Ltd.	021 7336034

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.

5.3 Induction Checklist

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

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

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

6.

MITIGATION PROPOSALS

All mitigation measures relating to the pre-commencement, construction and operational phases of the Proposed Development are set out in the various sections of the Environmental Impact Assessment Report (EIAR), NIS prepared as part of the planning application to An Bord Pleanála.

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

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

Table 6-1 Site Preparation and Mitigation Measures

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
EIAR Chapter 4 – Description of the Proposed Development					
<i>Pre-Commencement Phase</i>					
MM1	Environmental Management	EIAR Section 4	➤ All proposed activities on the site of the Proposed Development will be provided for in an environmental management plan. A Construction and Environmental Management Plan (CEMP) has been prepared for the Proposed Development and is included in Appendix 4-2 of this EIAR. The CEMP includes details of drainage, spoil management and waste management, and outlines clearly the mitigation measures and monitoring proposals that are required to be adhered to in order to comply with the environmental commitments outlined in the EIAR.		
MM2	Environmental Management	CEMP Section 4	➤ The Environmental Clerk of Works (ECOW) will be nominated by the Project Developer to oversee the Project Contractor's effective implementation of the Proposed Developments environmental requirements and obligations, as captured in the CEMP. The ECOW will be responsible for monitoring the works of the Project Contractor from an environmental perspective on behalf of the Project Developer. For the sake of expediency, the ECOW will report their ongoing audit findings, monitoring results and site observations to both the Project Developer and the Project Contractor, having been nominated by the developer to fulfil the role. ➤ The ECOW will also have to call upon the Project Ecologist, Project Hydrologist, or other members of the Project Developer's design team, as required, to oversee the contractor's works on-site.		
MM3	Environmental	CEMP Section	➤ The Project Developer will be required to engage a qualified Environmental Engineer, Environmental Scientist, or equivalent, with		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	Management	4	experience in wind farm construction to fulfil the role of Environmental Clerk of Works (ECoW) to oversee the construction works and audit the implementation of the CEMP. The ECoW will report to the Project Developer and Project Contractor but will liaise closely with the Construction Manager in relation to the Project Contractor's day-to-day implementation of the CEMP on site. ➤ The level, detail and frequency of reporting expected from the ECoW for the Construction Manager, Developer's Project Manager, and any Authorities or other Agencies, will be agreed by all parties prior to commencement of construction, and may be further adjusted as required during the course of the Proposed Development.		
MM4	Surface Water Quality	CEMP Section 4	➤ Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of felling and construction at the site. The baseline monitoring programme will be subject to agreement with Westmeath 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 at designated locations as outlined in Figure 9-5 of the EIAR. ➤ Baseline sampling will be completed on at least two occasions, and these should coincide with low flow and high flow stream conditions. The high flow sampling event will be undertaken after a period of sustained rainfall, and the low flow event will be undertaken after a dry spell.		
MM5	Concrete Deliveries	EIAR Section 4 CEMP Section 3	➤ The arrangements for concrete deliveries to the site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout of trucks and discussing emergency procedures.		
MM6	Waste	EIAR Section	➤ Prior to the commencement of the development, a Construction Waste Manager will be appointed by the Contractor. The Construction Waste		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	Management	4	Manager will be in charge of the implementation of the objectives of the plan, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to.		
MM7	Site Drainage Plan	EIAR Section 4 CEMP Section 4	➤ A detailed drainage design for the Proposed Development will be prepared prior to the commencement of construction to by the Project Hydrologist to incorporate these site drainage principles and carry forward into the construction phase of the Proposed Development. ➤ Prior to any works commencing on the upgrade of existing roads, the requirement for additional roadside drainage will be considered by the Project Hydrologist in line with the proposals outlined in Section 4 of the CEMP.		
MM8	Preparative Site Drainage Management,	CEMP Section 4	➤ The Project Hydrologist will complete a detailed drainage design and maintenance plan before construction commences and will attend the site to set out and assist with micro-siting of proposed drainage controls as outlined in Section 4.6 of the EIAR. ➤ An adequate quantity of straw bales, clean stone, terram, stakes, etc. will be kept on site at all times to implement the detailed drainage design measures as necessary. The detailed drainage measures will be installed prior to, or at the same time as the works they are intended to drain.		
MM9	Drainage Inspection	CEMP Section 3	➤ Prior to commencement of works in sub-catchments across the site, main drain inspections will be completed to ensure ditches and streams are free from debris and blockages that may impede drainage. It is proposed to complete these inspections on a catchment-by-catchment basis as the construction works develop across the site, as works in all areas will not commence simultaneously		
MM10	Watercourse Inspection	EIAR Section 4 CEMP Section	➤ Confirmatory inspections of the proposed new watercourse crossing location will be carried out by the Project Civil/Structural Engineer and the Project Hydrologist prior to the construction of the crossing.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		11			
MM11	Drainage Maintenance	EIAR Section 4 CEMP Section 4	➤ An inspection and maintenance plan for the drainage system onsite will be prepared in advance of commencement of any works on the Proposed Development. Regular inspections of all installed drainage features 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 ECoW or the supervising hydrologist.		
MM12	Earthworks	CEMP Section 2	➤ Drainage and associated pollution control measures will be implemented onsite before the main construction works commence. Where possible, drainage controls will be installed during seasonally dry ground conditions. This will reduce the possibility of impact on surface waters by suspended sediment released during construction and entrained in surface run-off.		
MM13	Felling	EIAR Section 4, 7	➤ Before the commencement of any felling works, an Environmental Clerk of Works (ECoW) shall be appointed to oversee the keyhole and extraction works. ➤ Pre-construction surveys will be undertaken prior to the initiation of works at the Wind Farm Site. If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the construction phase. If it is found to be active during the construction phase, no works shall be undertaken within a disturbance buffer in line with industry best practice (e.g. Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007). No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied. ➤ Prior to the commencement of felling works, review and agreement of the positioning by the Operator of the required Aquatic Buffer Zones (ABZs),		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			silt traps, silt fencing (see below), water crossings and onsite storage facilities for fuel, oil and chemicals will be carried out		
MM14	Felling Drainage Management	EIAR Section 4, 9	Prior to the commencement of tree felling for subsequent road construction the following key temporary drainage measures will be installed: ➤ All existing dry forestry drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using forestry check dams/silt traps; ➤ Clean water diversion drains will be installed upgradient of the works areas; ➤ Check dams/silt fence arrangements (silt traps) will be placed in all existing forestry drains that have surface water flows and also along existing forestry roadside drains; and, ➤ A double silt fence perimeter will be placed down-slope of works areas that are located inside the watercourse 50m buffer zone.		
MM15	Felling Licence	EIAR Section 4	➤ Felling will be carried out under the terms of a licence application to the Forest Service, as per the Forest Service's policy on granting felling licenses for wind farm developments.		
MM16	Traffic Management	EIAR Section 4, 14 CEMP Section 7	➤ Prior to the Traffic Management Plan being finalised, a full dry run of the transport operation along the potential routes will be completed using vehicles with attachments to simulate the dimensions of the wind turbine transportation vehicles. ➤ When the Grid Connection underground electrical cabling route is located on public roads, a traffic management plan will be prepared prior to any works commencing. A road opening licence will be obtained where required and all plant operators and general operatives will be inducted and informed as to the location of any services		
MM17	Spoil	EIAR Section	➤ Prior to the use of areas for spoil management an interceptor drain will first be excavated upslope in order to intercept existing overland flow and		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	Management	4 CEMP Section 2	divert it around the spoil management 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 spoil management area to surface water run-off and transfer it to a settlement pond prior to discharge via a buffered outfall and swale. ➤ Silt fences and double silt-fences will be emplaced down-gradient of spoil management areas and will remain in place throughout the entire construction phase, or until reseeded has been established to a sufficient level. ➤ All the recommendations/best practice guidelines for the placement of spoil in identified spoil management areas and alongside access roads will be confirmed by the Geotechnical Engineer prior to construction		
MM18	Grid Connection underground electrical cabling route trench excavation, and communications chambers/joint bay installation, and watercourse, culvert and drain crossings	EIAR Section 4	➤ The precise siting of all Joint Bays, Earth Sheath Link Chambers and Communication Chambers within the planning corridor assessed is subject to approval by ESB and Eirgrid. ➤ Before works commence, updated surveying will take place along the proposed cable route, with all existing culverts identified. All relevant bodies i.e. ESB, Westmeath County Council, Offaly County Council etc. will be contacted and all up to date drawings for all existing services sought.		
Construction Phase					
MM19	Refuelling	EIAR Section 4	➤ 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-axle custom-built refuelling trailer will be re-filled off site and will		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 4	be towed around the Wind Farm 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 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, spill kits and fuel absorbent mats will be available if necessary, during all refuelling operations. ➤ Fuels volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor; ➤ The plant used during construction will be regularly inspected for leaks and fitness for purpose; ➤ An emergency plan for the construction phase to deal with accidental spillages is contained within Section 5 of the CEMP. Spill kits will be available to deal with and accidental spillage in and outside the re-fuelling area.		
MM20	Plant and Equipment Inspections	CEMP Section 3	➤ A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the construction phase.		
MM21	Concrete Deliveries and Management	EIAR Section 4 CEMP Section	The risks of pollution arising from concrete deliveries will be further reduced by the following: ➤ No batching of wet-cement products will occur on the Wind Farm		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		3	Site/along the underground electrical cabling route works or near other ancillary construction activities. ➤ Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place; ➤ Where possible pre-cast elements for culverts and concrete works will be used; ➤ No washing out of any plant used in concrete transport or concreting operations will be allowed on-site; ➤ Where concrete is delivered on Site, only the chute will need to be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water is to be directed into a dedicated concrete wash out pit. Decommissioning of this pit will occur at the end of the construction phase and water and solids will be tanked and removed from the site to a suitable, non-polluting, discharge location; ➤ All concrete will be placed in shuttering and will not be in contact with soils or groundwater until after it has set; ➤ Use weather forecasting to plan dry days for pouring concrete; and, ➤ Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event. ➤ The arrangements for concrete deliveries to the site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout of trucks and discussing emergency procedures. ➤ Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place. Where possible pre-cast elements for culverts and concrete works will be used; ➤ The 50 m wide watercourse buffer zone and 10 m existing artificial drainage buffer will be in place for the duration of the construction phase. No construction activity will occur within the buffer zone with the exception of clear span crossing and culvert construction. The buffer zone		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			will: ➤ Prevent any cement-based products accidentally entrained in the construction phase drainage system entering directly into watercourses, achieved in part by ending drain discharge outside the 50 m buffer zone and allowing percolation across the vegetation of the buffer zone; ➤ Provide a buffer against accidental direct pollution of surface waters by any pollutants, or by pollutants entrained in surface water run-off.		
MM22	Road Cleanliness	EIAR Section 4 CEMP Section 3	➤ The site roads will be well finished with compacted hardcore, and so the public road-going vehicles will not be travelling over soft or muddy ground where they might pick up mud or dirt. ➤ A road sweeper will be available if any section of the public roads requires cleaning due to construction traffic associated with the Proposed Development.		
MM23	Watercourse Buffers	EIAR Section 4. CEMP Section 3	➤ There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows. All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses. Buffer zones around the existing natural drainage features have been used to inform the layout of the Proposed Development. ➤ Buffered outfalls which will be numerous over the site which will promote percolation of drainage waters across vegetation and close to the point at which the additional runoff is generated, rather than direct discharge to the existing drains of the site; and,		
MM24	Water Discharge	EIAR Section 4. CEMP Section 3	➤ There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows. All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses. ➤ Apart from interceptor drains, which will convey clean runoff water to the downstream drainage system there will be no direct discharge (without		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			treatment for sediment reduction, and attenuation for flow management) of runoff from the Wind Farm Site drainage into the existing site drainage network where possible. This will reduce the potential for any increased risk of downstream flooding or sediment transport/erosion ➤ Silt traps will be placed in the existing drains upgradient of where construction works / tree felling is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area;		
MM25	Wastewater Management	EIAR Section 4 CEMP Section 2	➤ The construction compound will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors. Temporary port-a-loo toilets and toilets located within a staff portacabin will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. There will also be a water supply on site for hygiene purposes, by way of a temporary storage tank.		
MM26	Drainage Swales	EIAR Section 4 CEMP Section 3	➤ Drainage swales will be installed downgradient of any works areas to collect surface flow runoff where it might have come into contact with exposed surfaces and picked up silt and sediment. Swales will intercept the potentially silt-laden water from the excavations and construction areas of the Site and prevent it reaching natural watercourses.		
MM27	Interceptor Drains	EIAR Section 4 CEMP Section	➤ Interceptor drains will be maintained up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		3			
MM28	Check Dams	EIAR Section 4 CEMP Section 3	➤ Check dams will be maintained at regular intervals along interceptor drains and swales/roadside drains in order to reduce flow velocities and therefore minimise erosion within the system during storm rainfall events;		
MM29	Level Spreaders,	EIAR Section 4 CEMP Section 3	➤ A level spreader will be constructed at the end of each interceptor drain to convert concentrated flows in the drain into diffuse sheet flow on areas of vegetated ground. The levels spreaders will be located downgradient of any proposed works areas in locations where they are not likely to contribute further to water ingress to construction areas of the site.		
MM30	Piped Slope Drains	EIAR Section 4 CEMP Section 3	➤ Piped slope drains will be used to convey surface runoff from diversion drains safely down slopes to flat areas without causing erosion. Once the runoff reaches the flat areas it will be reconverted to diffuse sheet flow. Level spreaders will only be established on slopes of less than 6% in grade. Piped slope drains will be used to transfer water away from areas where slopes are too steep to use level spreaders;		
MM31	Vegetation Filters	EIAR Section 4 CEMP Section 3	➤ Vegetation filters are the existing vegetated areas of land that will be used to accept surface water runoff from upgradient areas. The selection of suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions;		
MM32	Settlement Ponds	EIAR Section 4 CEMP Section 3	➤ Stilling ponds/settlement ponds, emplaced downstream of swales and roadside drains, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses. The stilling ponds will be sized according to the size of the		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			area they will be receiving water from but will be sufficiently large to accommodate peak flows storm events. Inspection and maintenance of all settlement ponds will be ongoing through the construction period.		
MM33	Dewatering Silt Bag	EIAR Section 4 CEMP Section 3	➤ Dewatering silt bags allow the flow of water through them while trapping any silt or sediment suspended in the water. The silt bags provide a passive non-mechanical method of removing any remaining silt contained in the potentially silt-laden water collected from works areas within the Site. ➤ Dewatering silt bags are an additional drainage measure that can be used downgradient of the stilling ponds at the end of the drainage swale channels and will be located, wherever it is deemed appropriate, throughout the Site. The water will flow, via a pipe, from the stilling ponds into the silt bag. The silt bag will allow the water to flow through the geotextile fabric and will trap any of the finer silt and sediment remaining in the water after it has gone through the previous drainage measures. The dewatering silt bags will ensure that there will be no loss of silt into the stream.		
MM34	Siltbuster	EIAR Section 4 CEMP Section 3	➤ Siltbusters or similar equivalent piece of equipment will be available to filter any water pumped out of excavation areas if necessary, prior to its discharge to stilling ponds or swales. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. They are specifically designed for use on construction sites.		
MM35	New Culverts/ Culvert Upgrades	EIAR Section 4	➤ All new proposed culverts and proposed culvert upgrades will be suitably sized for the expected peak flows in the watercourse. ➤ Some culverts may be installed to manage drainage waters from works areas of the Proposed Development, particularly where the waters have to be taken from one side of an existing roadway to the other for discharge. The size of culverts will be influenced by the depth of the track or road		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			sub-base. In some cases, two or more smaller diameter culverts may be used where this depth is limited, though this will be avoided as they will have a higher associated risk of blockage than a single, larger pipe. In all cases, culverts will be oversized to allow mammals to pass through the culvert. ➤ Culverts will be installed with a minimum internal gradient of 1% (1 in 100). Smaller culverts will have a smooth internal surface. Larger culverts may have corrugated surfaces which will trap silt and contribute to the stream ecosystem. Depending on the management of water on the downstream side of the culvert, large stone may be used to interrupt the flow of water. This will help dissipate its energy and help prevent problems of erosion. Smaller water crossings will simply consist of an appropriately sized pipe buried in the sub-base of the road at the necessary invert level to ensure ponding or pooling does not occur above or below the culvert and water can continue to flow as necessary.		
MM36	New Watercourse Crossing	EIAR Section 4 CEMP Section 2	➤ A foundation base will be excavated to rock or competent ground with a mechanical excavator with the foundation formed in-situ using a semi-dry concrete lean mix. The base will be excavated along the stream bank with no instream works required. ➤ Access to the opposite side of the watercourse for excavation and foundation installation will require the installation of a temporary pre-cast concrete or metal bridge pre-cast concrete slab across the watercourse to provide temporary access for the excavator. Plant and equipment will not be permitted to track across the watercourse. ➤ Once the foundation base has been completed, the pre-cast concrete box culvert will be installed using a crane which will be set up on the bank of the watercourse and will be lifted into place from the bank with no contact with the watercourse. ➤ The watercourse crossing will be constructed to the specifications of the		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			OPW bridge design guidelines 'Construction, Replacement or Alteration of Bridges and Culverts - A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945', and in consultation with Inland Fisheries Ireland. Abutments will be constructed from precast units combined with in-situ foundations, placed within an acceptable backfill material.		
MM37	Silt Fences	EIAR Section 4 CEMP Section 3	- Silt fences will be installed as an additional water protection measure around existing watercourses in certain locations, particularly where works are proposed within the 50-metre buffer zone of a stream or 100m buffer zone of a lake, which is inevitable where existing roads in proximity to watercourses are to be upgraded as part of the Proposed Development. These areas include around existing culverts, around the headwaters of watercourses, and the proposed locations are indicated on the drainage design drawings included in Appendix 4-3. - Silt fences will be installed as single, double or a series of triple silt fences, depending on the space available and the anticipated sediment loading. The silt fence designs follow the technical guidance document 'Control of Water Pollution from Linear Construction Projects' published by Construction Industry Research and Information Association (CIRIA, No. C648, 1996). Up to three silt fences may be deployed in series. - All silt fencing will be formed using Terrastop Premium or equivalent silt fence product. - Silt fences will be inspected regularly to ensure water is continuing to flow through the fabric, and the fence is not coming under strain from water backing up behind it.		
MM38	Sedimats	EIAR Section 4	Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM39	Oil Interceptors	EIAR Section 4 CEMP Section 4	➤ A limited amount of fuel will have to be stored on the Wind Farm Site and for the Grid Connection in appropriately bunded containers and a bunded area for oil storage will be constructed within the compound.		
MM40	Grid Connection underground electrical cabling route trench excavation, and communications chambers/joint bay installation, and watercourse, culvert and drain crossings	EIAR Section 4 CEMP Section 7	➤ Any underground services encountered along the cable route will be surveyed for level and the ducting will pass over the service provided adequate cover is available. ➤ A minimum clearance of 300 mm will be required between the bottom of the ducts and the service in question. ➤ If the clearance cannot be achieved the ducting will pass under the service and again 300 mm clearance between the top of the communications duct and bottom of the service will be achieved. ➤ In deeper excavations an additional layer of marker tape will be installed between the communications duct and top level yellow marker tape. ➤ If the required separation distances cannot be achieved then a number of alternative options are available such as using steel plates laid across the width of the trench and using 35N concrete surrounding the proposed ducting, with marker tape on the side of the trench. ➤ During construction the joint bay locations will be completely fenced off once they have been constructed they will be backfilled until cables are being installed ➤ The precise siting of all Joint Bays, Earth Sheath Link Chambers and Communication Chambers within the planning corridor assessed is subject to approval by ESBN and Eirgrid. ➤ The crossing methodologies employed at the other culvert and manmade drain crossings along the underground electrical cabling		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			route, will be selected from the suite of watercourse crossing options outlined below, as appropriate, depending on culvert type, depth, size and local ground conditions. ➤ The use of a natural, inert and biodegradable drilling fluid such as Clear Bore™ is intended to negate any adverse impacts arising from the use of other, traditional polymer-based drilling fluids and will be used sparingly as part of the drilling operations. It will be appropriately stored prior to use and deployed in the required amounts to avoid surplus. Should any excess drilling fluid accumulate in the reception or drilling pits, it will be contained and removed from the Site in the same manner as other subsoil materials associated with the drilling process to a licensed recovery facility. ➤ Backfilling of launch & reception pits will be conducted in accordance with the normal specification for backfilling excavated trenches. Sufficient controls and monitoring will be put in place during drilling to prevent frack-out, such as the installation of casing at entry points where reduced cover and bearing pressure exists. ➤ Inland Fisheries Ireland have published guidelines relating to construction works along water bodies entitled “Requirements for the Protection of Fisheries Habitats during Construction and Development Works at River Sites”, and these guidelines will be adhered to during the construction of the Proposed Development.		
MM41	Excavations	EIAR Section 4 CEMP Section 4	➤ The extent of the excavation will be marked out and will include an allowance for trimming the sides of the excavation to provide a safe working area and slope batter; ➤ Where practical, the soil will be stripped over the area of the excavation and stored locally for reuse, the subsoil will be excavated and stored to one side for reuse during the landscaping around the finished turbine; ➤ No material will be removed from site with excavated spoil being transported and stored in the identified spoil management areas within the Wind Farm		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Site. ➤ All groundwater and surface water arising from turbine base excavation will be pumped to the dirty water system prior to discharge from the works area; ➤ Soil excavation shall be observed by a qualified archaeologist in accordance with a scheme of archaeological monitoring to identify any significant remains as they come to light; ➤ The foundations excavation will be raised to formation level by compacted layers of well graded granular material will be spread and compacted to provide a hard area for the turbine foundation;		
MM42	Spoil Management	EIAR Section 4 CEMP Section 4	➤ The spoil management areas and placement of spoil alongside access roads have been selected based on the locations of spoil generation, areas suitable for spoil management and environmentally constrained areas such as identified site-specific flood modelled zones as detailed in Chapter 9: Water. ➤ Placement of spoil alongside access roads will consist of a 3m wide berm on either side of the road as appropriate. Spoil placement alongside access roads will take place outside of watercourse buffers and of the site-specific flood modelled zone within the Wind Farm Site (a 110m section of access road). ➤ At the identified spoil management areas, the vegetative top-soil layer will be removed to allow for spoil to be placed and upon reaching the recommended height, the vegetative topsoil layer will be reinstated. ➤ The identified spoil management areas will be developed in a phased approach, with the topsoil removed and temporarily stockpiled within the defined area while the spoil is being placed. The stockpiled topsoil will then be reinstated over the placed spoil, and the exercise will continue within the same spoil management area until the area is full. ➤ In the case of T04 where spoil management areas will be within areas of felled forestry, no topsoil will be excavated. The tree stumps will be left in-situ and the spoil will be placed on top of the existing ground		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			and finished with a layer of topsoil from within the site. ➤ The placement of spoil will be restricted to a maximum height of 1.0m, subject to confirmation by the Geotechnical Engineer. ➤ Where practical, it will be ensured that the surface of the placed spoil is shaped to allow efficient run-off of surface water. Where possible, shaping of the surface of the spoil will be carried out as placement of spoil within the area progresses. This will reduce the likelihood of debris run-off and ensure stability of the placed spoil. ➤ Finished/shaped side slopes of the placed spoil will be not greater than 1 (v): 2 (h) in the dedicated spoil management zones and not greater than 1 (v): 1 (h) alongside access tracks. ➤ Inspections of the spoil management areas will be made by a Geotechnical Engineer through regular monitoring of the works. The appointed contractor will review work practices at spoil management areas when periods of heavy rainfall are expected so as to prevent excessive dirty water runoff from being generated. ➤ An interceptor drain will be installed upslope of the identified spoil management areas to divert any surface water away from these areas. ➤ Silt fences and double silt-fences will be emplaced down-gradient of spoil management areas and will remain in place throughout the entire construction phase, or until reseedling has been established to a sufficient level. ➤ The surface of the deposited spoil will be profiled to a gradient to be agreed with the Geotechnical Engineer and vegetated or allowed to vegetate naturally as indicated by the Project Ecologist. ➤ All the above-mentioned general guidelines and requirements will be confirmed by the Geotechnical Engineer prior to construction. ➤ Prior to the use of areas for spoil management an interceptor drain will first be excavated upslope in order to intercept existing overland flow and divert it around the spoil management area prior to discharge via a buffer zone on the downslope side.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			➤ Drainage swales to intercept and collect drainage water from construction area will be provided on the downhill side of the spoil management 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 spoil management areas will be made by a geotechnical engineer through regular monitoring of the works. The appointed contractor will review work practices at spoil management areas when periods of heavy rainfall are expected so as to prevent excessive surface water runoff from being generated. ➤ The surface of the spoil management area will be profiled to a gradient to be agreed with the Geotechnical Engineer and vegetated or allowed to vegetate naturally as indicated by the Project Ecologist. Where there is a risk of inadvertent access into spoil management areas fencing will be provided.		
Operational Phase					
MM43	Wastewater Management	EIAR Section 4	The wastewater storage tank alarm will be part of a continuous stream of data from the Wind Farm Site's turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007(as amended), will be employed to transport wastewater away from the Wind Farm Site. The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. Full details of the proposed tank alarm system can be submitted to the Planning Authority in advance of any works commencing on-site. The wastewater storage tank alarm will be part of a continuous stream of data from the Wind Farm Site's turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			permits under the Waste Management (Collection Permit) Regulations, 2007(as amended), will be employed to transport wastewater away from the Wind Farm Site.		
MM44	Electrical Substation	EIAR Section 4, CEMP Section 7	➤ The electrical substation compound will be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor; ➤ Lightning poles will be erected at appropriate locations adjacent to the substation. All lightning poles will be appropriately earthed. ➤ Perimeter fencing will be erected around the substation and control buildings compound area.		
MM45	Surface water Flooding	EIAR Section 4 CEMP Section 2	➤ There is 110 metres of proposed access road within site-specific flood modelled 100-yr and 1000-yr zone within the Wind Farm Site. The new access tracks proposed on the Wind Farm Site are proposed to be founded on competent stratum and the track surface will be built up by at least 500mm above the flood modelled elevation of both the 100-yr and 1000-yr site-specific modelled flood events ➤ There is an existing field drain which will be culverted under the proposed access track. This culvert will provide a drainage outlet for flood water following a significant flood event. This will prevent any damming effect from the proposed access road within this section.		
			Decommissioning Phase		
MM46	Decommissioning	EIAR Section 4	The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will agreed with the competent authority at that time		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM47	Decommissioning	EIAR Section 4 DP Section 2	➤ Upon decommissioning of the Wind Farm Site, all above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. ➤ On removal of turbines, the covering of the foundation will be completed using locally sourced material imported to site as the required quantity of material does not currently exist at the site. The imported soil will be spread and graded over the foundation using a tracked excavator and revegetation enhanced by spreading of an appropriate seed mix to assist in revegetation. ➤ The underground electrical cabling connecting the turbines to the on-site substation will be removed from the cable ducts. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance. The cable materials will be transferred to a suitable recycling or recovery facility.		
MM48	Decommissioning	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,		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			➤ An emergency plan for the decommissioning phase to deal with accidental spillages will be developed (refer to DP Section 3). 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.		
Chapter 5: Human Beings					
Pre-Commencement Phase					
MM49	Human Health	EIAR Section 5	Prior to commencement of any works, the occupants of dwellings in the vicinity of the proposed works will be contacted and the scheduling of works will be identified in line with the engagement plan. Local access to properties will also be maintained throughout any construction works and local residents will also be supplied with the number of the works supervisor in order to ensure that disruption will be kept to a minimum.		
Construction Phase					
MM50	Human Health	EIAR Section 5	The Proposed Development will be constructed, operated and decommissioned in accordance with all relevant Health and Safety Legislation, including: ➤ Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005); ➤ Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2016 (S.I. No. 36 of 2016); ➤ S.I. No. 528/2021 - Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021 and ➤ Safety, Health and Welfare at Work (Work at Height) Regulations 2006 (S.I. No. 318 of 2006).		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			A Health and Safety Plan covering all aspects of the construction process will address the Health and Safety requirements in detail. Fencing will be erected in areas of the Site where uncontrolled access is not permitted. Appropriate health and safety signage will also be erected on this fencing and at locations around the Site. Health and safety guidelines for working within and around electrical substations and overhead lines will be adhered to on site.		
MM51	Human Health	EIAR Section 5, 11	➤ Keep local residents informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern; ➤ Ensure that any extraordinary site work occurring outside of the core working hours (for example, crane operations lifting components onto the tower) will be programmed, when appropriate, so that haulage vehicles would not arrive at or leave the site between 19:00 and 05:00, with the exception of abnormal loads that would be scheduled to avoid anticipated periods of high traffic flows; ➤ All vehicles and mechanical plant will be fitted with effective exhaust silencers and be subject to programmed maintenance; ➤ Select inherently quiet plant where appropriate - all major compressors would be 'sound reduced' models fitted with properly lined and sealed acoustic covers, which would be kept closed whenever the machines are in use; ➤ All ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers; ➤ Machines will be shut down between work periods (or when not in use) or throttled down to a minimum; ➤ Regularly maintain all equipment used on site, including		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			maintenance related to noise emissions; ➤ Vehicles will be loaded carefully to ensure minimal drop heights so as to minimise noise during this operation; and ➤ All ancillary plant such as generators and pumps will be positioned so as to cause minimum noise disturbance and if necessary, temporary acoustic screens or enclosures will be provided. Where the BS5228 threshold levels are anticipated to be exceeded due to directional drilling activities along the underground electrical cabling route, the following are examples of measures that will be considered, where necessary, to mitigate noise emissions from these activities are as follows: ➤ Temporary boarding alongside the drilling rig or use of ‘acoustic blanket panels’ to hang from heras fencing or similar. Installation will be as close to the drilling rig as is practicable and fitted so as to interrupt any direct line of site between the drilling rig and the closest residential receptors. ➤ Examples of appropriate products include Echo Noise Defender and Soundex DeciBloc. It is anticipated that this will be required should directional drilling be used for water crossings 3, 7 and 11, which are in close proximity to sensitive receptors.		
MM54	Human Health	EIAR Section 5, 10	In periods of extended dry weather, dust suppression may be necessary, and along haul roads to ensure dust does not cause a nuisance. 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 construction 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.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Operational Phase					
MM55	Human Health	EIAR Section 5	The build-up of ice on turbines is unlikely to present problems. The wind turbines will be fitted with anti-vibration sensors, which will detect any imbalance caused by icing of the blades. The sensors will cause the turbine to wait until the blades have been de-iced prior to beginning operation. Lightning conduction cables, encased in protection conduits, will follow the electrical cable run, from the nacelle to the base of the turbine. The conduction cables will be earthed adjacent to the turbine base. The earthing system will be installed during the construction of the turbine foundations Access to the turbines is through a door at the base of the structure, which will be locked at all times outside maintenance visits. 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.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			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.		
MM56	Shadow Flicker	EIAR Section 5	Where daily or annual shadow flicker exceedances are predicted at any inhabitable or 3rd party dwelling, a site visit will be undertaken firstly to determine the existing screening and window orientation. This will determine if the receptor has an actual line of sight to any turbine. Once this is completed and all of the potential receptors identified, the following measures will be employed; Screening Measures In the event of an occurrence of shadow flicker exceeding guideline threshold values of 30 minutes per day at residential receptor locations, mitigation options will be discussed with the affected homeowner, including: ➤ Installation of appropriate window blinds in the affected rooms of the residence; ➤ Planting of screening vegetation; ➤ Other site-specific measures which might be agreeable to the affected party and may lead to the desired mitigation. If agreement can be reached with the homeowner, then it would be arranged for the required mitigation to be implemented in cooperation with the affected party as soon as practically possible and for the full costs to be borne by the wind farm operator. Wind Turbine Control Measures If it is not possible to mitigate any identified shadow flicker limit exceedance locally		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			using the measures detailed above, wind turbine control measures will be implemented. Wind turbines can be fitted with shadow flicker control units to allow the turbines to be controlled to prevent the occurrence of shadow flicker at properties surrounding the wind farm. The shadow flicker control units will be added to any required turbines. A shadow flicker control unit allows a wind turbine to be programmed and controlled using the wind farm's SCADA control system to change a particular turbine's operating mode during certain conditions or times, or even turn the turbine off if necessary.		
Chapter 6: Biodiversity					
Pre-Commencement Phase					
MM57	Invasive Species Management	EIAR Section 6 CEMP Section 3	A baseline invasive species survey will be carried out at the site to identify the presence and location of any invasive species (listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) by a suitably qualified ecologist.		
MM58	Fauna	EIAR Section 6	Otter: ➤ As otter are known to occur within watercourses within the Wind Farm Site, and likely also those crossed by the Grid Connection, taking the precautionary principal, a pre-commencement otter survey will be undertaken upstream and downstream of all proposed watercourse crossings/culvert upgrades within the Wind Farm Site and watercourse crossings along the Grid Connection Underground Cabling Route.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			➤ From a precautionary basis, a pre-commencement otter survey will be undertaken in accordance with standard best practice guidance prior to the commencement of site works. In the unlikely event that an otter holt is identified within or immediately adjacent to the Proposed Development footprint, consultation will be undertaken with the National Parks and Wildlife Service and a derogation licence applied for. ➤ All conditions of a derogation licence will be implemented in full. ➤ No works should be undertaken within 150m of any holts at which breeding females or cubs are present. ➤ No wheeled or tracked vehicles (of any kind) should be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance should also not take place within 15m of such holts, except under licence (TII, 2006¹). Badger: In order to fully assess the potential for disturbance related effects on badgers during construction, especially given the time that can elapse between the original surveys and any future planning consent and construction, a pre-construction badger survey will be carried out in order to assess activity levels at setts and to identify any additional sett entrances that may have been excavated in the intervening period. Any active setts recorded within 50m of the Proposed Development footprint and will subsequently be monitored for a minimum period of 2 weeks using remote cameras in order to ascertain use by badgers and levels of activity, and to assess the requirement for specific mitigation measures to limit disturbance. All badger survey work will be undertaken in line with current best		

¹ NRA, 2006. *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes*. Dublin: Transport Infrastructure Ireland. Available at: www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Otters-prior-to-the-Construction-of-National-Road-Schemes.pdf

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			practice guidance². Should any setts within 50m of the Proposed Development be found to be in active use by badgers during the pre-construction badger monitoring, it would be necessary to ensure that the risk of disturbance to badgers is mitigated appropriately. Any badger mitigation required would be undertaken following published best practice guidelines for the treatment of badgers (NRW, 2009) and in consultation with NPWS. Any setts that could potentially be subject to direct impacts would be excluded and closed in consultation with NPWS, and wherever possible subsequently re-opened following completion of construction to allow badgers to recolonise them. If any works within 50m of an active sett are to take place during the badger breeding season (i.e. July 1st – November 30th) temporary exclusion of these setts during the construction phase would be required prior to the breeding season commencing. The setts would be excluded and closed in consultation with NPWS, and subsequently re-opened following completion of construction to allow badgers to recolonise them. Taking a precautionary approach, the following measures will be undertaken for the avoidance of disturbance/displacement and will be implemented during the construction phase of the Proposed Development to avoid heavy machinery access or materials storage in close proximity to the identified badger sett within the forestry that occurs within 30 metres of the proposed forestry felling: ➤ Exclusion zone fencing and appropriate signage will be put in place to prevent any activity that could directly impact the sett. Pine Marten: In order to fully assess the potential for disturbance related effects on pine marten at		

² National Roads Authority (2006) *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*.

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			the time of construction, especially given the time that can elapse between the original surveys and any future planning consent and construction, a pre-construction mammal survey will be carried out in order to assess activity levels at the den location used by the species during 2020, and to identify any additional dens within the Site that may have been created or become occupied in the intervening period. Any active dens recorded within 100m of the Proposed Development will subsequently be monitored for a minimum period of 2 weeks using remote cameras in order to ascertain use by pine marten and levels of activity, and to assess the requirement for additional mitigation measures. All survey work will be undertaken in line with current best practice guidance³. Should any active pine marten dens within 30m of the Proposed Development footprint (or breeding dens within 100m), including felling buffers, be found to be in active use by the animals during the pre-construction monitoring, it would be necessary to ensure that the risk of direct mortality and disturbance to pine marten is mitigated appropriately. Any pine marten mitigation required would be undertaken following published best practice guidelines and in consultation, and where required under licence from, NPWS. Where any breeding is found to be occurring at dens that could potentially be directly or indirectly affected, no works within 100m will be carried during the breeding season (March – June inclusive), and monitoring with camera traps will be required to ensure until all animals have left the den following breeding prior to any commencement of works within 100m of a breeding den. A derogation licence would be required for any works that could potentially cause disturbance to an occupied pine marten den.		
MM59	Bats	Appendix 6-2	NatureScot recommends that a distance of 50m between turbine blade tip and		

³ National Roads Authority (2006) *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*.

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			nearest woodland (or other key habitat features) is adequate mitigation. This 50m buffer will be implemented from the outset and monitored as per the post construction monitoring. As such, the trees with potential roosting features have been considered as a “roost resource” and compensation will be provided to cover for the loss of the resource. The following procedures are proposed prior to felling trees with PRFs: ➤ A bat derogation licence will be obtained from the NPWS for the loss of the roost resource, prior to felling, and the felling activity will be supervised by a qualified ecologist. ➤ Tree-felling of mature deciduous trees will be carried out according to the following standard mitigating procedures: ○ Trees with suitable potential roost features proposed for felling will be checked for bats by a suitably qualified arborist at the time of felling. ○ Trees will be nudged two or three times prior to limb removal, with a pause of 30 seconds in between, to allow bats to wake and move. ○ Rigged felling shall be used to lower the limbs and trunk carefully to ground level and cavities searched by a qualified ecologist. ○ Felled trees will be left in-situ for a minimum of 24 hours prior to sawing or mulching, to allow any bats present to escape (National Roads Authority, 2006). ○ Any tree felling will be undertaken outside the bat maternity season (May-August) and the hibernation period (December-February) (Marnell, Kelleher and Mullen, 2022). Where the potential for indirect effects (i.e. disturbance) on bats potentially roosting within watercourse, drain and culvert crossing infrastructure has been identified, the following mitigating procedures are proposed:		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			○ An inspection survey will be carried out prior to the commencement of the works to ensure no bats are roosting within the infrastructure. ○ If the inspection survey cannot provide sufficient data to exclude the presence of a roost (i.e. due to lack of access), an activity survey will also be conducted prior to commencement. ○ Where evidence of bats is identified during the above pre-commencement surveys, a Derogation Licence will be required from NPWS for the continuation of the works. ○ The works will be carried out outside the maternity (May-August) and hibernation (November-March) seasons to avoid the potential for disturbance on bats during sensitive periods of their lifecycle.		
Construction Phase					
MM60	Bats	EIAR Section 6 Appendix 6-2	➤ 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). ➤ Where lighting is required, directional lighting will be used to prevent overspill on to woodland/forestry edges. Exterior lighting, during construction (and post construction), shall be designed to minimize light spillage, thus reducing the effect on areas outside the Proposed Development, and consequently on bats i.e. Lighting will be directed away from mature trees/treelines around the periphery of the Wind Farm Site boundary to minimize disturbance to bats. Directional accessories can be used to direct light away from these features, e.g. through the use of light shields (Stone, 2013). The luminaries will be of		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			the type that prevent upward spillage of light and minimize horizontal spillage away from the intended lands. ➤ The proposed lighting around the site shall be designed in accordance with the Institute of Lighting Professionals Guidance Note 08/18 Bats and artificial lighting in the UK.		
MM61	Aquatic Habitats	EIAR Section 6	➤ A detailed drainage maintenance plan for the Proposed Development is provided in Chapter 4, Section 4.6.7 of this EIAR with additional drainage details described in Section 4.6 generally. ➤ In addition to this, specific mitigation is provided in relation to water quality in Chapter 9: 'Water' of this EIAR, see Section 9.5. This provides specific mitigation for the proposed works including mitigation by avoidance, mitigation by design, tree felling, water treatment measures and surface water quality monitoring. ➤ The upgrade of existing access tracks and construction of new tracks will involve some works within 50m of watercourses and new watercourse crossings. However, no instream works are proposed to natural watercourses, and a suite of measures are in place to avoid any adverse effects on watercourses		
MM62	Hedgerow and Treelines	EIAR Section 6	It is proposed to plant 3,350m of new hedgerow habitat to offset this potential loss and to provide additional habitat connectivity within the Wind Farm Site Overall, the proposed replanting will result in a net gain of approximately 1,012m in the linear landscape features within the Wind Farm Site. Planting will be of species indigenous to the local area.		
MM63	Aquatic Fauna	CEMP Section 2	In relation to new watercourse crossings, Inland Fisheries Ireland (IFI) will be consulted a minimum of four weeks in advance of the installation of pre-cast concrete bottomless box culverts. The Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries During		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Construction Works in and Adjacent to Waters; and the Scottish Natural Heritage (SNH) Good Practice During Wind Farm Construction (SNH, 2019, 4th Edition) will also be adhered to. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses (any deviation from this will be done in discussion with the IFI).		
MM64	Invasive Species	EIAR Section 6 CEMP Section 3	The following measures are proposed to establish good site hygiene to ensure the control of any potential spread of invasive species during construction works, if they are identified prior to the commencement of the construction phase: ➤ A risk assessment and method statement must be provided by the Contractor prior to commencing works. ➤ Fences will be erected around areas of infestation, as confirmed by test pits, and warning signs shall be erected. ➤ A designated wash-down area will be created, where power-washed material from machinery can be contained, collected and disposed of with other contaminated material. This area will contain a washable membrane or hard surface. ➤ Stockpile areas will be chosen to minimise movement of contaminated soil. ➤ Stockpiles will be marked and isolated. ➤ Contaminated areas which will not be excavated will be protected by a root barrier membrane if they are likely to be disturbed by machinery. Root barrier membranes will be protected by a layer of sand above and below and topped with a layer of hardcore. ➤ The use of vehicles with caterpillar tracks within contaminated areas will be avoided to minimise the risk of spreading contaminated material. ➤ An ECoW/suitably qualified ecologist will be on site to monitor and oversee the implementation of invasive species management plans. ➤ Plant and equipment which is operated within an area for the		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			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.		
Operational Phase					
MM65	Bats	EIAR Section 6 Appendix 6-2	In order to reduce the value of the habitat for bat species in the areas surrounding the turbines, a buffer of at least 50m between the tip of the blade and any trees or other tall vegetation that could provide high quality foraging habitat for bat species will be implemented. A full description of the mitigation measures proposed during operational phase are described in section 6.1 of the Bat report. Details of this mitigation and how it is calculated is provided in Appendix 6-2. 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		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			(NIEA, 2021). Bat Mitigation and Monitoring Plan Full details of the proposed operational bat monitoring programme for the Proposed Development are provided in Section 6.2.1 of the Bat Report (Appendix 6-2) ➤ The post-construction surveys will be carried out as per the pre-construction survey effort. Post-construction monitoring will include static detector surveys, walked survey transects and corpse searching to record any bat fatalities resulting from collision. ➤ Static monitoring shall take place at each turbine during the bat activity season (between April and October) (NatureScot, 2021, NIEA, 2021). ➤ Carcass searches, to monitor and record bat fatalities, shall be conducted at each turbine in accordance with NIEA Guidance. This shall include searcher efficiency trials and an assessment of scavenger removal rates to determine the appropriate correction factor to be applied in relation to determining an accurate estimate of collision mortality. Monitoring surveys shall continue in Year 2 and 3, and where a curtailment requirement has been identified, the success of the curtailment strategy shall be assessed in line with the baseline data collected in the preceding year(s).		
Decommissioning Phase					

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM66	Decommissioning	EIAR Section 6	The same mitigation to prevent significant impacts on water quality and associated aquatic fauna and other terrestrial fauna during construction will be applicable to the decommissioning phase.		
EIAR Chapter 7 Birds					
Pre-Commencement Phase					
MM67	Birds	EIAR Section 7	Pre-construction surveys will be undertaken prior to the initiation of works at the Wind Farm Site. The survey will include a thorough walkover survey to a 500m radius of the Proposed Development footprint and all works areas, where access allows. If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the construction phase.		
Construction Phase					
MM68	Birds	EIAR Section 7	If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the construction phase. If it is found to be active during the construction phase, no works shall be undertaken within a disturbance buffer in line with industry best practice (e.g. Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007). No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM69	Birds	EIAR Section 7	➤ Works will commence outside the bird nesting season (1st of March to 31st of August inclusive). Any requirement for construction works to run into the subsequent breeding season following commencement will be informed by pre-construction bird surveys. ➤ The removal of woody vegetation will be undertaken in full compliance with Section 40 of the Wildlife Acts 1976 – 2022. Where sections of woody vegetation are removed for the purposes of the junction and road upgrades, these will be replaced with suitable hedge/tree species which are common in the local context. ➤ During the construction phase, noise limits, noise control measures, hours of operation (i.e. dusk and dawn is high faunal activity time) and selection of plant items will be considered in relation to disturbance of birds. All plant and equipment for use will comply with the European Communities (Noise Emission By Equipment For Use Outdoors) Regulations, 2001, as amended (SI 632/2001). Plant machinery will also be turned off when not in use. ➤ Silt fences will be installed as an additional water protection measure around existing watercourses. ➤ If bird breeding activity of species of conservation concern are identified during the works, the nest sites will be located, and no works shall be undertaken within 500m buffer in line with industry best practice. ➤ An Environmental Clerk of Works and Project Ecologist will be appointed. Duties will include: ○ Organise the undertaking of a pre-construction walkover bird survey to ensure that significant effects on birds will be avoided. ○ Inform and educate on-site personnel of the ornithological and ecological sensitivities within the Wind Farm Site. ○ Oversee management of ornithological issues during the construction period and advise on ornithological issues as they		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			arise. ○ Provide guidance to contractors to ensure legal compliance with respect to protected species onsite. ○ Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress as necessary.		
Decommissioning Phase					
MM70	Birds	EIAR Section 7	During the decommissioning phase, disturbance limitation measures will be as per the construction phase.		
EIAR Chapter 8 Land Soils & Geology					
Construction Phase					
MM71	Earthworks	EIAR Section 8	➤ Mitigation by Design: ➤ The soils and subsoil which will be removed during the construction of turbine hardstands will be localised to the turbine locations. The soil/subsoil will be placed/spread locally alongside the excavations or accommodated within the spoil management areas; ➤ Excavated soils/subsoils shall be excavated and stored separately to topsoil; this will prevent mixing of materials and facilitate reuse afterwards; ➤ All materials which require storage will be stockpiled at low angles (< 5-10°) to ensure their stability and secured using silt fencing where necessary. This will help to mitigate erosion and unnecessary additions of suspended solids to the drainage system;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			➤ Spoil will be deposited, in layers of 0.50m and will not exceed a total thickness of 1m; ➤ No turbines or related infrastructure will be constructed in any designated sites such as NHAs or SACs; ➤ Placement of internal cable trenching will also be volume neutral, and all excess material will be managed locally and, ➤ Excess spoil from the underground electrical cabling route works will be placed within the spoil management areas within the Wind Farm Site or disposed at an off site licenced facility.		
MM72	Contamination of Soils	EIAR Section 8	➤ Where possible maintenance of construction vehicles or plant will take place off-site. This applies to both at the Wind Farm Site and the Grid Connection. Minimal maintenance of construction vehicles or plant will take place on-site; ➤ On-site re-fuelling will be undertaken using a double skinned bowser with spill kits on the ready for any minor accidental leakages or spillages; ➤ Fuels stored on Site will be minimised but will be appropriately banded; ➤ All waste tar and chip material arising during construction of the underground electrical cabling route will be removed off-site and taken to an appropriately licenced facility; ➤ The plant used during construction will be regularly inspected for leaks and fitness for purpose; and, ➤ An emergency plan for the construction phase to deal with accidental spillages will be contained within the Construction Environmental Management Plan (CEMP) Appendix 4-2 of this EIAR. Spill kits will be available to deal with accidental spillage in and outside of re-fuelling areas.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM73	Erosion of soils	EIAR Section 8	➤ Soil/subsoil removed from the Wind Farm Site infrastructure footprint will be used for landscaping, or accommodated in the identified spoil management areas within the Wind Farm Site. ➤ Temporary drainage systems will limit runoff impacts during the construction phase. ➤ In forestry areas (near T4) brash mats will be used to support vehicles on soft ground, reducing soil erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. ➤ Soil/subsoil removed from the underground electrical cabling route trench will be transported to the on-site spoil management areas or to a local licenced facility. ➤ Temporary drainage systems will limit runoff impacts during the construction phase. ➤ The underground electrical cabling route will be constructed in a stepwise manner along its length. This will minimise the time any particular section of the underground electrical cabling route trench is open before being reinstated.		
Operational Phase					
MM74	Soils and Geology	EIAR Section 8	Mitigation measures for soils and geology during the operational stage of the Proposed Development include the use of aggregate from authorised quarries for use in road and hardstand maintenance. Oil used in transformers (at the substation and within each turbine) and storage of oils in tanks at the substation will be bunded capable of holding 110% of the oil in the transformer and storage tanks. Turbine transformers are located within the turbines, so any leaks would be contained. These mitigation measures are considered sufficient to reduce risk to		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			soil/soils and subsoils, and groundwater and surface water quality.		
Decommissioning Phase					
MM75	Decommissioning Phase	EIAR Section 8	Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant. Some of the effects associated with reinstatement of the Wind Farm Site (excavation of turbine bases, access tracks etc.) will be avoided by leaving these in place. The bases will be rehabilitated by covering with local topsoil in order to regenerate vegetation which will reduce runoff and sedimentation effects. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures		
EIAR Chapter 9 Water					
Pre-Commencement Phase					
MM76	Earthworks	EIAR Section 9	Mitigation by Avoidance: The key mitigation measure during the construction phase is the avoidance of sensitive aquatic areas where possible, by application of suitable buffer zones (i.e. 50m to main watercourses, and 10m to main drains). The large setback distance from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures (discussed below) to be properly installed and operate effectively. The proposed buffer zone will: ➤ Avoid physical damage to watercourses, and associated release of sediment; ➤ Avoid excavations within close proximity to surface watercourses; ➤ Avoid the entry of suspended sediment from earthworks into watercourses; and, ➤ Avoid the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone; Timing of Site Construction Works: Construction of the Wind Farm Site drainage system will only be carried out during periods of low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. Construction of the drainage system during this period will also ensure that attenuation features associated with the drainage system will be in place and operational for all subsequent construction works.		
Construction Phase					
MM77	Earthworks	EIAR Section 9	The key mitigation measure during the construction phase is the avoidance of sensitive aquatic areas where possible, by application of suitable buffer zones (i.e. 50m to main watercourses, and 10m to main drains). Spoil management areas for removed soil/subsoil will be localised to spoil management areas outside of these buffer zones and will be designed and constructed with the minimal amount of surface area exposed. In these spoil management areas, the vegetative top-soil layer will be removed and re-instated or reseeded directly after construction, allowing for re-vegetation which will mitigate against erosion. Additional control measures, which are outlined further on in this section, will be undertaken at the proposed watercourse and drain crossing locations. More than 95% of the underground electrical cabling connection route is >50m from any nearby watercourse, sections within 50m of the route are confined to existing watercourse crossings at bridges. It is proposed to limit any works in any areas located within 50m of any watercourse/waterbody including the stockpiling of excavated soils and subsoils.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			No in-stream works are required at any of these crossings, however due to the proximity of the streams to the construction work at the crossing locations, there is a potential for surface water quality impacts during trench excavation work. Mitigation measures are outlined below. A constraint/buffer zone will be maintained for all crossing locations where possible. In addition, measures which are outlined below will be implemented to ensure that silt laden or contaminated surface water runoff from the excavation work does not discharge directly to the watercourse. Water Treatment Train: If the discharge water from construction areas fails to be of a high quality, then a filtration treatment system (such as a 'siltbuster' or similar equivalent treatment train (sequence of water treatment processes) will be used to filter and treat all surface discharge water collected in the dirty water drainage system. This will apply for all of the construction phase. Silt Fences: Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to watercourses of sand and gravel sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase. Double silt fences will be emplaced within drains down-gradient of all construction areas inside the hydrological buffer zones. Silt Bags: Silt bags will be used where small to medium volumes of water need to be pumped		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			from excavations. As water is pumped through the bag, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with natural vegetation filters. Management of Runoff from Spoil Management Areas: It is proposed that excavated soil will be used for landscaping where required. During the initial construction of roads, silt fences, straw bales and biodegradable geogrids will be used to control surface water runoff from works areas. Where applicable, the vegetative top-soil layer of the spoil management areas will be rolled back to facilitate placement of excavated spoil up to a maximum height of 1.0 metres, following which the vegetative-top soils layer will be reinstated. Where reinstatement is not possible, spoil management areas will be sealed with a digger bucket and seeded as soon possible to reduce sediment entrainment in runoff. Management of Runoff from underground electrical cabling route and existing and proposed access roads: Where construction is undertaken along sections of the underground electrical cabling connection route, proposed access road or existing roads requiring upgrade, the drainage management infrastructure (as outlined above) will be in place to manage and control runoff from the trench excavation area. Where the internal electrical cable trench is to be constructed off-road (within the Wind Farm Site) or for the Grid Connection underground electrical cabling route along public roads, surface water control measures such as silt fences will be employed when work is required within hydrological buffer zones.		
MM78	Tree Felling	EIAR Section 9	Mitigation by Avoidance: There is a requirement in the Forest Service Code of Practice and in the FSC		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Certification Standard for the installation of buffer zones adjacent to aquatic zones. Minimum buffer zone widths recommended in the Forest Service (2000) guidance document “Forestry and Water Quality Guidelines” Mitigation by Design: Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses comprise best practice methods which are set out as follows: ➤ Machine combinations will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance; ➤ Checking and maintenance of roads and culverts will be on-going through any felling operation. No tracking of vehicle through watercourses will occur, as vehicles will use road infrastructure and existing watercourse crossing points. Where possible, existing drains will not be disturbed during felling works; ➤ Ditches which drain from the proposed area to be felled towards existing surface watercourses will be blocked, and temporary silt traps will be constructed. No direct discharge of such ditches to watercourses will occur. Drains and sediment traps will be installed during ground preparation. Collector drains will be excavated at an acute angle to the contour (~0.3%-3% gradient), to minimise flow velocities; ➤ Sediment traps will be sited in drains downstream of felling areas. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of in the spoil management areas. Where possible, all new silt traps will be constructed on even ground and not on sloping ground; ➤ In areas particularly sensitive to erosion, it may be necessary to install double or triple sediment traps. This measure will be reviewed on site		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			during construction; ➤ All drainage channels will taper out before entering the aquatic buffer zone. This ensures that discharged water gently fans out over the buffer zone before entering the aquatic zone, with sediment filtered out from the flow by ground vegetation within the zone. On erodible soils, silt traps will be installed at the end of the drainage channels, to the outside of the buffer zone; ➤ Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Correct drain alignment, spacing and depth will ensure that erosion and sediment build-up are minimized and controlled; ➤ Brash mats will be used to support vehicles on soft ground, reducing mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal should take place when they become heavily used and worn. Provision should be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction should be suspended during periods of high rainfall; ➤ Timber will be stacked in dry areas, and outside a local 50m watercourse buffer. Straw bales and check dams to be emplaced on the down gradient side of timber storage/processing sites; ➤ Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water run-off; ➤ Checking and maintenance of roads and culverts will be on-going through the felling operation; ➤ Any diesel or fuel oils stored at the temporary site compounds will be bunded. The bund capacity will be sufficient to contain 110% of the storage tank's maximum capacity; ➤ Refuelling or maintenance of machinery will not occur within 100m		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required; and, - Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but care will be taken to avoid removing natural debris deflectors. Drain Inspection and Maintenance: The following items shall be carried out during inspection pre-felling and after: - Communication with tree felling operatives in advance to determine whether any areas have been reported where there is unusual water logging or bogging of machines; - Inspection of all areas reported as having unusual ground conditions; - Inspection of main drainage ditches and outfalls. During pre-felling inspection, the main drainage ditches shall be identified. Ideally the pre-felling inspection shall be carried out during rainfall; - Following tree felling all main drains shall be inspected to ensure that they are functioning; - Extraction tracks near drains need to be broken up and diversion channels created to ensure that water in the tracks spreads out over the adjoining ground; - Culverts on drains exiting the site will be unblocked; and, - All accumulated silt will be removed from drains and culverts, and silt traps, and this removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM79	Site Drainage Management	EIAR Section 9 CEMP Section 3	Pre-emptive Site Drainage Management: The works programme for the initial construction stage of the Proposed Development will also take account of weather forecasts, and predicted rainfall in particular. Large excavations and movements of soil/subsoil or vegetation stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast. The following forecasting systems are available and will be used on a daily basis at the site to direct proposed construction activities: ➤ General Forecasts: Available on a national, regional, and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates; ➤ MeteoAlarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale; ➤ 3 hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events; ➤ Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3 hour record is given and is updated every 15 minutes. Radar images are not predictive; and, ➤ Consultancy Service: Met Eireann provide a 24 hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			interest. Using the safe threshold rainfall values will allow work to be safely controlled (from a water quality perspective) in the event of forecasting of an impending high rainfall intensity event. Works will be suspended if forecasting suggests any of the following is likely to occur, or if on-site monitoring indicates any of the following has occurred: ➤ >10 mm/hr (i.e. high intensity local rainfall events); ➤ >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day); or, ➤ >half monthly average rainfall in any 7 days. ➤ Prior to, and after, works being suspended the following control measures will be undertaken: ○ All open excavations will be secured and sealed off; ○ Provide temporary or emergency drainage to prevent back-up of surface runoff; and, Avoid working during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded.		
MM80	Excavation Dewatering and Surface Water Quality	EIAR Section 9	Proposed Mitigation Measures (By Design) Management of excavation seepage and subsequent treatment prior to discharge into the drainage network will be undertaken as follows: ➤ Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place; ➤ If required, pumping of excavation inflows will prevent build up of water in the excavation;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			➤ The interceptor drainage will be discharged to the Site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters; ➤ The pumped water volumes will be discharged via volume and sediment attenuation ponds adjacent to excavation areas, or via specialist treatment systems such as a Siltbuster unit; ➤ There will be no direct discharge to surface watercourses, and therefore no risk of hydraulic loading or contamination will occur; and, ➤ Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work should immediately be stopped and a geotechnical assessment undertaken.		
MM81	Potential Release of Hydrocarbons	EIAR Section 9 CEMP Section 3	Proposed mitigation measures to avoid releases of fuel and other chemicals at the site are: ➤ Onsite re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off Site (Wind Farm Site and Grid Connection), and will be towed around the Site by a 4x4 jeep to where machinery is located. 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 temporary construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on Site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations; ➤ Refuelling or maintenance of machinery will not occur within 100m		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			- of a watercourse; - Fuels stored on site will be minimised; - Any diesel or fuel oils stored at the temporary construction compound will be bunded. The bund capacity will be sufficient to contain 110% of the storage tank's maximum capacity; - The plant used will be regularly inspected for leaks and fitness for purpose; and, - An emergency plan for the construction phase to deal with accidental spillages will be contained within the Construction and Environmental Management Plan (Appendix 4-2). Spill kits will be available to deal with accidental spillages.		
MM82	Wastewater Management	EIAR Section 9	Proposed Mitigation Measures (By Avoidance) - The temporary construction compound adjacent to the onsite substation located within the Wind Farm Site will be used for the construction of the northern section of the underground electrical cabling route; - Port-a-loos with an integrated waste holding tank will be used at the temporary construction compounds, maintained by the providing contractor, and removed from Wind Farm Site on completion of the construction works; - Mobile welfare units will be used during the construction of the underground electrical cabling route, particularly towards the south of the route; - Water supply for the Wind Farm Site office and other sanitation will be brought to the Wind Farm Site and removed after use from the Wind Farm Site to be discharged at a suitable off-site treatment location; and, - No water will be sourced on the Wind Farm Site, or discharged to the Wind Farm Site.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM83	Release of Cement-Based Products	EIAR Section 9	Proposed Mitigation Measures Mitigation by Avoidance: ➤ No batching of wet-cement products will occur on the Wind Farm Site/along the underground electrical cabling route works or near other ancillary construction activities. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place; ➤ Where possible pre-cast elements for culverts and concrete works will be used; ➤ No washing out of any plant used in concrete transport or concreting operations will be allowed on-site; ➤ Where concrete is delivered on Site, only the chute will need to be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water is to be directed into a dedicated concrete wash out pit. Decommissioning of this pit will occur at the end of the construction phase and water and solids will be tanked and removed from the site to a suitable, non-polluting, discharge location; ➤ All concrete will be paced in shuttering and will not be in contact with soils or groundwater until after it has set; ➤ Use weather forecasting to plan dry days for pouring concrete; and, ➤ Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event.		
MM84	Morphological Changes to		Proposed Mitigation Measures (By Design): ➤ Where possible all proposed new stream crossings will be bottomless		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	Surface Watercourses and Drainage Patterns		culverts and the existing banks will remain undisturbed. No in-stream excavation works are proposed and therefore there will be no impact on the stream at the proposed crossing location; ➤ Within the Wind Farm Site where the site underground cabling runs adjacent to a proposed access road or an existing access road proposed for upgrade, the cable will pass over the culvert (where one exists or is proposed) within the access road; ➤ Within the Wind Farm Site, where a proposed access road crosses an existing field drain, the crossing will include a suitably sized pipe at the correct invert level to maintain the existing flow regime and prevent ponding. ➤ Any guidance / mitigation measures proposed by the OPW or the Inland Fisheries Ireland will be incorporated into the design of the proposed crossings. A 10m buffer is applied to main drains to allow for future OPW maintenance; ➤ Works will be completed in accordance with the requirements of “<i>Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters</i>”; and, ➤ All new river/stream crossings will require a Section 50 application (Arterial Drainage Act, 1945). The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent. With respect to the Grid Connection underground electrical cabling route watercourse crossings, 4 construction crossing methods are proposed that will avoid in-stream works Mitigation Measures relating to the use of a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ and water for directional drilling include:		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			➤ The area around the Clear Bore™ batching, pumping and recycling plants will be bunded using terram and sandbags in order to contain any spillages; ➤ One or more lines of silt fences will be placed between the works area and adjacent rivers and streams on both banks; ➤ Accidental spillage of fluids will be cleaned up immediately and transported off site for disposal at a licensed facility; and, ➤ Adequately sized skips will be used for temporary storage of drilling arisings during directional drilling works. This will ensure containment of drilling arisings and drilling flush.		
MM85	WFD Water Body Status	EIAR Section 9	Proposed Mitigation Measures (By Avoidance) Changes in surface water or groundwater flow regimes and water quality has the potential to impact on the objectives and status of the associated Groundwater Bodies and Surface Water Bodies. Mitigation measures relating to surface water drainage regimes and water quality protection have been detailed above; Similarly, concise mitigation measures relating to the protection of groundwater quality, quantity and the groundwater flow regime have been detailed above. Relevant mitigation measures are all of those described in the preceding sections for the construction phase. The Contractor will be legally required to adhere to the CEMP. Extensive monitoring will be undertaken to monitor water quality, identify potential effects, and take corrective action as necessary.		
Operational Phase					
MM86	Progressive	EIAR Section	Mitigation by Design:		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	Replacement of Natural Surface with Lower Permeability Surfaces	9	The operational phase drainage system will be in place from the construction stage. Drainage from the operational site will comprise: ➤ Runoff from individual turbine hardstanding areas will not be discharged into the existing drain network, but discharged locally at each turbine location through settlement ponds and buffered outfalls onto vegetated surfaces; ➤ Interceptor drains will be installed up-gradient of all proposed infrastructure within the Wind Farm Site to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader; ➤ Swales/road side drains will be used to collect runoff from access roads and turbine hardstanding areas of the Wind Farm Site, likely to have entrained suspended sediment, and channel it to settlement ponds for sediment settling; ➤ On steep sections of access road transverse drains ('grips') will be constructed where appropriate in the surface layer of the road to divert any runoff off the road into swales/road side drains; ➤ Check dams will be used along sections of access road drains to intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock; ➤ Settlement ponds, emplaced downstream of road swale sections and at turbine locations, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses; and, ➤ Settlement ponds will be designed in consideration of the greenfield runoff rate.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM87	Wastewater	EIAR Section 9	Mitigation Measures by Avoidance: Wastewater will not be treated or disposed of onsite.		
MM88	WFD Water Body Status	EIAR Section 9	There is no direct discharge from the Proposed Development site to downstream receiving waters. Mitigation for the protection of surface water during the operational phase of the Proposed Development will ensure the qualitative status of the receiving waters will not be altered by the Proposed Development.		
Decommissioning Phase					
MM89	Decommissioning	EIAR Section 9	Upon decommissioning of the Wind Farm Site, the wind turbines will be disassembled in reverse order to how they were erected. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in unnecessary environment emissions such as silt laden run-off entering the receiving watercourses), erosion, dust, noise, traffic and an increased possibility of contamination of the local water table. There is no direct discharge from the Proposed Development site to downstream receiving waters. Mitigation for the protection of surface water during the decommissioning phase of the Proposed Development will ensure the qualitative status of the receiving waters will not be altered by the Proposed Development.		
Chapter 10 Air & Climate					
Construction Phase					
MM90	Exhaust Emissions	EIAR Section 10	➤ All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise. ➤ Turbines and construction materials will be transported to the Site on specified routes only, unless otherwise agreed with the Planning		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Authority. ➤ When stationary, delivery and on-site vehicles will be required to turn off engines. ➤ Users of the Site will be required to ensure that all plant and vehicles are suitably maintained to ensure that emissions of engine generated pollutants is kept to a minimum. ➤ The expected waste volumes generated onsite are unlikely to be large enough to warrant source segregation at the Proposed Development site. Therefore, all wastes streams generated onsite will be deposited into a single waste skip which will be covered. This waste material will be transferred to a licensed /permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal. ➤ The MRF facility will be local to the Proposed Development site to reduce the amount of emissions associated with vehicle movements. The nearest licensed waste facility to the Wind Farm Site is Ballydonagh Landfill which is located approximately 11.25km to the south-west of the Wind Farm Site. ➤ Waste associated with the construction of the Grid Connection underground electrical cabling route will be disposed of at the closest MRF to where waste is generated along the underground electrical cabling route. There are two licensed waste facilities in the vicinity of the underground electrical cabling route, and these are the Ballydonagh Landfill as outlined above and the Derryclure Landfill which is located approximately 6.5km to the south of the Thornsberry 110kV substation at Tullamore.		
MM91	Dust Emissions	EIAR Section 10 CEMP Section	➤ In periods of extended dry weather, dust suppression may be necessary along haul roads, site roads, and other infrastructure to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling ponds in the Wind Farm Site's drainage system and		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		3	will be pumped into a bowser or water spreader to dampen down haul roads, and site compounds to prevent the generation of dust where required. Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff. ➤ All plant and materials vehicles shall be stored in dedicated areas (on Site). ➤ Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction. ➤ Turbines and construction materials will be transported to the Site on specified haul routes only. ➤ The agreed haul route roads adjacent to the Site will be regularly inspected for cleanliness and cleaned as necessary. ➤ The Site access roads will be checked weekly for damage/potholes and repaired as necessary. ➤ The transport of construction materials to the Site that have significant potential to cause dust, will be undertaken in tarpaulin or similar covered vehicles where necessary. ➤ The transportation of dry excavated material from the Site to the designated on-site spoil management areas, which may have potential to generate dust will be minimised. If necessary, excavated material will be dampened prior to transport to the spoil management areas. ➤ A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-2). The CEMP includes dust suppression measures.		
MM92	Greenhouse Gas Emissions		➤ All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise. ➤ Turbines and construction materials will be transported to the Site on specified routes only unless otherwise agreed with the Planning Authority.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			➤ The majority of aggregate materials for the construction of the Proposed Development will be obtained from the local quarries. This will significantly reduce the number of delivery vehicles accessing the site and the length of such journeys, thereby reducing the amount of emissions associated with vehicle movements. ➤ Where applicable, low carbon intensive construction materials will be sourced and utilised onsite.		
Operational Phase					
MM93	Exhaust Emissions	EIAR Section 10	➤ Any vehicles or plant brought onsite during the operational phase will be maintained in good operational order that comply with the Road Traffic Acts 1961 as amended, thereby minimising any emissions that arise. ➤ When stationary, delivery and on-site vehicles will be required to turn off engines.		
Decommissioning Phase					
MM94	Decommissioning Phase	EIAR Section 10	The mitigation measures prescribed for the construction phase of the Proposed Development will be implemented during the decommissioning phase thereby minimising any potential impacts.		
EIAR Chapter 11 Noise					
Pre-Commencement Phase					
MM95	Construction Noise	EIAR Section 11	Keep local residents informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern;		
Construction Phase					
MM96	Construction Noise	EIAR Section 11	Good site practices, both on the Wind Farm Site and along the Grid Connection underground electrical cabling route will be implemented to minimise the likely effects. Particular care will be taken at watercourse, culvert and drain crossings along the underground electrical cabling route, where directional drilling activities are required to be undertaken. Section 8 of BS5228-1:2009+A1:2014 recommends a		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			number of simple control measures as summarised below that will be employed onsite: ➤ Keep local residents informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern; ➤ All vehicles and mechanical plant will be fitted with effective exhaust silencers and be subject to programmed maintenance; ➤ Select inherently quiet plant where appropriate - all major compressors will be 'sound reduced' models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use; ➤ All ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers; ➤ Machines will be shut down between work periods (or when not in use) or throttled down to a minimum; ➤ Regularly maintain all equipment used on site, including maintenance related to noise emissions; ➤ Vehicles will be loaded carefully to ensure minimal drop heights so as to minimise noise during this operation; and ➤ All ancillary plant such as generators and pumps will be positioned so as to cause minimum noise disturbance and if necessary, temporary acoustic screens or enclosures will be provided. Where the BS5228 threshold levels are anticipated to be exceeded due to directional drilling activities along the underground electrical cabling route, the following are examples of measures that will be considered, where necessary, to mitigate noise emissions from these activities are as follows: ➤ Temporary boarding alongside the drilling rig or use of 'acoustic blanket panels' to hang from heras fencing or similar. Installation		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			will be as close to the drilling rig as is practicable and fitted so as to interrupt any direct line of site between the drilling rig and the closest residential receptors. ➤ Examples of appropriate products include Echo Noise Defender and Soundex DeciBloc. It is anticipated that this will be required should directional drilling be used for water crossings 3, 7 and 11, which are in close proximity to sensitive receptors.		
Operational Phase					
MM97	Operational Phase Noise	EIAR Section 11	The predicted noise levels from the Proposed Development are within the Guidelines noise limits, and therefore no mitigation measures are required in respect of noise. Notwithstanding the above, this section discusses the principle of noise curtailment to demonstrate that all modern wind turbines have the capability of operating in reduced noise modes, should it be necessary to reduce the noise immissions from any installed turbine. Wind turbines can be programmed to run in reduced modes of operation (or low noise modes) in order to achieve noise criteria during certain periods (i.e. day or night) and under specific wind conditions (i.e. wind speed and direction). The turbine technology that has been assumed for this assessment offers various noise modes of operation which typically will have an associated energy output reduction. Operating the turbines in reduced modes is generally referred to as curtailment and is a proven effective mitigation to ensure noise limits are complied with. Low noise modes are available for all modern turbines likely to be considered for this Site.		
Decommissioning Phase					
MM98	Construction Noise	EIAR Section 11	Activities that occur during the decommissioning of the Proposed Development are unlikely to produce higher noise levels than those produced during construction and many of the activities will be similar in nature. As such it is considered that if construction noise levels are predicted to be below the threshold levels, then decommissioning noise will also be within the threshold levels.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
EIAR Chapter 12 Landscape & Visual					
Pre-Commencement, Construction and Operation					
MM99	Landscape Effects	EIAR Section 12	The following measures have been included in the Proposed Development design in order to avoid or reduce direct effects on landscape receptors of the Wind Farm Site: ➤ The spatial configuration of the proposed infrastructure footprint has been carefully designed to minimise the loss of valuable landscape receptors on the Wind Farm Site, such as mature woodland, Annex1 habitats or features of cultural heritage value. ➤ The internal site road layout makes use of the existing informal agricultural tracks wherever possible, to minimise the requirement for new tracks within the Wind Farm Site and where possible retain the integrity of existent field boundary walls, hedgerows and trees. ➤ To minimise cut and fill activities required to construct the Proposed Development, the proposed access roads, and other infrastructure such as hard stands have been designed to align with the existing terrain within the landscape of the Wind Farm Site. ➤ In all circumstances, excavation depths and volumes will be minimised, and excavated material will be re-used where possible. ➤ During initial vegetation stripping, all topsoil material will be temporarily stored on Wind Farm Site and used for “dressing” the edges of the development infrastructure during reinstatement/regrading, including that of the spoil management areas. 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.		
MM100	Landscape and	EIAR Section	The proposed onsite substation is sited in a location enclosed by vegetation,		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	Visual Effects	12	reducing visibility from receptors in the surrounding landscape to the south, east and west and north. Once established, the proposed treeline planting around the onsite substation will provide screening and mitigate visibility of the onsite substation.		
EIAR Chapter 13 Cultural Heritage					
Pre-Commencement					
MM101	Protected Structures		➤ Fencing off the structure 038-064 NIAH 15403808 Milestone at Ballinderry Big prior to construction. ➤ Protective traffic barriers will be placed around the structure 031-019 NIAH 15403124 Water pump at Ballybrickoge during construction		
MM102	Features of Local Cultural Heritage Merit		An exclusion zone will be established around the Umma House and associated outbuildings prior to construction		
MM103	Sub-surface Archaeological Potential		➤ Pre-development archaeological testing of the proposed turbine bases, hardstands, proposed roads, compounds, substation site and any other Proposed Development components within the Wind Farm Site will be carried out under licence from the National Monuments Service. This is in order to identify any archaeological features at the earliest stage possible to allow time to deal with any requirements such as preservation in situ (redesign / avoidance) or preservation by record (archaeological excavation). ➤ A report on the testing will be compiled on completion of the work and submitted to the relevant authorities.		
Construction Phase					
MM104	Recorded Monuments and Protected		➤ 30m buffer zones will be maintained around the monuments the details of which should appear in the CEMP. ➤ No ground works or storage of materials or tracking of machinery will		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	Structures		take place within the buffer zones ➤ Archaeological Monitoring will be carried out along the relevant sections of the Grid Connection cabling route where the route traverses through the Zone of Archaeological Protection (ZAP). ➤ A report on the monitoring should be compiled on completion of the work and submitted to the relevant authorities. ➤ Further mitigation such as preservation in situ (avoidance), preservation by record (excavation) may be required depending on the results of the monitoring.		
MM105	Sub-surface Archaeological Potential		➤ Pre-development archaeological testing of the proposed turbine bases, hardstands, proposed roads, compounds, substation site and any other Proposed Development components within the Wind Farm Site will be carried out under licence from the National Monuments Service. This is in order to identify any archaeological features at the earliest stage possible to allow time to deal with any requirements such as preservation in situ (redesign / avoidance) or preservation by record (archaeological excavation). ➤ A report on the testing will be compiled on completion of the work and submitted to the relevant authorities. ➤ Further mitigation such as preservation in situ (avoidance), preservation by record (excavation), buffer zones may be required depending on the results of the testing. ➤ Archaeological Monitoring of all groundworks during construction by a licensed archaeologist. ➤ A report on the monitoring will be compiled on completion of the work and submitted to the relevant authorities. ➤ Further mitigation such as preservation in situ (avoidance), preservation by record (excavation), buffer zones may be required depending on the results of the monitoring.		
Chapter 14 Material Assets					

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Pre-Commencement, Construction and Operation					
MM106	Traffic & Transport	EIAR Section 14	Mitigation by design measures include the following; ➤ Selection of the most appropriate delivery route to transport the wind turbine components, requiring the minimum remedial works to accommodate the vehicles A detailed Traffic Management Plan (TMP), incorporating all the mitigation measures set out in the CEMP included as Appendix 4-2 of this EIAR, will be finalised and confirmatory detailed provisions in respect of traffic management agreed with the roads authority and An Garda Síochána prior to construction works commencing on Site. Illustrations for the traffic arrangements and diversion routes identified for the Grid Connection works are included in Appendix 14-2: Grid Connection Traffic Arrangements and Diversion Routes, and identifies sections along the Grid Connection underground electrical cabling route where there will be road and pedestrian footpath closures, diverted traffic, and Stop/Go or traffic lights. The detailed TMP will include the following: Traffic Management Coordinator – a competent Traffic Management Co-ordinator will be appointed for the duration of the construction of the Proposed Development and this person will be the main point of contact for all matters relating to traffic management. Delivery Programme – a programme of deliveries will be submitted to Westmeath County Council and other relevant authorities in advance of deliveries of turbine components to the Wind Farm Site. Liaison with the relevant local authorities including the roads sections of local authorities that the delivery routes traverse and An Garda Síochána, during the delivery phase of the large turbine vehicles, when an escort for all convoys will be required. Information to locals – Locals in the area will be informed of any upcoming traffic		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			related matters e.g. delivery of turbine components at night, via letter drops and posters in public places. Information will include the contact details of the Contract Project Co-ordinator, who will be the main point of contact for all queries from the public or local authority during normal working hours. An "out of hours" emergency number will also be provided. A Pre and Post Construction Condition Survey – A pre-condition survey of roads associated with the Proposed Development will be carried out prior to construction commencement to record the condition of the road. A post construction survey will be carried out after works are completed. Where required the timing of these surveys will be agreed with the local authority. Implementation of temporary alterations to road network at critical junctions – At locations where required highlighted in Section 14.1.8. Identification of delivery routes – These routes will be agreed and adhered to by all contractors. Travel plan for construction workers to Wind Farm Site– While the assessment above has assumed the worst case that construction workers will drive to the Wind Farm Site, the construction company will be required to provide a travel plan for construction staff, which will include the identification of a routes to / from the site and identification of an area for parking. Travel plan for construction workers to underground electric cabling route – Due to the transient nature of the underground grid connection construction site which will generally be on a section of the public road, construction workers will be transported to and from the site by the construction company at the beginning and end of each shift. Temporary traffic signs – As part of the traffic management measures temporary		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			traffic signs will be put in place at all key junctions, including the access junction on the L5363. All measures will be in accordance with the <i>“Traffic Signs Manual, Section 8 – Temporary Traffic Measures and Signs for Road Works”</i> (DoT now DoTT&S) and <i>“Guidance for the Control and Management of Traffic at Roadworks”</i> (DoTT&S). A member of construction staff (flagman) will be present at key junctions during peak delivery times. Delivery times of large turbine components - The management plan will include the delivery of large wind turbine plant components at night in order to minimise disruption to general traffic during the construction stage. Additional measures - Various additional measures will be put in place in order to minimise the effects of the development traffic on the surrounding road network including wheel washing facilities on Site and sweeping / cleaning of local roads as required. Re-instatement works - All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers.		
MM107	Telecommunications		Mitigation by design: Vodafone responded to a scoping request from MKO on the 7th of May 2021, noting that they had links in the area. initial turbine locations were overlapping with the Vodafone link, therefore the turbine locations have been altered to ensure that no overlap or interference will occur.		
MM108	Existing Built Services		➤ Any area where excavations are planned will be surveyed and all existing services will be identified prior to commencement of any works.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			➤ Liaison will be had 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. ➤ The contractor must comply with and standard construction codes of practice in relation to working around electricity, gas, water, sewage and telecommunications networks.		
MM109	Traffic & Transport	EIAR Chapter 14	Implementation of temporary alterations to road network at critical junctions – At locations where required highlighted in Section 14.1.8 in Chapter 14.		
MM110	Telecommunications	EIAR Chapter 14	In the event of interference occurring to telecommunications, the Department of the Environment, Heritage and Local Government Wind Farm Planning Guidelines (2006) state that these effects can be dealt with by the use of divertor relay links out of line with the proposed wind turbines.		
MM111	Aviation	EIAR Chapter 14	The scoping response from the IAA set out lighting requirements for turbines as detailed above. These requirements will be complied with for the Proposed Development and any further details will be agreed in advance of construction with the IAA i.e crane erection. The coordinates and elevations for built turbines will be supplied to the IAA, as is standard practice for wind farm developments.		
Decommissioning Phase					
MM112	Decommissioning	EIAR Section 14	In the event that the Proposed Development is decommissioned after the 30 years of operation, a decommissioning plan, will be prepared for agreement with the local authority, as described in Section 4.11 of Chapter 4. A Decommissioning Plan has been prepared (Appendix 4-6) the detail of which will be agreed with the local authority prior to any decommissioning. This plan will include a material recycling /		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			disposal and traffic management plan will be prepared for agreement with the local authority prior to decommissioning.		

7.

MONITORING PROPOSALS

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

This section of the Construction and Environment Management Plan groups together all of the monitoring proposals presented in the EIAR. The monitoring proposals are presented in the following pages. The monitoring proposals are also outlined within Chapter 17: Schedule of Mitigation Measures.

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

Table 7-1 Monitoring Measures

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
Pre-Construction Phase						
MX1	Drainage Maintenance	EIAR Section 4 CEMP Section 4	The Project Hydrologist will complete a detailed drainage design and maintenance plan before construction commences and will attend the site to set out and assist with micro-siting of proposed drainage controls An inspection and maintenance plan for the drainage system on site will be prepared in advance of commencement of any works. Regular inspections of all installed drainage systems will be necessary, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water at parts of the systems where it is not intended. The inspection of the drainage system will be the responsibility of the site ECoW or the Project Hydrologist.	On going	Monthly	Project Hydrologist
MX2	Tree Felling	EIAR Section 9 CEMP Section 3	Sampling will be completed before, during (if the operation is conducted over a protracted time) and after the felling activity. The ‘before’ sampling will be conducted within 4 weeks of the felling activity, preferably in medium to high water flow conditions. The “during” sampling will be undertaken once a week passes, or after rainfall events. The ‘after’ sampling will comprise as many samplings as necessary to demonstrate that water quality has returned to pre-activity status (i.e. where an impact has been shown).	As Required	Monthly	ECoW
MX3	Invasive Species	EIAR Section 6 CEMP Section 3	A pre-commencement invasive species survey shall be completed for the site.	Once	As required	Project Ecologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX4	Birds	EIAR Section 7	Pre-construction surveys will be undertaken prior to the initiation of works at the Wind Farm Site. If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the construction phase. If it is found to be active during the construction phase, no works shall be undertaken within a disturbance buffer in line with industry best practice (e.g. Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007). No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied.	Once	As required	Project Ornithologist
Construction Phase						
MX5	Archaeological Monitoring	EIAR Section 13	- Archaeological Monitoring of all groundworks during construction by a licensed archaeologist. - Archaeological Monitoring will be carried out along the relevant sections of the Grid Connection cabling route where the route traverses through the Zone of Archaeological Protection - A report on the monitoring should be compiled on completion of the work and submitted to the relevant authorities. - Further mitigation such as preservation in situ (avoidance), preservation by record (excavation) may be required depending on the results of the monitoring.	As Required	As Required	Project Archaeologist
MX6	Water Quality	CEMP	The effectiveness of drainage measures designed to minimise	Daily	As Necessary	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
	and Monitoring	Section 3	runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the ECoW or supervising hydrologist on-site. The contractor is solely responsible for the implementation of the detailed drainage design on site. The ECoW is responsible for monitoring the effectiveness of the drainage design as it is implemented on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the Proposed Development proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. The drainage measures installed on-site should be inspected at least weekly by the contractor and maintained as required during the construction phase of the Proposed Development to ensure good performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.			
MX7	Water Quality and Monitoring	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; ➤ 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	Daily	As Necessary	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			inspected daily. Daily inspections checks will be completed on plant and equipment, and whether materials such as straw bales or oil absorbent materials need replacement; ➤ Event based inspections by the ECoW as follows: ➤ >10 mm/hr (i.e. high intensity localised rainfall event); ➤ >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or, ➤ Rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week). ➤ Monthly site inspections by the Project Hydrologist/ ECoW during construction phase;			
MX8	Water Quality and Monitoring	EIAR Section 9	Daily surface water monitoring forms will be utilised at every works site near any watercourse. These will be taken daily and kept on site for record and inspection.	Daily	As Necessary	ECoW
MX9	Surface Water Quality	CEMP Section 4	Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of felling and construction at the site. The baseline monitoring programme will be subject to agreement with Westmeath 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 at designated locations	As Required	Monthly	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			as outlined in Figure 9-5 of the EIAR. Baseline sampling will be completed on at least two occasions, and these should coincide with low flow and high flow stream conditions. The high flow sampling event will be undertaken after a period of sustained rainfall, and the low flow event will be undertaken after a dry spell. Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work should immediately be stopped and a geotechnical assessment undertaken.			
MX10	Tree Felling	EIAR Section 9	Checking and maintenance of roads and culverts will be on-going through any felling operation. No tracking of vehicle through watercourses will occur, as vehicles will use road infrastructure and existing watercourse crossing points. Where possible, existing drains will not be disturbed during felling works. Also, daily surface water monitoring forms (for visual inspections and field chemistry measurements) will also be utilised at every works site near any watercourse. These will be taken daily and kept on site for record and inspection.	As Required	Monthly	ECoW
MX11	Plant and Equipment Inspections	EIAR Section 9 CEMP Section 4	The plant used will be regularly inspected for leaks and fitness for purpose.	As Required	Monthly	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX12	Traffic and Transport	CEMP Section 3	The designated public roads outside the site and along the main transport routes to the site will be regularly inspected by the ECoW for cleanliness, and cleaned as necessary;	Daily	Monthly	ECoW
MX13	Flora and Fauna	CEMP Section 4	A Project Ecologist will be appointed. The responsibilities and duties of the Project Ecologist will include the following: ➤ Undertake a pre-construction transect/walkover bird survey to ensure that significant effects on breeding birds will be avoided. ➤ Inform and educate on-site personnel of the ornithological and ecological sensitivities within the Proposed Development area. ➤ Oversee management of ornithological and ecological issues during the construction period and advise on ornithological issues as they arise. ➤ Provide guidance to contractors to ensure legal compliance with respect to protected species onsite. ➤ Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress.	As required	As required	Project Ecologist
Operational Phase						
MX14	Surface Water Quality	CEMP Section 4	Quarterly site inspections by the Project Hydrologist/ ECoW after construction for a period of one year following the construction phase; and,	Monthly	Monthly	ECoW
MX15	Drainage Inspections	CEMP Section 4	The drainage system will be monitored in the operational phase until such a time that all areas that have been reinstated become re-vegetated and the natural drainage regime has been restored.	Monthly	Monthly	ECoW

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX16	Ornithology	EIAR Section 7	The programme of works will monitor parameters associated with collision, displacement/barrier effects and habituation during the operational phase of the Proposed Development. Surveys will be scheduled to coincide with Years 1, 2, 3, 5, 10 and 15 of the lifetime of the wind farm. Monitoring measures are broadly based on guidelines issued by SNH (2009). The following individual components are proposed: ➤ Vantage point surveys to monitor flight activity in the vicinity of the turbines; ➤ Breeding walkover surveys to monitor breeding bird activity at the Wind Farm Site; ➤ Collision monitoring, including carcass searches with trained dogs to monitor bird fatalities due to collision. These will include searcher efficiency and scavenger removal trails as a best practice measure.	Years 1, 2, 3, 5, 10, 15	Monthly	Project Ornithologist
MX17	Bats	EIAR Section 6	To assess the effects of the Proposed Development on bat activity, at least 3 years of post-construction monitoring is proposed. Post-construction monitoring will include static detector surveys, walked survey transects and corpse searching to record any bat fatalities resulting from collision. The results of post-construction monitoring shall be utilised to assess any potential changes in bat activity patterns and to monitor the implementation of the mitigation strategy. Results of Year 1 surveys will assess whether adaptations to the monitoring plan are required, and further mitigations such as curtailment	Years 1, 2, 3	Annually	Project Ecologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			will be considered. If a curtailment requirement is identified, a programme can be devised around key activity periods and weather parameters, as well as a potential increase in buffers. At the end of each year, the efficacy of the mitigation and monitoring plan will be reviewed, and any identified efficiencies incorporated into the programme. This approach allows for an evidence-based review of the potential for bat fatalities at the Wind Farm Site, post construction, to ensure that the necessary measures, based on a new baseline post-construction, are implemented for the protection of bat species locally. The effectiveness of any mitigation/curtailment needs to be monitored in order to determine (a) whether it is working effectively (i.e. the level of bat mortality is incidental), and (b) whether the curtailment regime can be refined such that turbine down-time can be minimised whilst ensuring that it remains effective at preventing casualties.			
MX18	Flora and Fauna	EIAR Section 6	To confirm that habitat restoration and enhancement has been successful, all areas of restored vegetation will be monitored post-restoration. This will be undertaken in partnership between the developer, the Project Ecologist and the Landowner. The proposed management actions will be conveyed to the developer and each of the landowners, and management alterations implemented as required to achieve the targets of the management plan. Hedgerows will be inspected following the main growing season (i.e. in September) for the first five years of growth, where the requirement for replacement planting will be assessed. If any shrubs are dead or damaged these will be replaced using the	As required	As required	Project Ecologist

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			same species within the next planting season. Recommendations for ongoing or remedial management required will be specified within an Annual Environmental Report			
Decommissioning Phase						
MX19	Decommissioning	DP Section 3	The Site Manager in consultation with the ECoW will be responsible for employing the services of a suitably qualified ecologist and any other suitably qualified professionals as required throughout the decommissioning works.	As required	As required	Site Manager
MX20	Decommissioning	DP Section 3	Prior to decommissioning, a suitably qualified ecologist will complete an invasive species survey of any material proposed for use as part of foundation backfilling.	As required	As required	Project Ecologist
MX21	Decommissioning	DP Section 7	Decommissioning monitoring surveys will be undertaken prior to works associated with decommissioning at the wind farm. The survey will include a thorough walkover survey to a 500m radius of the Proposed Development footprint and all works areas, where access allows. If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the decommissioning phase. If it is found to be active during the decommissioning phase, no works shall be undertaken within a disturbance buffer (Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007) in line with industry best practice. No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied.	As required	As required	Project Ornithologist

8. PROGRAMME OF WORKS

8.1 Construction Schedule

The construction phase will take approximately 18 – 24 months to complete from starting on site to the commissioning of the electrical system and export of electricity from site.

The EIAR stipulated that in the interest of breeding birds, construction would not commence during the breeding bird season, which runs from March to August. The EIAR also stipulated that construction including the removal of trees by felling may commence at any stage from September onwards to the end of February thus avoiding the period from the 1st of March to the 31st of August inclusive, as prescribed in the Wildlife Acts, so that construction activities are ongoing by the time the next breeding bird season comes around and can continue throughout the next breeding season.

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

ID	Task Name	Task Description	Year 1				Year 2			
			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 Commissioning									
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 impacts, relevant to the construction activities taking place at the time, are in place.

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

9.2 Auditing

An Environmental audit will first be carried out prior to the construction phase of the Proposed Development to ensure the implementation of pre-construction mitigation measures, completion of baseline studies and implementation of pre-construction felling mitigation measures. Further environmental audits will be carried on a monthly basis during the construction phase of the Proposed Development 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 Project Developer, in an and objective manner. Environmental audits will be conducted at planned intervals to determine whether the CEMP is being properly implemented and maintained. The results of environmental audits will be provided to the Project Developer and Project Contractor.

An audit of compliance with the pre-commencement mitigation measures will be completed by the ECoW prior to the commencement of the construction phase of the Proposed 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 within the EMP for the site. The findings of each audit will be made available to Westmeath County Council or Offaly County Council on request.

Once the Proposed Development 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 proposed renewable energy development:

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

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

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

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

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

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

9.4

Corrective Action Procedure

A corrective action is implemented to rectify an environmental problem on-site. Corrective actions will be implemented by the 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; and,
- Environmental Complaints.

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

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

9.5

Construction Phase Review

The Project Contractor's CEMP will be the subject of review by the ECoW on behalf of the Project Developer whenever a revised version of the CEMP is presented for approval.