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Ballyfasy Wind Farm, Co Kilkenny

Construction Environmental Management Plan (CEMP)

BUILT ON KNOWLEDGE

Document Control Sheet	
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1. INTRODUCTION

Manogate Limited, a development company supported by ART Generation and FuturEnergy Ireland, have applied to An Coimisiún Pleanála for planning permission to construct the proposed Ballyfasy Wind Farm Project in County Kilkenny. The proposed project is described in detail in Chapter 2 of the project Environmental Impact Assessment Report (EIAR) and comprises:

- The wind farm site to include a wind farm of 10 no. turbines, an onsite 110 kilovolt (kV) substation and ancillary infrastructure such as turbine foundations, hardstanding areas, borrow pits and access roads;
- Grid Connection Options (GCO) (two options being considered); and
- Works along the proposed Turbine Delivery Route (TDR).

The proposed project is the subject of two separate planning applications. The first application is for the proposed wind farm and on-site 110 kV substation along with the works on private lands along the proposed TDR. The second application is for the proposed grid connection. This Construction Environmental Management Plan (CEMP) considers the project as a whole.

1.1 SITE LOCATION

The site of the proposed wind farm is located in the southern portion of County Kilkenny between the villages of Listerlin (approximately 3 km northeast), Mullinavat (approximately 3.5 km west), Glenmore (approximately 5 km southeast), and Slieverue (approximately 9 km south).

The topography of the wind farm site varies from around 140 metres Ordnance Datum (mOD) to 220 mOD. The highest points are found in the north-east areas, while the southwest corner has the lowest elevation.

The landscape is agricultural with areas of coniferous forestry occurring mainly to the north and south. Two watercourses traverse through the wind farm site; the Arrigle River and the Smartcastle Stream. The source of the Arrigle River occurs in the north, and flows in a northerly direction. The Smartcastle Stream, which is situated towards the south, flows in a southerly direction.

1.2 BRIEF PROJECT DESCRIPTION

Design flexibility has been sought from An Coimisiún Pleanála for the turbine ranges used by the project. The 10 no. wind turbines on site will have a maximum blade tip height range from 170 m-180 m inclusive, a rotor diameter range from 149 m-163 m inclusive, and a hub height range from 95 m-105.5 m inclusive, and all associated foundations and hard-standing areas respective of each turbine.

<u>Works at the proposed wind farm site</u>

- Erection of 10 no. wind turbines with a maximum blade tip height range from 170 m-180 m inclusive, a rotor diameter range from 149 m-163 m inclusive, and a hub height range from 95 m-105.5 m, and all associated foundations and hard-standing areas respective of each turbine;
- A new site entrance with access onto the Local Road L3417;
- Modifications at one existing site entrance with access onto the Local Road L3417;
- Modifications to two existing site entrances with access onto the Local Road L7499;

- Modifications at one existing site entrance with access onto Local Road L3424;
- A temporary road crossing location to allow turbine delivery along the Local Road L3417;
- A temporary crossing location to allow turbine delivery along the Local Road L7499;
- A temporary crossing location to allow turbine delivery along the Local Road L3424;
- Construction of 2 no. temporary construction compounds with associated temporary site offices, parking areas and security fencing;
- Three no. temporary deposition areas;
- Construction of 5 no. clear span bridges;
- Installation of 1 no. permanent meteorological mast up to a height of 100 m with a lightning finial extending above the mast;
- Two no. borrow pits;
- Construction of new internal site access roads and upgrade of existing site roads, to include passing bays and all associated drainage;
- Two no. temporary construction stage Moby Dick type wheel wash systems (with over ground settlement tank);
- Construction of drainage and sediment control systems;
- Construction of 1 no. permanent 110 kilovolt (kV) Air Insulated Switchgear (AIS) Electrical Substation with associated compound. The substation will be configured as either a tail-fed design or a loop-in design, depending on the final grid connection arrangement. The substation compound will include:
    - 1 no. EirGrid Control Building containing, a Relay Room, Battery Room, Generator Room, Messroom, WC, and Workshop/ Store Room;
    - 1 no. Independent Power Producer (IPP) Control Building containing a Switchgear Room, Control Room, Office, Messroom, WC, Control Room, and Store Room;
    - Lightening Masts;
    - A Telecommunications mast;
    - Parking;
    - Security Palisade Fencing;
    - Electrical Plant and Infrastructure and Grid Ancillary Services Equipment;
    - Drainage Infrastructure;
    - All associated and ancillary works;
- All associated underground electrical and communications cabling connecting the wind turbines to the proposed wind farm substation;
- All related site works and ancillary development including berms, landscaping, ecological enhancement and soil excavation; and
- Ancillary forestry felling to facilitate construction and operation of the proposed project.

<u>Turbine Delivery Route Works</u>

The proposed project also comprises works on the public road network and at private properties to accommodate the delivery of turbine components and oversized loads (see EIAR Appendix 2-1). Four private locations (locations 10, 13, 14 and 15) require works to facilitate turbine and

oversize load deliveries. The Preliminary Route Assessment which details the required TDR works at each location for the project is presented in EIAR Appendix 2-1.

Grid Connection

Two options for the grid connection are considered to connect the proposed project to the national grid.

Grid Connection Option (GCO) One proposes to install a 110 kV underground cable from the proposed onsite substation to the consented Castlebanny Wind Farm 110 kV substation 12 km to the north. This option also includes a construction site compound and a temporary deposition area along the cable route.

GCO Two will connect the onsite substation with the existing 110 kV Great Island-Kilkenny overhead line which crosses 2.3 km to the east of the proposed wind farm site. All works are within the wind farm site.

A single grid connection will be constructed for the proposed project and will become a permanent component of the Irish national grid network.

1.3 Construction Environmental Management Plan (CEMP)

This CEMP has been prepared to present the proposed management and administration of site activities for the construction phase of the proposed project, to ensure that all construction activities are undertaken in an environmentally responsible manner. This CEMP summarises the environmental commitments related to the construction of the project, and the measures to ensure compliance with legislation and the requirements of statutory bodies, all as detailed in the project EIAR and Natura Impact Statement (NIS).

This CEMP will be a live document and will be reviewed and updated, as necessary. Upon appointment, the Main Contractor for construction of the proposed project shall update this document to produce an updated version of the CEMP (i.e. the Contractor's CEMP) which will account for any additional requirements set out in Planning Conditions.

The CEMP provides a summary of the requirements from relevant guidance, standards, and codes of practice applicable to the work being undertaken as part of the proposed project. The following is a non-exhaustive list of relevant guidance/standards/codes referenced in the preparation of this CEMP:

- Environmental Protection Agency (EPA), Guidelines on the Information to be contained in Environmental Impact Assessment Reports (May 2022);
- Department of Housing, Planning and Local Government (DHPLG), Draft Revised Wind Energy Development Guidelines (December 2019);
- Department of Environment, Heritage and Local Government (DEHLG), Wind Energy Development Guidelines (December 2006);
- EPA Best Practice Guidelines for the preparation of resource & waste management plans for construction & demolition projects (November, 2021);
- Inland Fisheries Ireland (IFI) Guidelines on the Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016);

- Construction Industry Research and Information Association (CIRIA) C532 publication 'Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors' (CIRIA, 2001);
- CIRIA C648 publication 'Control of water pollution from linear construction projects' (CIRIA, 2006);
- CIRIA C741 publication 'Environmental Good Practice on Site' (4th Edition) (CIRIA, 2015);
- CIRIA C750, 'Groundwater control: design and practice' (CIRIA, 2016);
- CIRIA C697 & C753F publications 'SuDS Manual' (CIRIA, 2007 & 2015);
- National Roads Authority (NRA) (2008). Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. National Roads Authority;
- Irish Working Group on Groundwater (2005) Guidance Document GW5, Groundwater Working Group (WGGW) 2005;
- British Standards Institution (BSI), BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise;
- BSI, BS 5228: Part 1 and the European Communities (Construction Plant and Equipment) (Permissible Noise Levels);
- Scottish Natural Heritage (SNH) (2019) 'Good Practice during Wind Farm Construction' (4th edition). Scottish Natural Heritage;
- The Institute of Air Quality Management (IAQM) publication 'Guidance on the Assessment of Dust from Demolition and Construction ' (2014);
- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes published by the NRA (now TII) in 2011;
- The Control of Dust and Emissions during Construction and Demolition published by the Greater London Authority (GLA) in 2014; and
- Eastern Regional Fisheries Board (2004) guidance document "Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites".

1.4 OBJECTIVES OF THIS CEMP

The objectives of the CEMP are to:

- Outline the proposed mechanisms for ensuring the delivery of environmental measures to avoid or reduce environmental effects identified;
- Ensure procedures are in place so that there is a prompt response to effects requiring remediation, including reporting and any additional mitigation measures required to prevent a recurrence;
- Provide an outline of the content that would be supplied in the construction method statements and strategies that would be prepared in order to secure mitigation measures in relation to different design aspects of the proposed development;
- Ensure compliance with legislation and identify where it would be necessary to obtain authorisation from relevant statutory bodies;
- Ensure that appropriate proposed development monitoring and reporting would be in place;
- Provide a framework for reporting, compliance auditing and inspection to ensure environmental aims would be met; and

- Set out the client's expectations to guide contractors on their requirements with regards to environmental commitments and environmental management.

1.5 Implementation and Control of the CEMP

In terms of overall environmental responsibility, everyone on site is responsible for ensuring that their actions constitute good environmental practice. All site personnel are charged with following good practice and encouraged to provide feedback and suggestions for improvements. All site personnel are also required to ensure compliance with the requirements of the CEMP.

Compliance with the CEMP, the procedures, work practices and controls will be mandatory and must be adhered to by the Contractor, all site personnel, and sub-contractors employed during the construction phase. The CEMP seeks to:

- Provide a basis for achieving and implementing the construction related mitigation measures identified in the EIAR and NIS; and
- Promote best environmental on-site practices for the duration of the construction phase.

1.6 Revisions to the CEMP

As mentioned above, the CEMP is considered a 'live' document and as such will be reviewed on a regular basis to allow any changes to construction programme, operations or unforeseen issues be incorporated at any stage throughout the project as deemed necessary by the Applicant, their agents or relevant authorities. The CEMP will be subject to continual review to address, for example:

- Any conditions stipulated in the planning approval;
- Any requirements/issues highlighted through consultations prior to works e.g. by the National Parks and Wildlife Service (NPWS), Kilkenny County Council etc.;
- To ensure it reflects best practice at the time of construction; and
- To ensure it incorporates the findings of any pre-construction site investigations.

This CEMP will be provided to the appointed Main Contractor who will have responsibility for updating the document as necessary through the construction phase.

The Contractor's CEMP will incorporate the conditions associated with any grant of planning for the proposed project. This CEMP will be subject to ongoing review (throughout the construction phase of the development), through regular environmental auditing and site inspections. This will confirm the efficacy and implementation of all relevant mitigation measures and commitments identified in the application documentation.

The appointed Contractor is required to include further details and/or confirmation in the updated version of the CEMP which will include:

- Details of emergency plan including personnel and contact numbers;
- Site and traffic signage; and
- Method statements.

The appointed Contractor shall also agree and implement monitoring measures to monitor the effectiveness of the CEMP.

1.6.1 Environmental Awareness and Control

In order to ensure that environmental awareness and compliance is communicated effectively at the start and throughout the construction works, this CEMP and its contents will be communicated to all site personnel, including management staff, operatives and sub Contractors. The key elements of this CEMP will form part of the site induction which will be mandatory for all employees, Contractors and visitors attending the site. Environmental toolbox talks will be provided to all site personnel and sub-consultants on a regular basis. These will be targeted at particularly sensitive environmental issues such as:

- Protection of sensitive ecological habitats and key ecological receptors;
- Works close to sensitive water bodies;
- Invasive species management;
- Water pollution and silt control;
- Water pollution in relation to cement and concrete handling;
- Spill prevention and control; and
- Dust management.

1.7 Emergency Response Plan (ERP)

The Contractor will be responsible for developing a detailed environmental Emergency Response Plan (ERP) for the proposed works, to cover environmental emergencies, as part of the Health & Safety Plan. Details related to the ERP are outlined in Section 6 of this CEMP.
Further information relating to the management of spills or leaks and the procedure for responding to an environmental incident is outlined in Section 6 of this CEMP.

1.8 Incidents and Complaints

Details related to the incidents / complaints are outlined in Section 6.2.4 of this CEMP.

2. SCOPE OF THE CEMP

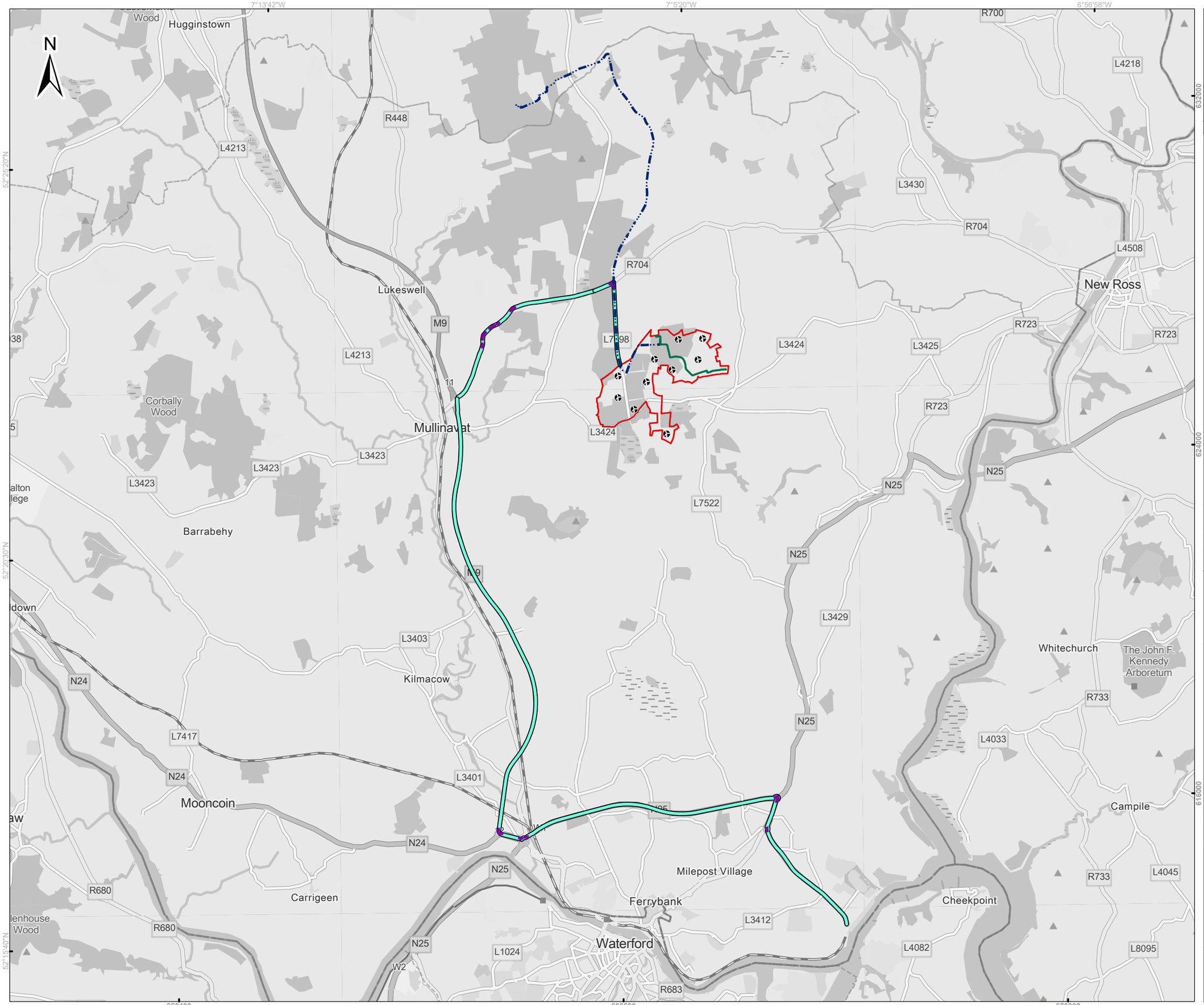
The purpose of this document is to communicate the environmental obligations that apply to all Contractors, their sub-Contractors and personnel while carrying out any form of construction activity for the development of the proposed project.

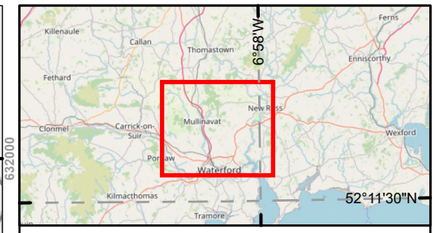
This CEMP should be read in conjunction with the Planning Documents and Drawings, the EIAR, NIS, and the construction stage elements of the Traffic Management Plan (TMP) (see Appendix 16-1 of the EIAR). The CEMP draws from relevant good practice guidance, standards, and codes of practice applicable to the work being undertaken as part of the proposed project. The documents used to prepare the CEMP are listed in the reference section at the end of this document.

The CEMP is a live document that will evolve during the project. As such it will be subject to constant review to address:

- Any conditions attached in the planning permission;
- To ensure it reflects best practice at the time of construction;
- To ensure it incorporates the findings of pre-construction site investigations;
- Changes resulting from the construction methods used by the contractor(s); and
- Unforeseen conditions encountered during construction.

This CEMP provides a mechanism for ensuring compliance with environmental legislation and statutory consents. It defines the approach to environmental management at the site during the construction phase and addresses all relevant environmental aspects of the management of site preparation and construction work within the development works area.





Legend

- Wind Farm Study Area
- Turbine locations
- TDR Works Areas
- Turbine Delivery Route

Grid Connection Options

- Option 1
- Option 2

0 1.5 3
Kilometers

Spatial Reference
Datum: IRENET95
EPSG: 2157

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Rev	Date	Description	By	Chkd.
A	08/12/2025	First issue	S.P	A.M

Client: Manogate Ltd.

Project: Ballyfasy Wind Farm

Title: Figure 2-1: Proposed Project Extent

Scale @ A3: 1:80,000

Prepared by:	Checked by:	Date:
S.Pezzetta	A.Murphy	December 2025

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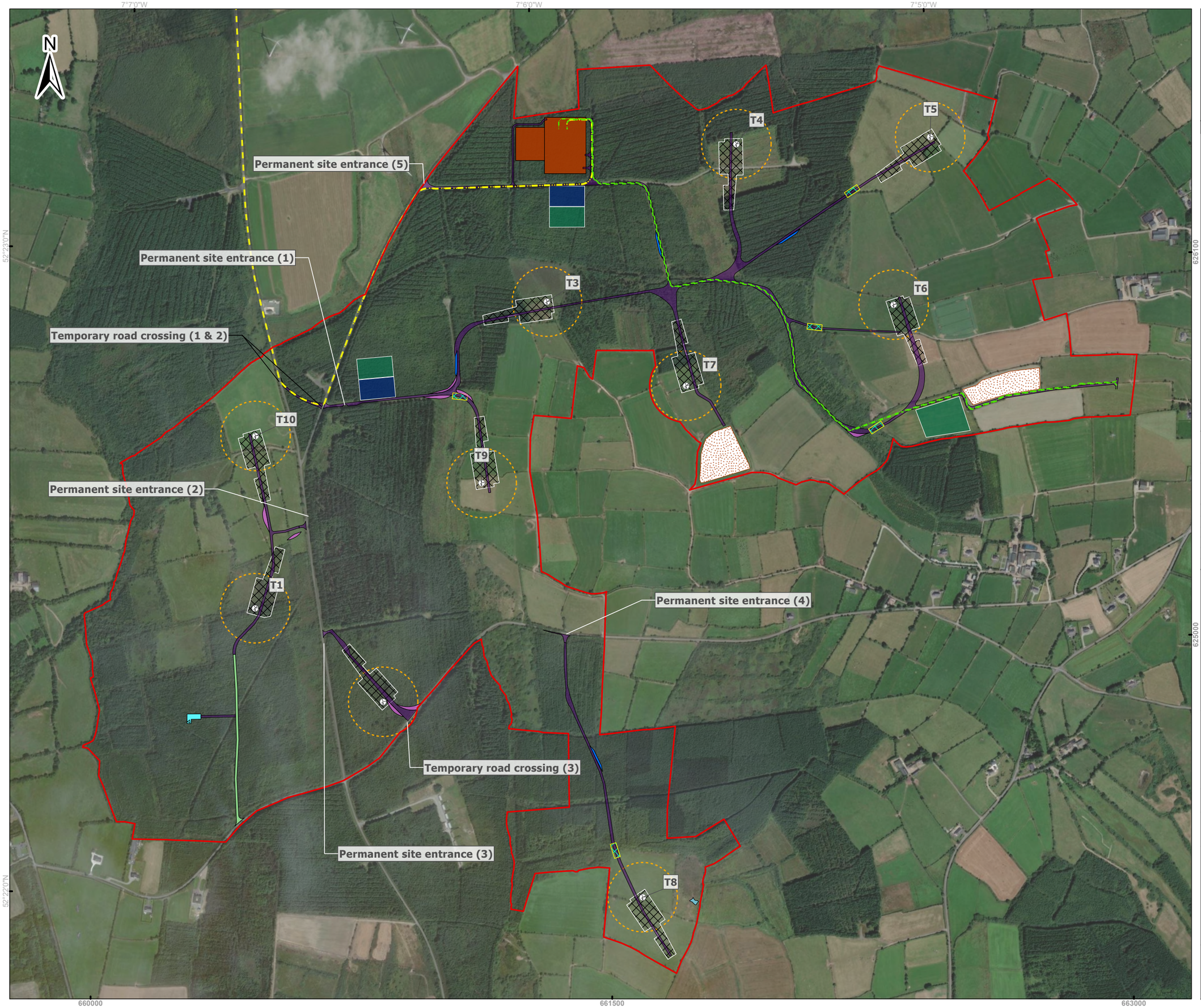

Legend

- Wind Farm Study Area

Grid Connection Options

- Option 1
- Option 2

Site Layout

- Turbine locations
- Bat Buffer
- Hardstand
- Substation
- Compounds
- Met Mast Location
- Borrow Pits
- Proposed Permanent Access Roads
- Proposed Passing Bay
- Existing Road
- Clear Span Bridges
- Proposed Deposition Area
- Oversail Area
- Proposed Pond

0 250 500
Meters

Spatial Reference
Datum: IRENET95
EPSG: 2157

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Client:
Manogate Ltd.

Project:
Ballyfasy Wind Farm

Title:
Figure 2-2:
Wind Farm Site Layout

Scale @ A3: 1:10,000

Prepared by:	Checked by:	Date:
S.Pezzetta	A.Murphy	December 2025

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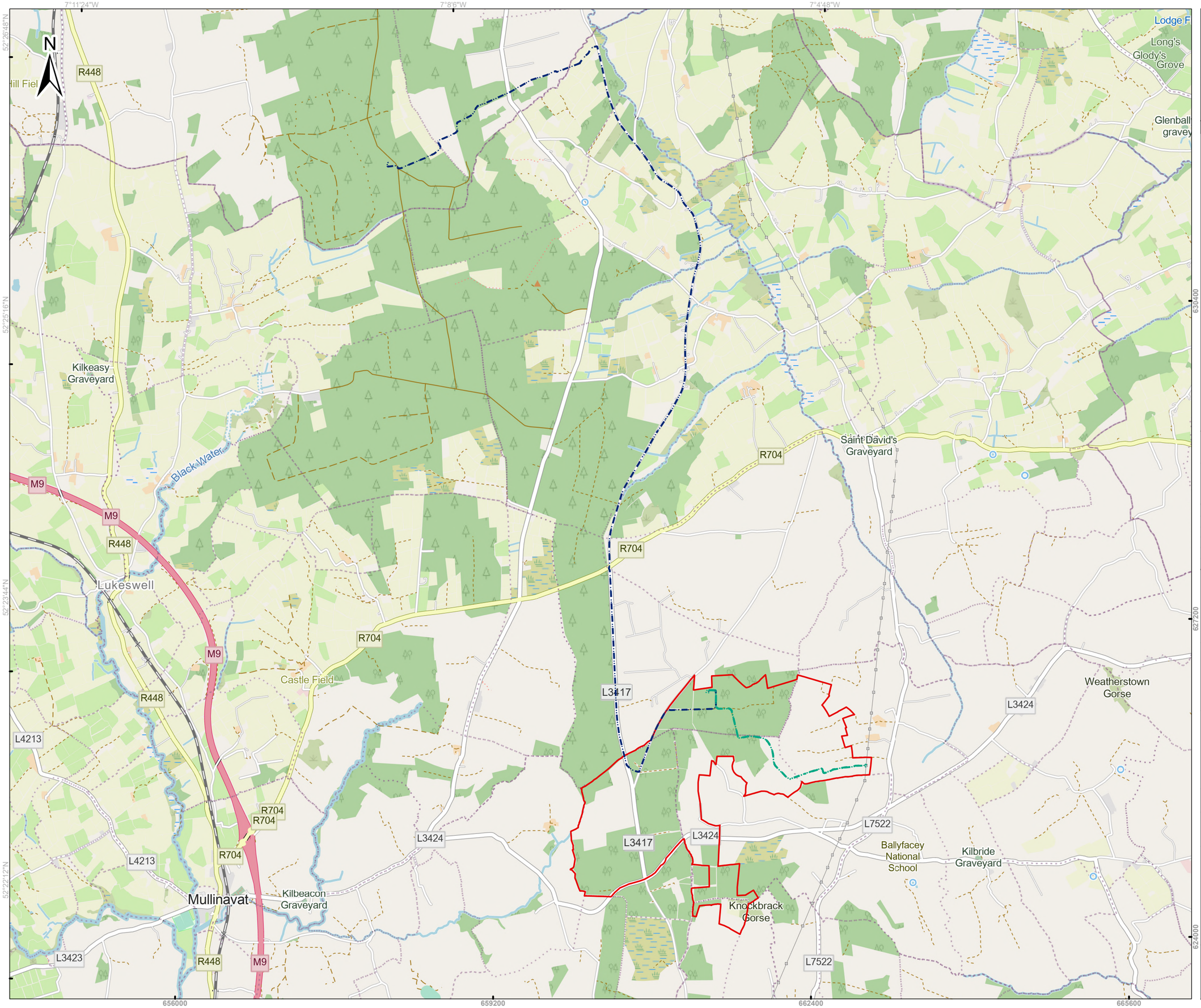

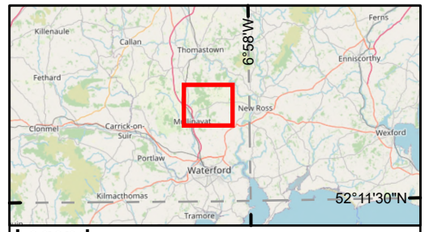

Legend

- Wind Farm Study Area

Grid Connection Options

- Option 1
- Option 2

0 1 2
Kilometers

Spatial Reference
Datum: IRENET95
EPSG: 2157

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Client:
Manogate Ltd.

Project:
Ballyfasy Wind Farm

Title:
Figure 2-3:
Grid Connection Options

Scale @ A3: 1:35,000

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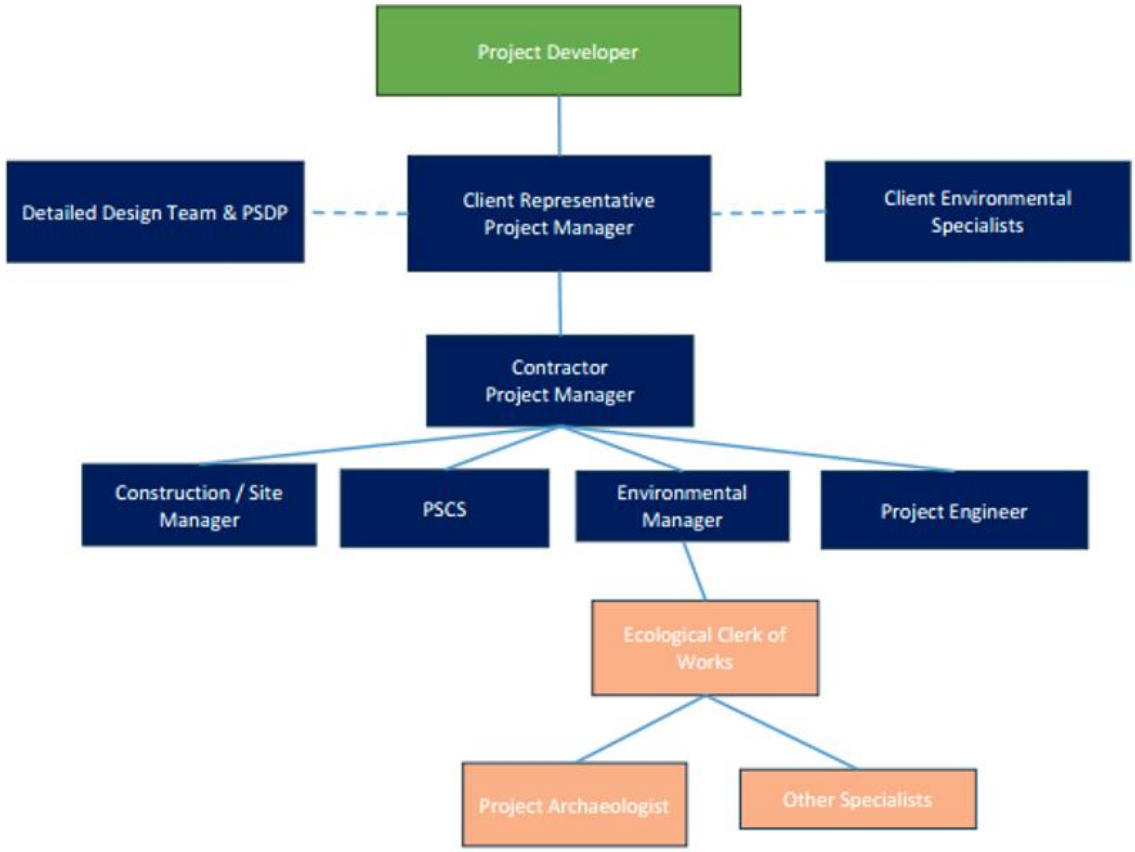
2.1 KEY ROLES AND RESPONSIBILITIES

At this stage it is envisaged that the following roles will be appointed for the construction phase of the proposed project; Construction/ Site Manager; Environmental Manager, Ecological Clerk of Works (ECoW); Project Geotechnical Engineer / Geologist; and Project Archaeologist.

The names and contact details of the individuals with responsibility for implementation and supervision of mitigation measures during all phases of the development will be clearly identified and set out in documents such as the Contractor's CEMP and site- specific method statements as appropriate.

Summary details of these roles are outlined in the following sections. At construction stage, the Contractor's CEMP will confirm roles and finalise responsibilities and contact details once appointed.



2.1.1 Construction Site Manager

A suitably qualified Construction / Site Manager will be appointed by the Contractor for the duration of the construction period. The Construction / Site Manager will have overall responsibility for the organisation and execution of all related environmental activities as appropriate, in accordance with regulatory and project environmental requirements.

2.1.1.1 Environmental Manager

The Environmental Manager will ensure compliance with all relevant environmental regulations, and environmental quality control on-site during the construction stage. The Environmental Manager will be responsible for:

- The daily implementation of the CEMP and any other monitoring/mitigation proposals required under the planning consent;
- Ensuring that the objectives of the CEMP are achieved and maintained;
- Informing the appointed contractor(s) of the CEMP and ensuring that appropriate training and awareness materials are developed and implemented on-site;
- Co-ordinating and monitoring the inputs from the ECoW, Project Geotechnical Engineer and Project Archaeologist;
- Implementing appropriate measures in the event of any environmental incidents and managing communications with relevant authorities; and
- Regular communication with the Construction/Site Manager detailing the execution and progress of environmental activities on-site.

2.1.1.2 Ecological Clerk of Works

The role of the ECoW is defined by British Standard BS 42020:2013[1] as "*person who has the ecological qualifications, training, skills and relevant experience to undertake appropriate monitoring and to provide specialist advice to "development" site personnel on necessary working practices required to i) safeguard ecological features on site and ii) aid compliance with any consents and relevant wildlife legislation related to the works.*".

Typically, the requirements of the ECoW role is largely fulfilled by a single individual, with support and assistance provided by technical specialists and senior colleagues when required, and will include:

- The ECoW (individual or team of individuals) must therefore have appropriate qualifications, training and experience to meet the requirements of the role and in addition, where needed, can access support from senior ecologists within the company with the required qualifications, training and experience;
- The ECoW will have the power to "Stop Works" at any time they deem it necessary to do so;
- The ECoW will be responsible for monitoring compliance with the mitigation measures and construction phase monitoring requirements relating to ecology / biodiversity as set out project EIAR, NIS and supporting documents such as the, CEMP etc.;
- The ECoW will be responsible for the day to day management and interaction with the project Environmental Manager;
- The ECoW will have authority over the content of routine reports and will act independently in determining instances of non-compliance with the consents and licenses or any breaches of environmental legislation;

- The ECoW will provide the contractors team, with advice on environmental issues and compliance with planning conditions, commitments etc. as required. This includes managing certain activities that may be required in discharging consent conditions. The ECoW will inform the Contractor and Project Developer Teams of any information that could increase the risk of a non-compliance and/ or require a new licence, consent or approval.

During construction there will be occasions when the ECoW will be required to rapidly respond to unplanned events such as any wildlife incidents, pollution incidents, etc. The ECoW will have a very specific role within the emergency response teams responding to these incidents. Further detail is provided in Section 6.0. The ECoW will also be expected to support the project team in resolving any other unplanned events that are not classified as emergency responses or incidents.

Non-Compliance Events

The ECoW shall produce a procedure setting out the sequence of actions to be completed and the lines of communication required to resolve and appropriately report on a non-compliance event relating to ecology/biodiversity, should one occur.

This procedure shall be approved by the Project Developers team prior to construction commencing. The ECoW, and any other individual present on-site, has a duty of care to report any wildlife crime or breach of environmental legislation to the Project Developer. The Project Developer must report such breaches to the relevant authorities.

Reporting and Follow up

After the ECoW has responded to an incident or non-compliance event the ECoW will produce a report to the Environmental Manager for approval before it is issued to the Project Developer. The report will set out the following information as a minimum;

- Precise details of the event and those involved;
- Assessment of impact and severity (method for assessment to be developed by ECoW);
- Mitigation introduced;
- Subsequent revision of risk assessments and construction method statements and/or construction programme; and
- Lessons learnt.

Ad-Hoc Advice and Support

The ECoW will provide the Contractors Team, with advice on environmental issues and compliance with planning conditions, commitments etc. as required. This includes managing certain activities that may be required in discharging consent conditions.

2.1.2 Project Geotechnical Engineer / Geologist

The Geotechnical Engineer / Project Geologist will report to the Environmental Manager and is responsible for inspection and review of geotechnical aspects associated with construction stage of the project. The Geotechnical Engineer / Project Geologist will be full time on-site during the site preparation and groundworks (such as excavation activities) and will visit site regularly at agreed periods during the construction phase.

2.1.3 Project Archaeologist

The Project Archaeologist will report to the Environmental Manager and is responsible for inspection and review of any finds discovered during the construction of the project. The Project Archaeologist will monitor all stripping of topsoil for the proposed project, including the proposed grid connection.

2.2 Compliance Audits and Communications

The ECoW and Environmental Manager will develop appropriate procedures and programmes for the following non exhaustive list of items:

- Environmental Audits, a programme of planned and spot check audits shall be developed and approved by the client;
- A programme of toolbox talks shall be developed. Toolbox talks covering relevant topics during construction;
- The ECoW and Environmental Manager will support the project team in producing site induction material tailored to the different activities carried out on site, and ensuring this material is appropriately incorporated into the overall project induction material. This will require attendance to project meetings, and production of material relevant to planning conditions and Environmental Legislation. The toolbox talks and site inductions shall include information on the role of the ECoW in the event of an incident;
- The ECoW shall ensure this information is included in the relevant induction and toolbox talk material. Once the above programmes and plans have been agreed, the Environmental Manager will be responsible for managing these plans and conducting the necessary audits, toolbox talks etc.;
- The ECoW shall check progress, and the Environmental Manager will be reporting on progress against the programmes, plans and status of completed audits, toolbox talks etc to the ECoW on a daily basis;
- The ECoW will be required to report on audits and toolbox talks delivered in the monthly compliance report; and
- Occasionally the ECoW will be required to deliver toolbox talks and produce site induction material depending on the topic being considered.

2.3 Facilities, Safety and Security

The proposed Ballyfasy Wind Farm project will be constructed, in accordance with all relevant Health and Safety Legislation.

Aspects of the development that will present health and safety issues include:

- Health and safety aspects of construction activities;
- General construction site safety (e.g. slip/trip, moving vehicles etc);
- On site traffic safety during construction associated with localised high road embankments;
- Traffic safety during the transport of abnormal loads to the site;
- Lifting of heavy loads overhead using cranes;
- Working at heights; and
- Working with electricity during commissioning.

A (Preliminary) Health and Safety (H&S) Plan covering all aspects of the construction process will address the Health and Safety requirements in detail. This will be prepared prior to the construction stage by the Project Supervisor for the Design Process (PSDP).

Rigorous safety checks will be conducted on the turbines during construction. Signs will be erected at suitable locations across the site as required.

3. CONSTRUCTION PROGRAMME

It is estimated that the construction phase will take approximately 24 months from starting onsite to completion of commissioning of the turbines. Where practical, vegetation clearance that is required during construction works will commence outside the breeding birds season, which runs from the 1st of March to the 31st of August. If any minor clearance or trimming is required within those dates, or if the initial vegetation clearance extends past the 1st of March due to unsuitable weather conditions, the works will be preceded by an ecological survey (from a qualified and suitably experienced ecologist) to ensure there are no sensitivities associated with the action.

The construction phase can be broken down into 5 no. main phases as follows (there will be overlap between these):

- 18 months – Civils (including forestry felling and vegetation clearance, drainage, construction of site roads, hardstands, turbine foundations);
- 9 months – Electrical grid connection/substation installation and commissioning;
- 12 months – Site electrical (installing between turbines and substation, pulling cables);
- 4 months – Turbine deliveries and erection;
- 2 months – Commissioning.

3.1 CONSTRUCTION HOURS

The hours of construction activity will be limited to avoid unsociable hours, where possible. Construction operations will be restricted to between 07:00 hrs and 19:00 hrs Monday to Friday (excluding public holidays) and between 07:00 hrs and 14:00 hrs on Saturdays.

However, during the following critical periods longer hours will be required:

- Concrete pours for turbine foundations;
- During turbine installation when the weather is suitable (i.e. light winds);
- Delivery of oversized loads; and
- In the unlikely event of an emergency (see Section 4 Emergency Response Plan / Procedures of this CEMP).

Any such out of hours working will be agreed in advance with Kilkenny County Council apart from in the case of an emergency and in line with the Schedule of Mitigation requirements of the EIAR (Chapter 19 (Schedule of Mitigation)).

3.1.1 Employment

It is anticipated that 74 persons will be directly employed during the peak construction period.

4. CONSTRUCTION METHODOLOGIES

4.1 OVERVIEW OF CONSTRUCTION METHODOLOGIES

4.1.1 Turbine Hardstand, Foundations and Erections

The topsoil will be stripped where development of the hardstands is proposed. Hardstands will be constructed flat at a level close to existing ground level where possible, with the exception of areas where existing site topography requires the hardstand to be constructed in an area of cut or fill for construction and / or turbine delivery purposes.

Ground investigations in the form of trial pitting, probing, and use of augers have been carried out at the proposed turbine locations and hardstanding locations to inform the depth of excavation and upfill required. Following site visits and site design, volume calculations provide an estimation of fill required for the hardstands. This is predicted to be approximately 70,000 m^3 of stone material. This material volume will be obtained primarily from the on-site borrow pits with only the surface 150 mm layer to come from local quarries which are within reasonable proximity to the site. Each turbine foundation will require 1543 m^3 of concrete which will be sourced from off-site suppliers. No batching of concrete will occur on site. Further site investigations will be undertaken pre construction to inform the site detailed design and all works will be monitored by a geotechnical engineer.

The geotechnical investigations indicate that the foundations at the proposed wind farm will be excavated. Piling is not anticipated to be required.

Each of the turbines to be erected on site will have a reinforced concrete base. Overburden will be stripped off the foundation area to a suitable formation using a 360º excavator. The sides of the excavated areas will be sloped sufficiently (2:1 for mineral soil, 1:1 for rock) to ensure that slippage does not occur.

In the case of gravity foundations, if the formation level is reached at a depth lower than the depth of the foundation, the ground level will have to be raised with clause 804 hardcore material and/or lean mix concrete, compacted in layers as required. An interceptor drain will be formed around the upgradient perimeter of the turbine and hardstand to divert the clean water away from the works. This will outfall out at the lowest point level to a spreader. Water within the excavation will be treated via a settlement pond and level spreader. If the water has a heavy silt load, then an additional measure such as a silt buster will be employed.

An embankment approximately 600 mm high and a fence will be constructed around the perimeter of each turbine base to prevent construction traffic from driving into the excavated hole and also to demarcate the working area. All necessary health and safety signage will be erected to warn of deep excavations etc. Access to and from excavated bases will be formed by excavating a gangway to a standard 1:12 grade, thereby allowing safe passage into/out of the foundation area.

Approved lifting equipment will be used to unload reinforcing steel to required areas. The bottom mat of steel will be fixed prior to the tower cans, if used, being lifted into position and reinforcing steel will be positioned and fixed in accordance with the turbine suppliers' requirements.

Form work to concrete bases will be propped/supported sufficiently to prevent failure by compacting stone around the outside of the forms in addition to straps to prevent

expansion. Concrete for bases will be poured using a concrete pump. After a period of time when the concrete has set sufficiently, the top surface of the concrete surface is to be finished with a power float.

Once the base has sufficient curing time it will be filled with suitable fill (i.e. hardcore) up to existing ground level. The working area around the perimeter of the foundation will be backfilled with suitable material (hardcore). These hardstand areas around the turbines will be levelled, compacted and finished with a suitable surface material for traffic (clause 804 or similar) as per the site access roads and remainder of the hardstand areas.

Turbines will be erected in suitable weather windows (i.e. low wind speed). Following crane setup, the turbine tower sections will be delivered by truck and hoisted into place. This is followed by the nacelle and finally each blade. In accordance with an agreed lifting plan, turbine sections will be lifted by crane into place. Wind speeds will be monitored at all times during lifting operations. Turbine sections will be fitted together by workers within the structure. Following erection of the turbine, lightning protection, lighting and other ancillary components will be installed on the turbine and commissioned.

4.1.2 Turbine Delivery Accommodation Works Area

Where works are needed along the public road corridor to facilitate deliveries to site, they will be agreed in advance with the local authority and carried out to the appropriate road design standard (TII, purple book, etc.) to ensure they will be safe and durable in design.

At the locations where a vehicular surface is needed for the proposed works will start with the clearing of vegetation (grass, hedgerows and scrub), and the topsoil will be stripped and either used locally for landscaping purposes/side cast for later use in local reinstatement or used for borrow pit reinstatement on-site. It will be taken to a local licensed/permitted waste facility if found to contain any contaminants such as bitumen.

Where landscaping does occur, it will be smoothed off with the back of a bucket and seeded with a suitable grass seed mix. Silt control curtains will also be employed within 50 m of a surface watercourse. Suitable fill material (broken stone and clause 804) will be used to create a firm running area for the passage of turbine delivery vehicles. The areas will be fenced off when the delivery is not occurring. After the delivery of turbines to site, the site will be re-instated to the original condition with removal of the temporary surface, and any removed vegetation will be reseeded/replanted with a similar native species composition.

4.1.3 Internal Access Roads and Site Entrances

Site roads will be constructed to each turbine location, and to all proposed site infrastructure, as shown in Figure 2-2. Passing bays will be included along roads strategically. There are two road construction methodologies; upgrading of existing site roads and excavated new road. These are described below in further detail.

Sections of new roads and upgraded roads are shown in EIAR Appendix 1-1 of this EIAR. Where required, the road widths will be increased to form the passing bays.

4.1.3.1 Excavated New Roads

Tracked excavators will be used to carry out excavations. Surplus excavated material will be temporarily stored on site before reuse or removed to a permitted facility.

When the topsoil has been removed and/or the formation layer (bedrock/firm subsoils) has been reached, stone from the on-site borrow pits will be placed to form the road foundation. The sub grade will be compacted with the use of a roller or other similar approved compaction method. The top dressing will be added to the roads at this point. As a final measure to ensure long term stability of the road this layer will be checked and repaired as required after all turbine bases have been poured (i.e. after the heavy wearing traffic is largely finished).

All on-site roads will be maintained for the duration of the construction and operational phases of the project. They will be used for forestry (and agricultural) purposes after decommissioning of the wind farm.

4.1.3.2 Upgrade of Existing Site Roads

The site of the proposed project has an existing network of site roads present which have been incorporated into the proposed design as much as possible.

Where an existing road needs to be widened the same steps as described in the new road construction above will be followed (without excavating the existing road material). There are no significant known constraints running alongside the roads to be upgraded, but where forest or roadside drainage channels are located alongside the road (as they occur frequently through the site), they will be moved as required during dry weather periods where there is no moving water present within. The replacement drain will be constructed as per best practice for forestry drains[1].

Tracked excavators will be used to construct this road type. When the topsoil has been removed and/or the formation layer has been reached, stone from the on-site borrow pits will be placed to form the road foundation. The foundations of the new and existing sections of the road will be built up to the required level. The sub grade will be compacted with the use of a roller or other similar compaction method. The top dressing will be added to the roads at this point. As a final measure to ensure long term stability of the road this layer will be checked and repaired as required after all turbine bases have been poured (i.e. after the heavy wearing traffic is largely finished).

All on-site roads will be maintained for the duration of the construction and operational phases of the project.

4.1.3.3 Site Entrances

There are five permanent site entrances proposed for this project. Four of these are existing entrances which will require modifications. The fifth is a new entrance to facilitate two turbines. There are also three temporary road crossings proposed for this project to enable turbine delivery and reduce the impact on the public road network (see planning drawings in EIAR Appendix 1-1).

4.1.3.4 Clear Span Bridges

Five clear span bridges are required on site to enable access across watercourses. The site access roads will be constructed as far as possible to allow easy access to the works area. Following this, the topsoil will be stripped from the foundation footprint on either side of

[1] Forestry Standards and Procedures, January 2015. Forest Service, Department of Agriculture, Food and the Marine. (Accessed 08/09/25)

the watercourse, taking care to avoid disturbing any part of the watercourse bed or banks. Retaining stone gabion will be placed in the foundation and a concrete base placed on top. Suitable stone fill material (clause 804 or similar) will then be added in layers and compacted to form the base of the foundation. The precast clear-span bridge will be placed onto this either as one or more pieces. This will be put into place by a crane that will be positioned a minimum of 10 m from the watercourse. There will be no requirement for large-scale casting of wet concrete. Following this, barriers will be attached to the sides of the bridge structure.

The construction method will ensure that there is no requirement for in-stream works. This will be sufficiently high off the watercourse to allow unrestricted flow of water beneath. The installation of these bridges will not alter or move the existing watercourse. The bridges will be laid in a manner that will not affect or impede on the existing profile of the watercourse. The foundations and abutments will be constructed without damaging the riparian zone of the watercourse or existing profile. No alteration of the hydraulic characteristics, scouring, deposition or erosion of the watercourse upstream or downstream will occur due to the implementation and operation of the clear span bridges.

The clear span design will maintain the channel profile and not alter the rivers gradient by retaining the natural stream bed and gradient. The water velocity will not be changed and they will be designed to maintain the normal stream width. The foundations of the clear span bridges will be positioned at least 2.5 m away from the edge of the river bank. No damage will occur to the riparian habitat as a result of the installation of the span bridges within 2.5 m of the river.

The bridges will be designed to allow surface water to drain away from the watercourse. The AMO drain will be installed on the lower section of the bridge to ensure the machinery cannot cause discharge of material from the bridge deck into the waters below and will prevent all surface water run to enter the river from the bridge. The water will discharge at a downward slope along the drain to a gravel soak away located >4 m from the bridge. The bridges will not prevent the maintenance of the channel and existing gradient and will have the capacity to convey the full range of river flows including flood flows likely to be encountered without the crossing being over topped. Adequate light will be able to penetrate the river and not cause a reduction in primary production.

4.1.4 110 kV Substation and Electrical Grid Connection Works

The proposed substation has been designed and will be constructed to meet all the required EirGrid/ESB standards.

An area will be levelled and built to the required level with stone fill material, capped by high quality compacted stone. Two control buildings will be constructed using traditional techniques for constructing small buildings (i.e. concrete block walls, timber and slate tile roof). Foundations will be built for all of the proposed electrical infrastructure. All the electrical equipment will be installed to EirGrid/ESB requirements. Perimeter fencing will be constructed around the substation compound for security and safety purposes. Further information on the associated construction methodologies provided in EIAR Appendix 2-2.

A local electricity supply will be made from the nearest suitable power lines at the time of construction in the same way that residential houses are connected. Standard overhead

electricity poles and cables will be installed avoiding sensitive habitats and using a minimal footprint.

Internal cables connecting the wind turbines to the on-site substation will be laid within or immediately adjacent to the on-site access roads. All cables will be laid in underground ducts. Ducts will be installed by open trenching. Where there is a requirement for internal cables to cross watercourses, these will be built into the clear span bridge deck formation or attached to it, or by Horizontal Directional Drilling (HDD) under the watercourse, avoiding any in-stream works.

4.1.4.1 Grid Connection Options

The proposed wind farm will connect to the existing national grid via a 110 kV underground grid connection. The on-site substation and associated grid connection has been assessed in this EIAR, along with the required works to allow connection to the national grid at either the consented Castlebanny Wind Farm substation or on-site loop in to the existing Great Island – Kilkenny overhead line which crosses the east of the wind farm site.

Once fixed into position, the internal site cabling (between turbines and the substation), the substation and the electrical grid connection will all be commissioned. They will remain powered off until the turbines are being commissioned and the wind farm enters into service.

4.1.4.2 110kV Underground Cable Trenches

The number and layout of cables was an important consideration in the design of the proposed wind farm site and both GCOs. Minimum safety distances and angles etc. must always be maintained. This has been a fundamental consideration in determining the final location of the substation buildings and electrical infrastructure. Further information and drawings of the underground 110 kV cable trenches are provided in EIAR Appendix 1-2 of this EIAR, while the associated construction methodologies are provided in EIAR Appendix 2-2. These will be fully complied with when constructing the project.

The 110 kV cables will be installed mainly within an internal access road in the proposed wind farm site, within public roads and across some third party lands. A service/maintenance access road will be put in place over the entire cable option. It is noted that works within the public road corridor will also be subject to further consents/agreements with local authorities, for example a Road Opening Licence as appropriate.

A Traffic Management Plan has been prepared for the proposed project and is included as EIAR Appendix 16-1. This is a living document and will be updated ahead of construction to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by An Coimisiún Pleanála, in the event planning permission/approval is granted. Also, a confirmatory survey of road condition, including the condition of all road water crossings on the route, will be carried out along the proposed GCO in advance of any works.

4.1.4.3 Watercourse crossings

Table 4-1 details the proposed methodologies for crossing the given watercourses involved in the wind farm site and grid connection.

Table 4-1: Watercourse crossing details

Watercourse Crossing No.	Project detail	Proposed crossing methodology	In Stream works required?
1	Grid Connection Option One	Horizontal Directional Drilling	No
2	Grid Connection Option One	Horizontal Directional Drilling	No
3	Grid Connection Option One	Horizontal Directional Drilling	No
4	Grid Connection Option One	Horizontal Directional Drilling	No
5	Grid Connection Option One	Horizontal Directional Drilling	No
6	Grid Connection Option One	Horizontal Directional Drilling	No
7	Grid Connection Option Two (southwest of T6)	Horizontal Directional Drilling	No
8	Internal access road south west of T5	Clear Span Bridge	No
9	Internal access road between T9 and Site Entrance 1	Clear Span Bridge	No
10	Internal access road between T8 and Site Entrance 4	Clear Span Bridge	No
11	Internal access road southwest of T6	Clear Span Bridge	No
12	Internal access road from T6 into main site for operational maintenance	Clear Span Bridge	No

4.1.4.4 Crossing Methodology Directional Drilling

A launch and reception pit is required for directional drilling. Two ducts will be required at each crossing location. There will be a 50 m buffer area maintained either side of the watercourse between the watercourse and works area. A specialised directional drill machine will be anchored to the ground and will drill at a suitable shallow angle to allow it to achieve the required depth for the bore. If ground conditions are unfavourable, the drilling process will need to be repeated using progressively larger drill heads until the required size is achieved. The drilling process involves pumping a drilling fluid through the drill head, which is inert, natural and biodegradable (e.g. Clear Bore™). This fluid will be used sparingly and only as required to avoid an excess and will be appropriately stored in a sealed container >50 m from watercourses when not in use. This fills voids locally around the drill head and enables the drill to progress without the hole collapsing. Should any excess drilling fluid occur, it will be contained and removed for disposal at a licensed waste facility. The duct will be positioned, and the launch and reception pits will be refilled.

Further details of construction methodologies are provided in EIAR Appendix 2-2.

4.1.4.5 Clear Span Bridges

Five clear-span bridges will be used for watercourse crossings on the proposed wind farm site to avoid the requirement for in-stream works. Therefore, there will be no direct effect on the watercourses at the proposed crossing locations and downstream. The clear-span bridge will be sufficiently above the stream to allow unrestricted flow of water beneath. The proposed clear-span bridge locations are shown on Figure 2-2.

4.1.5 Permanent Meteorological Mast

An 100 m meteorological mast will be constructed to the west of the site in the townland of Bishopsmountain (see Figure 2-2). A small stone crane pad will be constructed in front of the proposed mast location. General construction methods for the hard standing will match those described for wind farm hard standings.

The foundation will be excavated followed by shuttering, steel fixing and finally concrete pouring by a ready mix truck. Following crane setup, the mast sections will be delivered and unloaded by truck. In accordance with an agreed lifting plan, mast sections will be lifted into place by crane. Wind speeds will be monitored at all times during lifting operations by the lead climber and crane operator. Mast sections will be bolted together by climbers.

Following erection of main mast sections, lightning protection and other ancillary components will be fixed to the mast.

4.1.6 Forestry Felling

For the footprint of the infrastructure and associated felling buffers, there will be full tree removal.

A report detailing the forestry felling is provided as EIAR Appendix 2-3. It is noted that the clear-felling of trees in the State requires a felling licence. The associated afforestation of alternative lands equivalent in area to those lands being permanently clear felled is also subject to licensing ('afforestation licensing'). The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing.

In light of the foregoing and for the purposes of the proposed project, the Applicant commits that the location of any replanting (alternative afforestation) associated with the project will be greater than 10 km from the proposed wind farm site and also outside any potential hydrological pathways of connectivity i.e. outside the catchment within which the proposed project is located. On this basis, it is reasonable to conclude that there will be no more than imperceptible indirect or in-combination effects associated with the replanting. In addition, the Applicant commits to not commencing the proposed project until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.

4.1.7 Borrow Pits

Material will be extracted from the two on-site borrow pits to avoid the need for large stockpiles of material. There will be some small stockpiling of material as rock is broken/crushed, but these will be kept to a minimum.

Once the required rock has been extracted from each borrow pit, they will be reinstated using any suitable material from the site. Rock and fill material will need to be extracted from a number of proposed turbine foundation locations. In that case, this material will be used where possible to replace the material requirements from borrow pits. The borrow pits will be excavated into the ground and on completion of reinstatement they will be no higher than existing ground level.

During the extraction of the first borrow pit, removed spoil will be stored in a temporary stockpile with appropriate gradient and appropriate mitigation will be used to ensure the protection of downgradient watercourses (e.g. the use of silt fences).

4.1.7.1 Rock Extraction

The rock will be extracted from the proposed borrow pits by rock breaking. Rock breaking is suitable considering the geology and soil conditions at these locations.

A hydraulic rock breaking attachment is fitted to the arm of a large tracked excavator, and this breaks large pieces of rock from the ground. These large rocks are broken down into smaller pieces using these hydraulic rock breaking attachments, until they are small enough for use or to fit into a rock crusher. At that point, a large loader feeds them into a mobile rock crusher, where they are crushed, graded into various sizes, and removed by the loader (and trucks) for use on site. They will be removed as they are produced, and as such there will be no stockpiling apart from the area within the borrow pits adjacent to the crusher. Stockpiles will build up under the conveyor belts of the crusher for use on site.

4.1.7.2 Stone and Fill Requirements

A significant amount of stone and aggregate fill material will be required during construction. This will be used under and around key infrastructure including the turbines, substation, site roads, hardstands and construction compounds.

By sourcing the majority of the required stone volume from the on-site borrow pits the volume of traffic that will occur on public roads in the area will be significantly reduced. Stone from offsite sources will be used for surface dressing, while stone sourced on-site will be used for the initial capping layer.

Hardstands and site roads will be constructed to be above the existing ground level. The lower layer (approximately 450 mm) of this will be lower grade stone, with the top 150 mm being high quality compacted aggregate. Internal cable trenches which connect each turbine to the proposed on-site substation will be 1500 mm deep, with the first 600 mm being backfilled with sand. The excess excavated material will be used for backfilling of the borrow pits to the surface.

4.1.8 Temporary Construction Compounds

Two onsite temporary construction compound areas will be developed on the wind farm site to provide office space, welfare facilities, car parking and hardstands for storing materials. The locations are shown on Figure 2-2. These two compounds will be developed simultaneously.

A third temporary construction compound area will be developed adjacent to the L3418 road within Coillte lands should GCO One be constructed. This compound will be developed to provide parking, welfare facilities, hardstands for storing construction materials and space for excavated road materials to be stored until collected by a permitted facility.

Any mineral soils removed during construction of compounds will be stored for later use in reinstatement on the wind farm site. At the end of the construction phase, the compounds will be removed, with any stone being used towards reinstatement of the on-site borrow pits. After removal of the compounds, the areas will be recovered in soil and replanted with grass/trees.

4.1.9 Temporary deposition areas

Three temporary deposition areas have been identified on the proposed wind farm site, see Figure 2-2. Excavated materials will be temporarily stored at these locations until reused in site construction and landscaping works or removed from site to a permitted facility.

A temporary deposition area is also located along the cable route of GCO One, see Figure 2-3, should this option be constructed.

A Spoil Management Plan (see EIAR Appendix 2-4) has been prepared for this project and will be complied with.

5. CONSTRUCTION MANAGEMENT

5.1 CONSTRUCTION MANAGEMENT

5.1.1 Construction Phase Monitoring and Oversight

The requirement for a CEMP to be prepared in advance of any construction works commencing on any wind farm site and submitted for agreement to the Planning Authority is now well-established.

The construction Contractor will be responsible for implementing the mitigation measures specified in Section 7 of this CEMP and for communicating the requirements with all staff on-site. The implementation of the mitigation measures will be overseen by the supervising site staff, including the Environmental Manager, Ecological Clerk of Works (ECoW), site supervisor, archaeologists and/or geotechnical engineers, as appropriate.

The surface water drainage system will require weekly and daily inspections depending on the construction phase works to ensure that it is working optimally. Settlement ponds will require regular inspection and cleaning where sediment collects. The drainage and treatment system for the proposed wind farm will be monitored more frequently during/after heavy rainfall events during the construction phase. A programme of inspection and maintenance will be designed and dedicated construction personnel assigned to manage the inspection programme.

This CEMP will be a key construction contract document, which will ensure that all mitigation measures, which are considered necessary to protect the environment are implemented.

5.1.2 Construction Activities and Timing

It is anticipated that approximately 74 persons will be employed during the peak construction period (see EIAR Chapter 5) and it is estimated that the construction phase will take approximately 24 months from starting on-site to completion of commissioning of the turbines. With the exception of commercial forestry felling, vegetation clearance will commence outside the breeding birds season, which runs from the 1st of March to the 31st of August to protect any active bird nests and chicks. If any minor clearance or trimming is required within those dates, or if the initial vegetation clearance extends past the 1st of March due to unsuitable weather conditions, the works will be preceded by a confirmatory ecological survey (carried out by a qualified and suitably experienced ecologist) to ensure there are no active bird nests within the vegetation involved. If active bird nests are identified, works will stop and consultation will be undertaken with the National Parks and Wildlife Service (NPWS).

The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations will be restricted to between 07:00 hrs and 19:00 hrs Monday to Friday (excluding public holidays) and between 07:00 hrs and 14:00 hrs on Saturdays.

However, during the following critical periods longer hours will be required:

- Concrete pours for turbine foundations;
- During turbine installation when the weather is suitable (i.e. light winds);
- Delivery of oversized loads; and

- In the unlikely event of an emergency (this is unlikely - see Chapter 17 (Major Accidents and Natural Disasters)).

Any such out of hours working will be agreed in advance with Kilkenny County Council apart from in the case of an emergency.

Due to the volume of concrete required for each turbine foundation, and the requirement for the concrete pours to be continuous, deliveries are often carried out outside normal working hours. Such activities are limited to the day of turbine foundation concrete pours, which are completed in a single day per turbine (can take >12 hours). Because of the scale of the main concrete pours that will be required to construct the proposed wind farm, the main pours will be planned weeks in advance, and refined in the days leading up to the pour. Concrete pours are required for 10 no. wind turbines so they will require 10 days of longer working hours. A similar number of days with longer working hours would be needed for installation of the turbines during a period of calm weather (this is mostly limited to on-site activity).

To accommodate delivery of large turbine components along public routes it could be necessary on occasion to work outside of the core hours, with delivery of these oversized loads in late evenings.

The construction phase can be broken down into 5 no. main phases as follows (there will be overlap between these):

- 18 months – Civils (including forestry felling and vegetation clearance, drainage, construction of site roads, hardstands, turbine foundations);
- 9 months – Electrical grid connection/substation installation and commissioning;
- 12 months – Site electrical (installing between turbines and substation, pulling cables);
- 4 months – Turbine deliveries and erection;
- 2 months – Commissioning.

The phasing and scheduling of the main construction task items are outlined in Figure 5-1 where January 2028 has been selected as a potential start date for construction activities. Where there is overlap between phases, this reflects the anticipated progression of work through the site, with different areas within the site at different stages of completeness.

ID	Task Name	Task Description
1	Site Health and Safety	
2	Site Compounds	Forestry felling & vegetation clearance (avoid Mar – Aug), Construct site compounds, site access, fencing, gates
3	Site Roads	Forestry felling & vegetation clearance, construct roads, install drainage measures, install clear span bridges, install water protection measures
4	Turbine Hardstands	Forestry felling & vegetation clearance , excavate base, construct hardstanding areas
5	Turbine Foundations	Fix steel, erect shuttering, concrete pour
6	Substation Construction & Electrical Works	Construct substation and grid connection, underground cabling between turbines
7	Backfilling & Landscaping	
8	Turbine Delivery and Erection	
9	Substation Commissioning	
10	Turbine Commissioning	

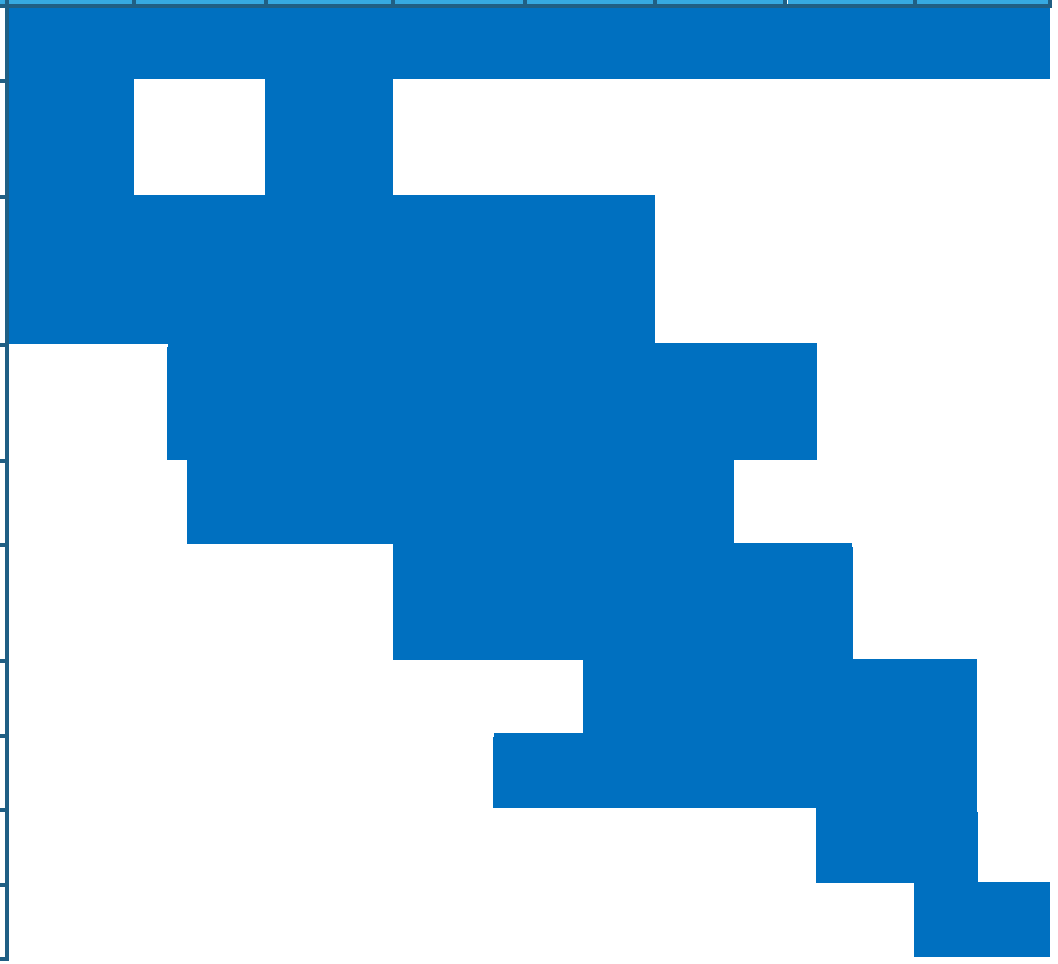


Figure 5-1: Indicative Construction Schedule

5.1.2.1 Wind Farm Construction Sequencing

It is proposed that works will start from the west through upgrade of Site Entrance One and development of the adjacent temporary construction compound and progress east wards. The borrow pit south of turbine T7 will be utilised first with the second borrow pit utilised when required. Turbines T3, T4, T5, T6, T7 and T9 will be completed first within the central plot of the wind farm site, with subsequent plots at turbines T1, T10, T2 and T8 to follow. The substation site construction works will be completed simultaneously with direct access to this area from Site Entrance Five (see Figure 2-2).

5.1.3 Surface Water Management

5.1.3.1 Existing Site Drainage

The proposed wind farm site is located within the Suir and Nore Water Framework Directive catchments (hydrometric areas 15 and 16) in Kilkenny. These catchments are further subdivided into sub-catchments with the site located within the Arrigle_SC_010 and Blackwater Kilmacow SC_020 WFD sub-catchments.

Two watercourses traverse the proposed wind farm site; the Smithstown 15 Stream (a tributary to the Arrigle River) and the Smartcastle Stream. The source of the Smithstown 15 Stream occurs in the north, and flows in a northerly direction for approximately 2.6 km before forming the Arrigle River. The Smartcastle Stream, which is situated towards the south, flows in a southerly direction.

The proposed wind farm site and adjacent lands also include man-made agricultural and forestry drains which flow into the watercourses mentioned above. These are primarily used to assist in the drainage of forestry and agricultural land-use.

5.1.3.2 Drainage and Silt Control

The proposed surface water drainage system utilises sustainable drainage devices and methods. The measures outlined in this project have been developed in adherence to the CIRIA (Construction Industry Research and Information Association) C648 (Control of water pollution from linear construction projects) guidance, and that guidance has itself been developed based on site experience in Ireland and the UK over recent decades.

A Surface Water Management Plan (SWMP) has been prepared (see EIAR Appendix 2-8). The purpose of this plan is to ensure that all works are conducted in an environmentally responsible manner so as to minimise any potential adverse impacts from the proposed project on surface water quality. The plan incorporates the following specific objectives:

- Provide overall surface water management principles and guidelines for all phases of the proposed project;
- Address erosion, sedimentation and other water quality issues; and
- Present measures and management practices for the prevention and/or mitigation of potential downstream impacts.

Construction Phase

During the construction phase, all run-off from construction areas will be controlled and treated to reduce suspended solids concentration prior to being discharged into the

existing drainage network or overland. Examples of proprietary silt control measures are illustrated on Plate 5-1.

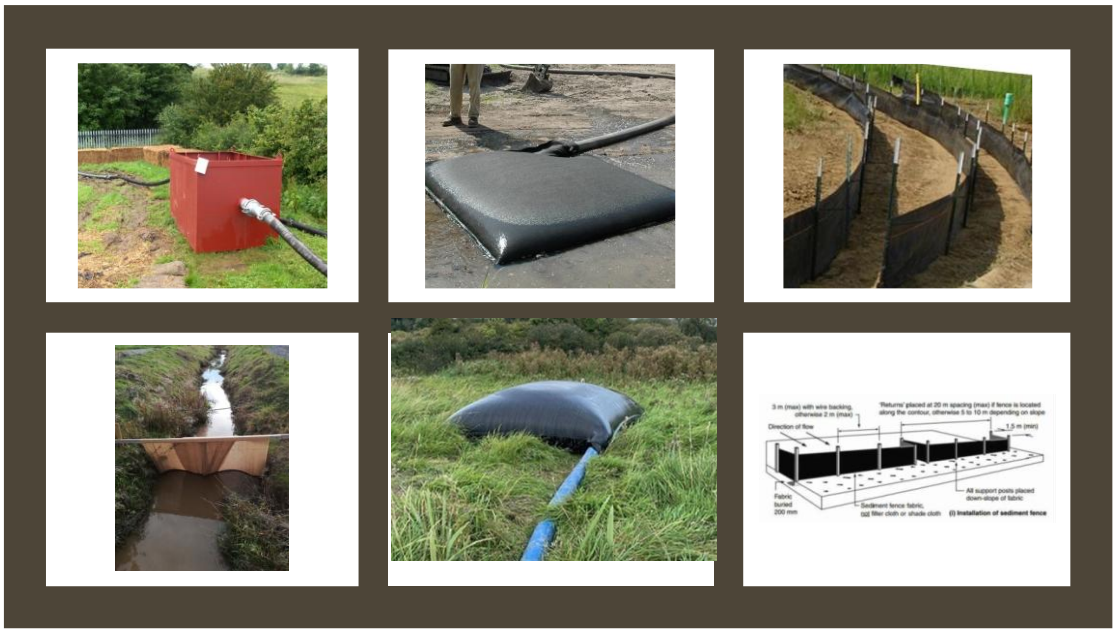


Plate 5-1 Examples of Proprietary Silt Control measures

Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. These flows will discharge diffusely overland, within the buffer zone before entering any watercourse. Regular cross flow and energy dissipation devices will be installed to divert overland flows and prevent these flows from entering the borrow pits. An overview of the surface water drainage system to be used across the proposed wind farm site during the construction phase is provided in Plate 5-2.

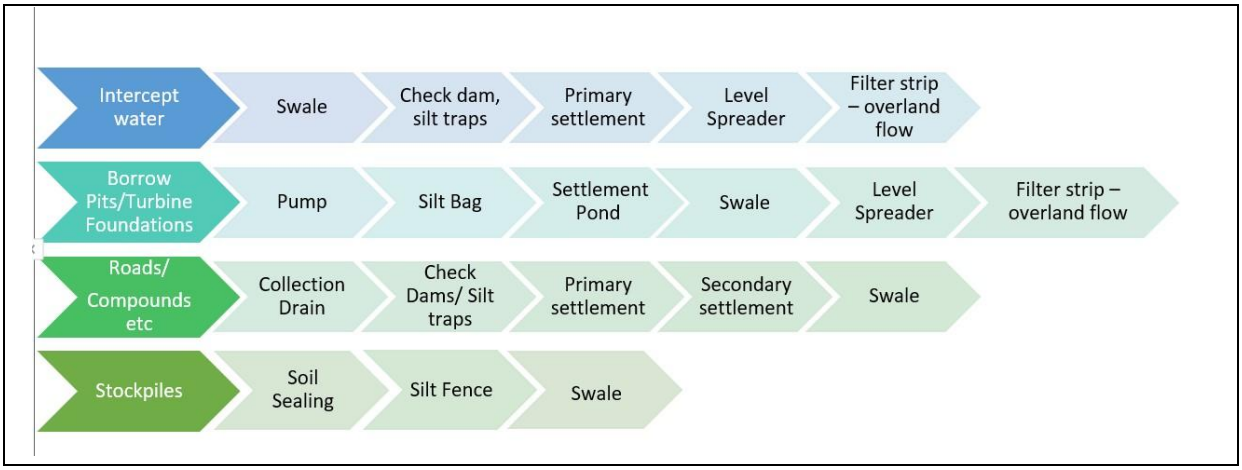


Plate 5-2 Treatment train

A number of temporary settlement ponds will be established during the construction phase along the proposed internal access roads and in areas of high construction activity (adjacent to turbine foundations, borrow pits, construction compounds etc.) to minimise silt laden run-off entering the drainage network. The settlement ponds will be designed to provide sufficient retention time and a low velocity environment to allow suspended solids to fall out of suspension prior to allowing the water to outfall to the receiving environment.

Surface water runoff from hardstanding areas will be collected and discharged to associated settlement ponds adjacent to the proposed infrastructure. It will then be managed by gravity flow at greenfield runoff rates (i.e. the runoff of the site at natural rates without development). These level spreaders/diffusers will be used where overland discharge of water is carried out. The level spreader will prevent soil erosion at these locations by spreading out and slowing down the water, see Plate 5-3.

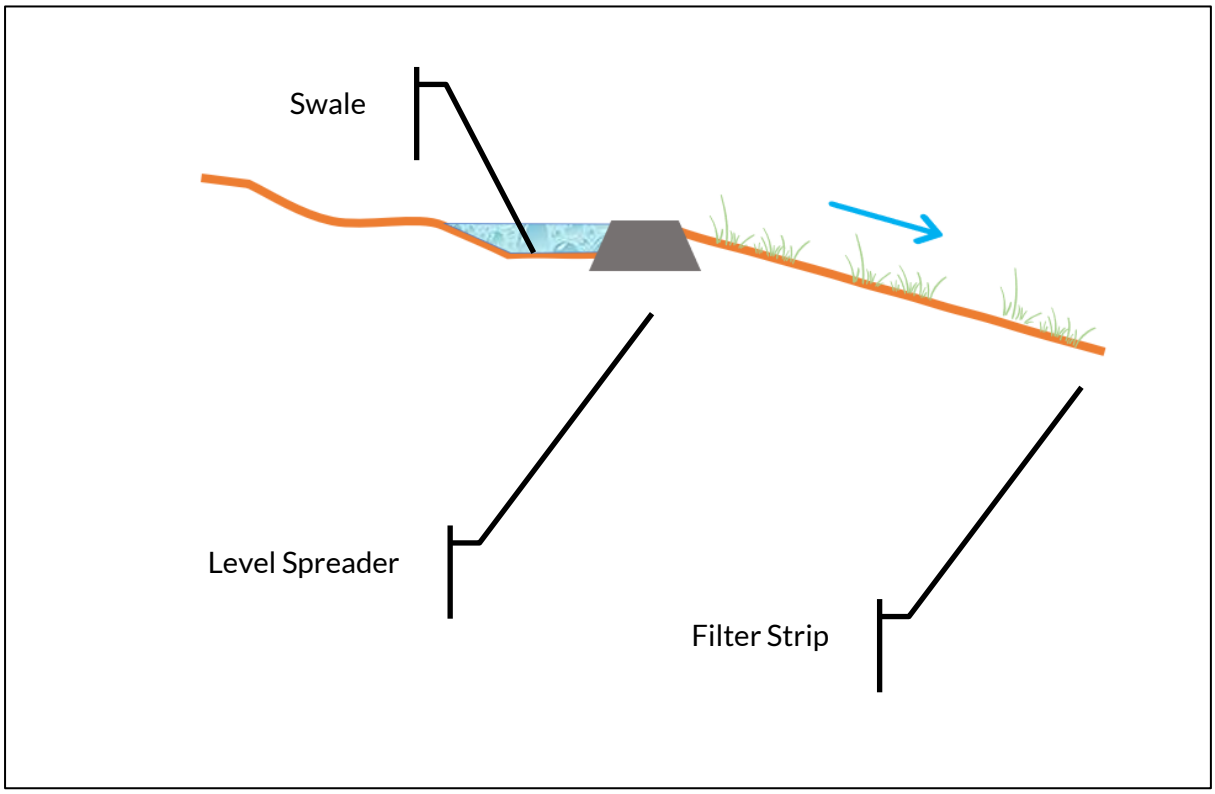


Plate 5-3 Conceptual Level Spreader and Filter Strip

5.1.3.3 Culverts & Clear Span Bridges

Culverts will be required where site roads or hardstands cross minor forest drain networks. The use of culverts will only be employed for minor field/forest drains.

The use of a clear-span bridges will be used for vehicles crossing the Smartcastle Stream and Smithstown 15 Stream (tributary to the Arrigle River). Therefore, there will be no direct effect on these streams at each proposed crossing location and downstream. Each clear-span bridge will be sufficiently above the stream to allow unrestricted flow of water beneath. The proposed clear-span bridge locations are shown on Figure 2-2 and the design details are provided in EIAR Appendix 1-1.

5.1.4 Environmental Management

5.1.4.1 Concrete deliveries and pouring

Primarily ready-mixed concrete will be used during the construction phase, with all concrete being delivered from batching plants in sealed concrete delivery trucks. Localised mixing will be used for small tasks such as blockwork for building the substation. The use of ready-mixed concrete deliveries will eliminate any potential environmental risks from large scale on-site batching. When concrete is delivered to site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the site. Concrete trucks will be washed out fully at the batching plant, where facilities are already in place. The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area. These residual liquids and solids will be collected by an appropriately licensed waste collector. Where temporary lined impermeable containment areas are used, such containment areas are excavated and lined with an impermeable membrane. This washout will be located near Site Entrance One and also at any significant concrete pour locations (e.g. at turbine hardstand during a foundation pour) so that it is easily accessed when departing. An example of a concrete washout is shown in Plate 5-4.

Plate 5-4 Example of a temporary concrete washout facility

Although unlikely to happen any disposal of surplus concrete after completion of a pour will be off-site at the concrete production facility. Localised mixing of concrete for blockwork, etc. will only be carried out as needed, but any small volume of surplus will be disposed of in the concrete washout area.

5.1.4.2 Refuelling

Any easily manoeuvrable road-going vehicles (i.e. cars, jeeps, lorries etc.) will be refuelled off-site. For any vehicles which are slow moving or tracked or those for whom regular trips off-site to refuel will not be practical, on-site fuelling will be required.

A limited amount of fuel will need to be stored on the site within the construction compounds for this purpose, and this will be within a double skinned and bunded mobile tank which can be moved around the site using a 4x4 vehicle to refuel. This will be stored in the construction compound when not in use.

A spill kit in the form of a supply of fuel absorbent material and mats and a drip tray will be kept with the tank at all times. The drip tray and fuel absorbent mats will be used at all times during refuelling. Similar spill kits will be stored in each construction compound, and at the on-site substation in case of emergency.

In line with best practice, no refuelling will be carried out within 50 m of a watercourse. Only designated trained and competent operatives will be authorised to refuel plant on site.

In the event of an accidental fuel spill, the source of the spill will be fixed, fuel will be contained and cleaned as quickly as possible using the fuel absorbent material in the spill kits. The incident will be reported to the site manager and Environmental Clerk of Works, and appropriate remediation will be carried out (i.e. soil removal for safe disposal at a licensed waste facility by licensed waste collectors.

5.1.4.3 Dust suppression

In periods of extended dry weather, dust suppression will be necessary along haul roads and along the site roads to ensure dust does not cause a nuisance to any residential properties long the route. If necessary, during a period of extended dry weather, water will be taken from settling ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and site compounds to prevent the generation of dust. Silty or oily water will not be used for dust suppression, because this will 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 would lead to increased risk of runoff.

5.1.4.4 Waste Management

Best practice in waste management will be employed during all phases of the proposed project, with a view to reducing, reusing, recycling and recovering waste produced, in that order of preference. Waste disposal will be avoided where possible. The following sections outline the Waste Management Plan (WMP) and waste management practices associated with the proposed project, which will be in accordance with relevant provisions of the Waste Framework Directive (Directive 2008/98/EC on waste), the Waste Management Act 1996 as well as all other Irish and EU legislation.

Waste Management Plan

The main site Contractor will ensure that all waste contractors have the correct permits for any waste streams they are removing from site, and that they are taking it to the appropriately licensed/permitted waste facilities. They will also ensure that all parts of the WMP will be implemented onsite. All waste generated from the construction phase will be managed in accordance with the provisions of the Waste Management Act 1996 as amended and associated Regulations. In line with good industry practice, the following measures will be implemented on site by the appointed Contractor for the duration of construction:

- Ensure all excavated topsoil and subsoils will be reused within the site boundary, insofar as possible, primarily for reinstatement of the borrow pits. Any excess material which cannot be reused onsite will be transferred offsite to a licensed

waste facility. Similarly, any excess or unsuitable rock material which cannot be reinstated in the borrow pits will be transferred off-site.

- Ensure that any excess material which cannot be reused will be transferred off-site to a suitable licensed waste facility. Similarly, any excess or unsuitable soil / rock material which cannot be reinstated will be transferred off-site.
- Ensure typical waste streams (such as metals, paper, cardboard, plastics, wood, rubber, textiles, bio-waste, packaging, WEEE (electronic waste, batteries, accumulators and construction waste) will be managed, collected, segregated and stored in separate area(s) at the site before being removed off site by a licensed waste management contractor at regular intervals for the duration of the construction works;
- Provide skips and bins of appropriate sizes onsite in a designated area(s) and used to maximise source segregation of waste materials. This will include food and packaging waste from canteen and welfare facilities. Appropriate control of food waste in the compound will minimise the potential for pests and rodents to visit the area;
- Any contaminated materials used for spills and equipment maintenance works will be separately stored in a suitable container for collection by the appointed authorised hazardous waste contractor(s);
- Encourage all staff to minimise waste generation and to maximise the segregation of waste at source. Material wastage will be avoided by delivering only the required quantities of material to site and utilising off-site manufacturing of materials as much as possible;
- Establish 'just-in-time deliveries to avoid excess material storage at the site which can lead to waste generation. Delivery drivers will be encouraged to remove any excess packaging from materials delivered to site and remove unused timber pallets where possible;
- Reusable formwork for concrete pouring will be used where possible, in preference of non-reusable options. Other opportunities for material reuse across the site will be sought by the appointed Contractor;
- Due to the current nature / use of the site (commercial forestry / agriculture), it is not anticipated that there will be contaminated soils or materials encountered during the excavation works. No contaminated soils were identified during the site investigation works.
- It is noted that illegal dumping is common in large forestry areas and may be encountered at the time of construction. Where illegal dumping is discovered, appropriate communication and measures will be taken to try and identify the source of the illegal waste. The appropriate authorities will be notified, and the materials will be removed from site by authorised waste collection contractors and transferred to suitably licensed waste facilities:
- The Environmental Manager, or other appropriate person, will be designated by the appointed Contractor as the Waste Manager for the duration of the project in accordance with the general guidance set out in the Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects, published by the EPA in November 2021;

- At the pre-construction stage, the Waste Manager will be in a position to require fellow designers to take full advantage of all reasonable C&D waste prevention, reuse and recycling opportunities;
- During construction, the practicalities of waste prevention, salvaging re-useable materials, and the need to synchronise the recycling of waste materials through the timing of their use in the new construction works will be emphasised by the appointed Waste Manager.

5.1.4.5 Vehicle Management

Vehicles will be kept on site access roads for the vast majority of the construction phase, however in the initial construction phases, there will be some requirement for off-road vehicle movements (for forestry felling, ground works, etc.). For forestry felling, standard practices and equipment/vehicles will be used (as described in the Forestry Report – see EIAR Appendix 2-3).

For ground works and other off-road activity, the use of specialist vehicles that are tracked or use large low ground pressure tyres or bog mats which distribute their weight evenly across a large surface area will be used. These will minimise ground disturbance and therefore minimise the risk of sediment entering downstream watercourses.

All vehicles will be restricted to the areas where works are required, and unnecessary off-road movements around the wider site will be avoided. Where there are any sensitive habitats present around a proposed work area, these areas will be marked out so that vehicles will not enter and damage them.

5.1.4.6 Vehicle Washing

Wheels or vehicle underbodies will be washed before leaving sites to prevent the build-up of mud on public (and site) roads. Site roads will be already formed using on-site materials before other 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.

However, in accordance with best practice and to avoid the potential for the transfer of alien invasive plant species into the site, it is proposed to install a self-contained wheel-wash system. Water will be supplied for this using a water bowser.

A road sweeper will be available if any section of the surrounding public roads becomes soiled by vehicles associated with the proposed project.

During the operational phase, the on-site access roads will be maintained in good condition, and any vehicles that need to access the site will be keeping on these surfaces. As a result of this, and the low volume of traffic expected on site, it is not anticipated that a wheel washing facility would be required during the operational phase or decommissioning.

5.1.4.7 Spoil Management

The use of the borrow pits will be phased. This will allow materials to be permanently placed in the first borrow pit while the second is in use, thereby minimizing the volume of soils requiring temporary storage. In order to further reduce temporary storage requirements,

soils and turves will be reinstated around infrastructure as part of restoration and landscaping works. This will be carried out during the construction phase, as soon as is practical after the completion of the works in any one area of the site. Approximately 90,000 m^3 will be excavated from the borrow pits on-site.

Where the proposed project footprint is located on any mineral-based soil, this material will be side-cast and profiled as close to the excavation areas as practical. In the case where other adjacent infrastructure or constraint features might prevent side-casting, it will be used to reinstate the borrow pits. The sides of the excavated areas will be battered/sloped sufficiently to ensure that slippage does not occur (2:1 for mineral soil). The excavated side cast material will be smoothed with the back of an excavator bucket and surrounded by silt fences to minimise the potential for sediment-laden run-off occurrence. Side-casting will not occur within 50 m of a watercourse. The side-cast material will be used later in backfilling the working area around the turbine foundations, or for landscaping locally or reinstatement elsewhere on site (such as the borrow pits). Further information on the spoil management is provided in EIAR Appendix 2-4.

Where side-casting is not possible, topsoil and sub-soil will be stockpiled separately. Turves will be stored turf side up and will not be allowed to dry out. Stockpiles will be isolated from any surface drains and a minimum of 50 m away from watercourses, and will be located at points with easy access to internal roads within the proposed borrow pit areas which have not yet been extracted. Measures that will be employed will include interceptor ditches around these areas (with sediment traps within these), deployment of double silt curtains and seeding of the piles will be incorporated to prevent runoff of suspended solids and soil erosion. No permanent spoil or stockpiles will be left on site.

Where available, vegetative sods/turves or other topsoil in keeping with the surrounding vegetation type will be used to provide a dressing for the final surface. Where sods/turves are not available, some seeding with native species will be carried out. This method for restoration of excavated or disturbed areas is to encourage stabilisation and early establishment of vegetation cover.

To prevent erosion and run-off and to facilitate vegetation reinstatement, any sloped soil embankment will be graded such that the slope angle is not too steep (i.e. 1:3) and that embankments match the surrounding ground profile.

5.1.4.8 Traffic Management

A Traffic Management Plan (TMP) for the construction phase of the proposed project is included as EIAR Appendix 16-1. This TMP will be agreed in advance with the Local Authority and updated as appropriate.

6. ENVIRONMENTAL EMERGENCY RESPONSE PLAN / PROCEDURES

6.1 HAZARD IDENTIFICATION

In order to establish the type of potential emergencies that may occur, the hazards outlined in Table 6-1 have been identified as being potential situations that may require an emergency response they occur.

Table 6-1: Potential Hazards Identified

Hazard Type	Emergency Incident
Plant / Machinery/tools causing damage	Accident resulting in injury / power failure / loss of critical infrastructure
Spillages / Leaks	Accidental spill / leak leading to significant environmental contamination
Flooding	Accident leading to injury / damage to site infrastructure
Severe Weather	Accident leading to injury / damage to site infrastructure
Fire / Explosion	Accident leading to injury / damage to site infrastructure
Turbine Collapse	Accident leading to injury / damage to site infrastructure
Landslide	Accident leading to injury / damage to site infrastructure
On-site/Construction Traffic – plant/machinery and construction vehicle movements	Traffic accident leading to injury / damage to site infrastructure
Wind Turbine Rotational Failure	Accident leading to injury / damage to site infrastructure

6.2 ENVIRONMENTAL EMERGENCY RESPONSE PROCEDURES

Every effort will be made to prevent environmental emergencies and incidents during the construction and operational phase of the project.

The Contractor will be responsible for developing a detailed environmental Emergency Response Plan (ERP) for the proposed construction works, environmental emergencies, as part of the H&S Plan.

This ERP will be activated in the event of an environmental emergency such as a fire, spillage, structure collapse etc. and will provide details on who is required to be notified etc. The ERP will also include details of all personnel inducted and authorised to work on the site.

In the event of an environmental emergency, the Environmental Manager, ECoW and Project Manager will be notified immediately and will determine the scale of the emergency and the requirement for the assistance of emergency services. Works will cease in the area of the incident and contact will be maintained with the emergency services to direct them to the scene of the incident as required.

If necessary, the Environmental Manager, with support from the ECoW will inform the appropriate regulatory authority depending on the nature of the incident. Details of the incident will be recorded (e.g. cause, extent, actions and remedial measures).

A record of all environmental incidents will be kept on file by the Environmental Manager. These records will be made available to the relevant authorities if required.

Furthermore, the Environmental Manager and ECoW will be responsible for outlining corrective actions required and will advise the Contractor and Project Developer Teams as appropriate.

The ERP must include contact names and telephone numbers for the relevant local authorities (all sections/departments) including ambulance, fire brigade, An Garda Siochána and the HSA. Reporting of environmental emergencies to the local authority will be required as well as other relevant stakeholders such as IFI, NPWS or the EPA.

6.2.1 ECoW Responsibilities

During construction there will be occasions when the ECoW will be required to rapidly respond to unplanned events such as any wildlife incidents, pollution incidents, etc.

The ECoW will have a very specific role within the emergency response teams responding to these incidents.

The ECoW will also be expected to support the project team in resolving any other unplanned events that are not classified as emergency responses or incidents.

6.2.2 Site Evacuation and Fire Drills

A site evacuation/fire drill procedure will be developed to provide basis for carrying out the immediate evacuation of all site personnel in the event of an emergency. At induction, all personnel will be made aware of the evacuation procedure. The Fire Services Acts of 1981 and 2003 require the holding of fire safety evacuation drills at specific intervals and maintaining records of such drills. The details of this procedure will be finalised in the Contractor's CEMP at construction stage and will include:

- Details regarding the notification of emergency situations to all those on site including use of a siren/horn to notify all personnel;
- Details of assembly point(s) and signage;
- Details of the roll call procedure to account for all personnel on site;
- Communication process between the Site Security Officer and the Site Manager during the procedure (i.e. notification of roll count etc.); and
- Course of action to be undertaken by the Site Manager.

6.2.3 Spill Response and Control

A detailed spill response and control procedure will be developed and finalised in the Contractor's CEMP at construction stage, outlining the steps that will be followed in the event of an oil / fuel spill occurring, including:

- Identification and blocking of the source of the spill;
- Alerting personnel in the vicinity of the spill and any possible dangers;
- Elimination of any potential ignition sources in the vicinity of the spill;
- Spill containment approach and spill control materials;
- Covering or bunding off of any vulnerable areas where appropriate (i.e. drains, streams, sensitive habitats);
- Clean up using the spill control materials;
- Containment and disposal of used spill control materials;

- Communication with the ECoW – providing relevant information on the location, type and extent of the spill so that they can take appropriate action;
- ECoW actions including inspection of the site, making certain necessary measures are in place to manage the spill and prevent further spillage; and
- ECoW notification to the appropriate regulatory body if necessary.

6.2.4 Incidents / Complaints

All safety or environmental incidents associated with the project will be reported and investigated in line with the ERP. Typically, the following procedures will be followed in the event of an incident:

- Works will stop immediately where safe to do so;
- The Environmental Manager will be contacted;
- The size of the incident will be assessed and determined if it can be controlled by site staff or if emergency services are required to attend;
- The appropriate enforcing authority will be contacted;
- The Environmental Manager will investigate after the incident;
- The findings will be sent to the appropriate authority; and
- An action plan will be prepared to set out any modifications to working practices required to prevent a recurrence.

This section sets out a procedure to manage and resolve any complaints received from members of the public during the construction phase of the proposed project. The following measures will be adopted and refined, as necessary, taking account of any relevant planning conditions.

The following measures will be implemented to deal with complaints and the Contractor's CEMP will contain more specific details with regard to phone numbers to contact:

- Clearly display a notice board at the site entrance so that the public know whom to contact if they have a complaint or comment;
- Personnel on site, including sub-contractors are required to perform their duties in accordance with this CEMP, and in such a way as to minimise the risk of complaints from third parties;
- All complaints received regarding the construction works will be recorded and categorised (e.g. noise, property damage, traffic, dust etc.) within a central Site Complaints Log. This complaints log will include the following key details:
    - Name, address and contact details of the complainant (with the complainant's permission);
    - Brief outline of the complaint;
    - Date of Complaint;
    - Name of person receiving complaint details; and
    - Agreed timeline for response to complaint.
- All complaints will be communicated to the Project Manager and the Project Developer immediately;
- All complaints will be followed up and resolved in so far as is practicable; and
- The complainant, Project Developer and other stakeholders will be kept informed of the progress in resolving the complaint.

6.2.5 Emergency Contact Details

A list of emergency contacts is presented in Table 6-2. 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 6-2: List of Emergency Contacts

Contact	Telephone
Emergency Services – Ambulance, Fire, Gardaí	112 / 999
Local Garda Station – Ballyhale	+353567768602
Local Fire Service	999 or 112
Local Doctor / GP Service – Mullinavat Health Centre	051 898244
Waterford Regional Hospital	(051) 848 000
ESB Faults / Emergencies	1850 372 999
Gas Networks Ireland 24hr Emergency Line	1850 20 50 50
Site Manager / Construction Manager / Site Supervisor	TBC
Client: Manogate Limited	TBC
Ecological Clerk of Works (ECoW)	TBC
Environmental Manager	TBC
Project Supervisor Design Stage (PSDS)	TBC
Project Supervisor Construction Stage (PSCS)	TBC
Health and Safety Authority Ireland (HSA)	TBC
Inland Fisheries Ireland (IFI)	TBC
Project Ecologist	TBC
Project Hydrologist	TBC
Project Geotechnical Engineer / Geologist	TBC
Project Archaeologist	TBC

6.3 Emergency Communication Procedure

The Contractor's CEMP will be updated with an agreed Emergency Communication Response Procedure following appointment of the Contractor.

6.4 Induction Checklist

Table 6-3 provides a list of items highlighted in the Emergency Response Procedure (ERP) which must be included in the induction or gathered from all personnel that will work on the proposed project during the mandatory site induction. This will be revised throughout the various stages of the project. This list will be updated and expanded on within the Contractor's CEMP.

Table 6-3: Site Induction Checklist

Emergency Response Plan – Site Induction Items TBC	Status
Site Induction (all personnel must undergo the site induction prior to commencing work on-site)	
All personnel must be made aware of site evacuation and fire drill procedures	
All personnel must be made aware of the spill response and control procedure	
All personnel must be made aware of environmental incident procedures	
All personnel must be made aware of incident and complaints procedures	
All personnel must be made aware of the emergency communication procedure and Emergency Contact Details for the project	
All personnel must be made aware and have access to the Site Safety Manual	
All personnel must be made aware of the personnel tracking procedure and provide their contact details at induction	

7. MITIGATION AND MONITORING MEASURES AGREED

All mitigation and monitoring measures relating to the proposed project are set out in the various sections of the project EIAR, and Natura Impact Statement (NIS) prepared as part of the planning applications for this project.

Tables 7-1 and 7-2 lists these mitigation measures. These tables are intended to provide a review list that can be easily checked and reported on during the future phases of the project. The use of a table to present the information will be further expanded upon over the course of the proposed project and will provide a template for use during site compliance audits.

Table 7-1: Table of EIAR Mitigation Measures

Ref No.	Related to	Location	Mitigation Measure	Monitoring
Pre-construction Phase				
Description of Proposed Project				
MM1	Environmental Management – Construction Environmental Management Plan (CEMP)	EIAR Chapter 2	The CEMP will be updated prior to commencement of development to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned and will be submitted to the planning authority for written approval. The Contractor will be responsible for implementing the mitigation measures specified in the EIAR and CEMP and for communicating the requirements with all staff on-site. Their implementation of the mitigation measures will be overseen by the supervising environmental manager/clerk of works, ecologists, archaeologists and/or geotechnical engineers, as appropriate.	As required through the Contractor's CEMP.
MM3	Health and Safety	EIAR Chapter 2	A Project Supervisor Design Process (PSDP) and Project Supervisor Construction Stage (PSCS) are required to be appointed in accordance with the provisions of the Safety, Health and Welfare at Work (Construction) Regulations.	As required through the Contractor's CEMP and the Health and Safety Plan.
MM4	Surface Water Drainage System	EIAR Chapter 2 and Chapter 9	Silt fences will be installed prior to the commence of works to protect any downgradient watercourses.	As required through the Contractor's CEMP and the Surface Water Management Plan (EIAR Appendix 2-8).
MM5	Traffic Management	EIAR Chapter 2 and Chapter 16	A Traffic Management Plan (TMP) has been prepared for the proposed project and is included as EIAR Appendix 16-1. This is a living document and will be updated ahead of construction to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by An Coimisiún Pleanála, in the event planning permission/approval is granted.	As required through the Contractor's CEMP and TMP.
MM6	Road condition	EIAR Chapter 16	A confirmatory survey of the road condition, including the condition of all road water crossings along GCO One (if proceeding), will be carried out in advance of any works.	As required through the Contractor's CEMP and TMP.
Biodiversity				

Ref No.	Related to	Location	Mitigation Measure	Monitoring
MM7	Ecological Clerk of Works (ECoW)	Chapter 6 and Chapter 7	An ECoW will be appointed to the project pre construction. The ECoW will be responsible for pre-construction surveying and monitoring compliance with the EIAR and Natura Impact Statement (NIS) mitigation measures and construction phase monitoring requirements relating to ecology/biodiversity.	As required through the Contractor's CEMP.
MM8	Otter	EIAR Chapter 6	Pre-construction confirmatory surveys prior to the commencement of any works will be carried out by a competent ecologist to identify any changes in otter activity or holt/couch locations within the proposed project. Otter surveys will be undertaken no more than 10—12 months in advance of the construction works as per the advice in the NRA	As required through the Contractor's CEMP.
MM9	Habitat Protection	EIAR Chapter 6	Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes (NRA, 2006) will be followed to ensure that any vegetation which is to be retained is given protection during the construction phase: • All areas of hedgerows which are required to be retained as part of the proposed project will be demarcated to ensure that only habitat outside of these areas are subject to removal/fragmentation; • If a tree is required to be felled, it will be assessed by an arborist/tree surgeon on how best to fell in order to avoid impact to the surrounding habitats and determine the proficient size of a root protection area (RPA). The RPA will be defined based upon the recommendation of a qualified arborist; • The area within the RPA will not be used for vehicle/machinery parking or the storage of any materials (including soils, oils and chemicals). The storage of hazardous materials (e.g., hydrocarbons) or concrete washout areas will also not be undertaken within 5 m of any retained trees, hedgerows and treelines; • A qualified arborist will assess the condition of, and advise on any repair works necessary to, any trees which are to be retained or that lie outside of the proposed project but whose RPA is impacted by the works. Any remedial works required will be carried out by a qualified arborist; and	As required through the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			• A buffer zone of at least 5 m will be maintained between construction works and retained hedgerows to ensure that the RPA are not damaged.	
			Any drains (FW4 habitat) which are to be retained as part of the proposed project will be demarcated to ensure that only habitat outside of these areas are subject to removal.	As required through the Contractor's CEMP.
			All areas of wet grassland (GS4 habitat) at turbine T3 which are required to be retained as part of the proposed project will be demarcated to ensure that only habitat outside of these areas are subject to removal. This area is adjacent to wet heath habitat (HH3) and demarcation of the area will be done under guidance and supervision of the Ecological Clerk of Works (ECoW). To ensure that no direct impact occurs within the footprint of the HH3 habitat, the entire area of wet heath adjacent to T3 will be fenced off to ensure no construction phase vehicles, machinery, personnel and/or works take place within this area of habitat, including personnel and machinery undertaking conifer felling as part of the bat buffer at T3. Demarcation of the area will be done so under guidance and supervision of the ECoW. In order to prevent additional surface water from entering this HH3 habitat, drainage at T3 will be directed to flow westerly away from this area. This will ensure no change to the habitat type as a result of surface water.	As required through the Contractor's CEMP.
MM10	Common Frog	EIAR Chapter 6	Common frog will be surveyed during the appropriate season (February to June) in advance of any works at drainage ditches where the common frog may spawn. If recorded, a method statement will be prepared to detail specific measures to translocate the frogs and spawn, by hand or net, to suitable nearby habitat that will not be impacted by the proposed project. The method statement will be used to inform the application to NPWS for a licence to capture and relocate spawn and frogs.	As required through the Contractor's CEMP.
Ornithology				
MM11	Bird protection	EIAR Chapter 7	A Bird Protection Plan (BPP) will be produced prior to construction as set out in EIAR Chapter 7.	As required through the Contractor's CEMP and the BPP.
Material Assets				
MM12	Underground Services	EIAR Chapter 11	Prior to the commencement of the construction phase the applicant will engagement with all utility asset owners / service providers;	As required through the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			• A confirmatory survey of all existing services (electrical/ESB, water/Uisce Éireann, gas/Gas Networks Ireland (GNI), telecoms cables etc.) will be carried out prior to construction to verify the assumptions in this report and identify the precise locations of any services. Where assets / services are identified, the Applicant will liaise with the service provider; • Utility assets / services (underground and overhead) will be identified and clearly marked prior to any pre-construction (site clearance) / construction / demolition activity occurring; • No excavations will take place without prior consultation with relevant utility asset owners / service providers; • Digging around existing services, if present, will be carried out as per best practice/guidance[2] by hand to minimise the potential for accidental damage; • Prior to any mechanical excavation taking place ESBN will be consulted with and the exact locations of all underground electricity cables established and verified; • All works undertaken in the vicinity of underground assets will be carried out in accordance with current HSA guidance, namely the HSA 'Code of Practice for Avoiding Danger from Underground Services'; • All works will be undertaken with in accordance with the exclusion and safe operating distances around electricity infrastructure as set out in the ESB Code of Practice, as well as HSA guidance including the 'Code of Practice for Avoiding Danger from Overhead Electricity Lines'; • Any proposed works will require a minimum clearance distance of 1 m either side of electrical cables; and • Liaison with asset owners / service providers will continue as required throughout the construction phase.	
Archaeology				
MM13	Archaeological Investigations	EIAR Chapter 15	Prior to the commencement of construction, a programme of archaeological test trenching will be carried out at the greenfield	As required through the Contractor's CEMP.

[2] https://www.gasnetworks.ie/home/safety/dial-before-you-dig/
Transmission Policies and Standards (eirgridgroup.com)/ Publications (esbnetworks.ie)

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			locations of the proposed wind farm development and cable route. Additionally, the area required for accommodation works for the TDR within the ZoN of AH43 will be subject to archaeological testing, in advance of construction. These investigations will be carried out under licence to the National Monuments Service of the DoHLGH. Dependant on the results of the assessment and if archaeological remains are identified, further mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require agreement from the National Monuments Service of the DoHLGH.	
			Lime kiln (CH35) is located within the proposed hardstand for Turbine 10, and will be demolished during construction of the proposed project. The lime kiln will be subject to a detailed photographic and written record prior to the construction of the proposed project, carried out by a suitably qualified archaeologist.	
Traffic and Transport				
MM14	Traffic: Pre-Construction Condition Survey	EIAR Chapter 16	The client will undertake pre-construction and post-construction visual pavement surveys on the Haul Roads. Where the surveys conclude that damage on the roadway is attributable to the Construction Phase of the proposed project, the applicant will fund the appropriate reinstatement works to bring the road back to pre-construction condition as a minimum, details for which will be agreed with the Roads Authorities.	As required through the Contractor's CEMP and TMP.
MM15	Sightlines	EIAR Chapter 16	Maintenance of the hedgerows within the visibility splays shall be undertaken to maintain the required visibility splays and mitigate the potential for overgrown vegetation which may result in inadequate visibility at the access and crossing points during the construction activities.	As required through the Contractor's CEMP and TMP.
Construction Phase				
Description of Proposed Project				
MM16	Construction Hours	EIAR Chapter 2	The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations will generally be restricted to between 07:00 hrs and 19:00 hrs Monday to Friday (excluding public holidays) and between 07:00 hrs and 14:00 hrs on Saturdays. However, during the following critical periods longer hours will be required: • Concrete pours for turbine foundations;	As required through the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			• During turbine installation when the weather is suitable (i.e. light winds); • Delivery of oversized loads; and • In the unlikely event of an emergency (this is unlikely - see Chapter 17 (Major Accidents and Natural Disasters)). Any such out of hours working will be agreed in advance with Kilkenny County Council apart from in the case of an emergency.	
MM17	Surface Water Drainage / Silt Control	EIAR Chapter 2	The surface water drainage system will have weekly and daily inspections depending on the construction phase works to ensure that it is working optimally. Settlement ponds will have regular inspection and cleaning where sediment collects. The drainage and treatment system for the proposed wind farm will be monitored more frequently during/after heavy rainfall events during the construction phase. A programme of inspection and maintenance will be designed and dedicated construction personnel assigned to manage the inspection programme.	As required through the Contractor's CEMP and SWMP.
MM18	Concrete Deliveries & Pouring	EIAR Chapter 2	Primarily ready-mixed concrete will be used during the construction phase, with all concrete being delivered from local batching plants in sealed concrete delivery trucks. Localised mixing will be used for small tasks such as blockwork for building the substation. The use of ready-mixed concrete deliveries will eliminate any potential environmental risks from large scale on-site batching. When concrete is delivered to site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the site. Concrete trucks will be washed out fully at the batching plant, where facilities are already in place. The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area. These residual liquids and solids will be collected by an appropriately licensed waste collector. Where temporary lined impermeable containment areas are used, such containment areas are excavated and lined with an impermeable membrane. This washout will be located near Site Entrance One and also at any significant concrete pour locations (e.g. at turbine hardstand during a foundation pour) so that it is easily accessed when departing. Although unlikely to happen any disposal of surplus concrete after completion of a pour will be off-site at the concrete production facility. Localised mixing of concrete for blockwork, etc. will only be carried out	As required through the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			as needed, but any small volume of surplus will be disposed of in the concrete washout area.	
MM19	Refuelling	EIAR Chapter 2	Any easily manoeuvrable road-going vehicles (i.e. cars, jeeps, lorries etc) will be refuelled off-site. For any vehicles which are slow moving or tracked or those for whom regular trips off-site to refuel will not be practical, on-site fuelling will be required.	As required through the Contractor's CEMP.
			A limited amount of fuel will need to be stored on the site within the construction compounds for this purpose, and this will be within a double skinned and bunded mobile tank which can be moved around the site using a 4x4 vehicle to refuel. This will be stored in the construction compound when not in use.	
			A spill kit in the form of a supply of fuel absorbent material and mats and a drip tray will be kept with the tank at all times. The drip tray and fuel absorbent mats will be used at all times during refuelling. Similar spill kits will be stored in each construction compound, and at the on-site substation in case of emergency.	
			No refuelling will be carried out within 50 m of a stream. Only designated trained and competent operatives will be authorised to refuel plant on site.	
			In the event of an accidental fuel spill, the source of the spill will be fixed, fuel will be contained and cleaned as quickly as possible using the fuel absorbent material in the spill kits. The incident will be reported to the site manager and Environmental Manager, and appropriate remediation will be carried out (i.e. soil removal for safe disposal at a licensed waste facility by licensed waste collectors.	
MM20	Waste Management	EIAR Chapter 2	Waste disposal will be avoided where possible. The Waste Management Plan and waste management practices associated with the proposed project will be in accordance with relevant provisions of the Waste Framework Directive (Directive 2008/98/EC on waste), the Waste Management Act 1996 as well as all other Irish and EU legislation. The main site contractor will appoint an Environmental Clerk of Works who will ensure that all waste contractors have the correct permits for any waste streams they are removing from site, and that they are taking it to the appropriately licensed/permitted waste facilities. This includes any waste produced along GSO One (if constructed) from works occurring in the existing public road. They will also ensure that all parts of the Waste Management Plan will be implemented.	As required through the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
MM21	Spoil Management	EIAR Chapter 2	The use of the borrow pits will be phased. This will allow materials to be permanently placed in the first borrow pit while the second is in use, thereby minimizing the volume of soils requiring temporary storage. In order to further reduce temporary storage requirements, soils and turves will be reinstated around infrastructure as part of restoration and landscaping works. This will be carried out during the construction phase, as soon as is practical after the completion of the works in any one area of the site.	As required through the Contractor's CEMP.
			Where the proposed project footprint is located on any mineral-based soil, this material will be side-cast and profiled as close to the excavation areas as practical. In the case where other adjacent infrastructure or constraint features might prevent side-casting, it will be used to reinstate the borrow pits. The sides of the excavated areas will be battered/sloped sufficiently to ensure that slippage does not occur (2:1 for mineral soil). The excavated side cast material will be smoothed with the back of an excavator bucket and surrounded by silt fences to minimise the potential for sediment-laden run-off occurrence. Side-casting will not occur within 50 m of a watercourse. The side-cast material will be used later in backfilling the working area around the turbine foundations, or for landscaping locally or reinstatement elsewhere on site (such as the borrow pits).	
			Where side-casting is not possible, topsoil and sub-soil should be stockpiled separately. Turves will be stored turf side up and will not be allowed to dry out. Stockpiles are to be isolated from any surface drains and a minimum of 50 m away from watercourses, and will be located at points with easy access to internal roads within the proposed borrow pit areas which have not yet been extracted. Measures that will be employed will include interceptor ditches around these areas, deployment of double silt curtains and seeding of the piles will be incorporated to prevent runoff of suspended solids and soil erosion. No permanent spoil or stockpiles will be left on site.	
			Where available, vegetative sods/turves or other topsoil in keeping with the surrounding vegetation type will be used to provide a dressing for the final surface. Where sods/turves are not available, some seeding with native species will be carried out. This method for restoration of excavated or disturbed areas is to encourage stabilisation and early establishment of vegetation cover.	

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			To prevent erosion and run-off and to facilitate vegetation reinstatement, any sloped soil embankment will be graded such that the slope angle is not too steep (i.e. 1:3) and that embankments match the surrounding ground profile.	
MM22	Health and Safety	EIAR Chapter 2 and Chapter 5	A Health and Safety Plan covering all aspects of the construction process will address the Health and Safety requirements in detail. This will be prepared prior to the construction stage.	As required through the Contractor's CEMP.
			The scale and scope of the project requires that a Project Supervisor Design Process (PSDP) and Project Supervisor Construction Stage (PSCS) are required to be appointed in accordance with the provisions of the Safety, Health and Welfare at Work (Construction) Regulations.	
Population and Human Health				
MM23	Health & Safety	EIAR Chapter 5	All activities carried out by the appointed Contractor during the construction phase will be in accordance with the requirements of the Safety, Health and Welfare at Work Act 2005 as amended and Regulations made under this Act. A Health and Safety Plan covering all aspects of the construction process will detail Health and Safety requirements. At the procurement stage, the Health and Safety Plan will be prepared on a preliminary basis and developed further at construction stage, with all hazards and risks identified and assessed.	As required through the Contractor's CEMP.
MM24	Turbine Delivery Route (TDR)	EIAR Chapter 5	The TDR works will be carried out to the relevant construction and road safety guidelines, and will allow for the proposed turbine dimensions. Turbine components will be being transported at night when there is less traffic on the road, and will be accompanied by Garda escort.	As required through the Contractor's CEMP.
Biodiversity				
MM25	Forestry Felling	EIAR Chapter 6 and Chapter 7	With the exception of commercial forestry felling, hedgerow and tree vegetation clearance will commence outside the breeding birds season, which runs from the 1st of March to the 31st of August to protect any active bird nests and chicks. If any minor clearance or trimming is required within those dates, or if the initial vegetation clearance extends past the 1st of March due to unsuitable weather conditions, the works will be preceded by a confirmatory ecological survey (carried out by a qualified and suitably experienced ecologist) to ensure there are no active bird nests within the vegetation involved. If active bird nests are identified, works will stop and consultation will be undertaken with the National Parks and Wildlife Service (NPWS).	As required through the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
MM26	Water Quality Protection	EIAR Chapter 6 and Chapter 9	The Inland Fisheries Ireland (IFI) 2016 guidelines 'Guidelines on Protection of Fisheries During Construction Works and in Adjacent to Waters' will also be adhered to. For example, at the bridge crossing locations, the foundations of the clear span bridges will be positioned at least 2.5 m from a watercourse. All temporary crossings of watercourses will ensure the passage of water, fish and macroinvertebrates and will ensure erosion and sedimentation do not occur. Any discharged water during the construction phase will be in the rage of pH 6-9 and will not alter the pH of receiving waters by+/- 0.5 units. Furthermore, suspended solids in any discharged waters will not exceed 25 mg/l.	As required through the Contractor's CEMP.
MM27	Horizontal Directional Drilling (HDD)	EIAR Chapter 6 and Chapter 9	HDD will be used to cross watercourses by grid connection cables. This will avoid the need for instream works. The following mitigations are included to protect watercourses during HDD: • A competent and experienced Contractor will be appointed to undertake the horizontal directional drilling works; • The Contractor will prepare a directional drilling Method Statement which will outline the standard approach for the construction. The Method Statement will include a contingency plan for frac-out and for excessive ground settlement; • The Contractor will undertake the directional drilling in accordance with industry best practice including British Standard EN 16191:2014 Tunnelling machinery, safety requirements and CIRIA C648 'Control of water pollution from linear construction projects Technical Guidance' (CIRIA, 2006); • The Contractor will ensure that all personnel working on site are trained in pollution incident control response. A regular review of weather forecasts of heavy rainfall is required, with the Contractor required to prepare a contingency plan for before and after such events; • Weather conditions will be considered when planning construction activities to minimise the risk of runoff from site; • There will be no storage of fuels within 30 m of the watercourse;	As required through the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring

			• Provision of exclusion zones and barriers (silt fences) between any excavated material and any surface water features will be installed to prevent sediment washing into the receiving water environment. Silt fences will be installed and the contractor will ensure that silt fences are regularly inspected and maintained during the construction phase;
			• If dewatering is required as part of the works (e.g., in trenches for underground cabling or in wet areas), water must be treated prior to discharge;
			• To prevent loss of bentonite or 'frac-out' from occurring, a series of actions will be implemented; the drill fluids operator will monitor drill fluid density, viscosity and solids content on an ongoing basis, to ensure that the fluid does not increase in viscosity, requiring additional pressure to maintain mobility;
			• In critical cases, viscometers will be used to measure drill fluid gel strength and shear strength. Filtrate can also be measured to calculate the amount of filter cake building up on the internal wall of the bore. Any increases in pump pressure experienced by the drill operator will be investigated immediately to prevent the risk of pressure build up within the annulus. In some circumstances, dependant on the drilling equipment used, the pilot drill borehole assembly will be fitted with a down hole pressure monitor to measure pressure in the annulus between the drill and the bore wall. This will give an early indication of pressure build up in the hole and allow the drill operator to prevent a 'frac-out'. If there is a risk of a 'frac-out' a number of measures will be implemented including:
			  ○ Pumping a pill of drilling fluid with a higher density to the risk zone; and
			  ○ Circulate and pump loss circulation material (typically cork or manufactured inert polymers) to the risk zone to seal the risk zone, grouting of the risk zone, and, or launch a packer before the risk zone.	

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			• The Contractor will implement procedures to maximise the recirculation or reuse of drilling fluid to minimise waste disposal; • Disposal of drilling fluids will be the responsibility of the Contractor to an approved and licenced waste facility; • Monitoring of the drilling operations will be undertaken at all times by the Contractor. The monitoring will include visual inspection of the pits and monitoring of the volume of returns flowing back to the entry pit. The monitoring personnel will be in constant communication with the drilling rig operator and thus will be able to immediately cease drilling if necessary; and • Buffer strips of natural uncleared vegetation shall be preserved between construction activity. Reception pits will be situated outside of the riparian zone. A buffer zone width for smaller channels (<10 m) of 20 m or greater will be maintained.	
MM28	Broadleaved woodland (WD1 habitat)	EIAR Chapter 6	The removal of broad leaved woodland for the project will be mitigated by the planting of native broad leave woodland at the onsite compound sites.	As required through the Contractor's CEMP.
MM29	Otter	EIAR Chapter 6	Twilight working hours (i.e., time between dawn and sunrise and dusk and sunset), especially at the clear span bridge locations, will be restricted as far as possible. Otter are crepuscular species and as such disturbance will be reduced by restricting the amount of twilight working hours.	As required through the Contractor's CEMP.
MM30	Bats	EIAR Chapter 6	A 100 m buffer zone which is established from each turbine during the construction phase will be maintained throughout the operational phase of the proposed project.	As required through the Contractor's CEMP.
Ornithology				
MM31	Bird Protection	EIAR Chapter 7	The Bird Protection Plan (BPP) will be followed (see pre-construction mitigation and EIAR Chapter 7).	As required by the Contractor's CEMP and BPP.
Land, Soils and Geology				
MM32	Land Use	EIAR Chapter 8	Vegetation clearance will be kept to a minimum. Construction vehicles will be restricted to designated areas and access roads in order to avoid effecting adjacent habitats and to ensure that soil compaction is restricted to these areas.	As required by the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			All disturbed ground outside of the permanent footprint will be fully reinstated following the completion of the works.	
			Biodiversity enhancement measures will be undertaken to improve ecological habitats as detailed in EIAR Chapter 6 Biodiversity.	
MM33	Soil protection	EIAR Chapter 8	The CEMP and Spoil Management Plan (EIAR Appendix 2-4) will be fully implemented to ensure proper handling, storage, and reuse of soils.	As required by the Contractor's CEMP.
			Hazardous substances (fuel, oils, chemicals) will be stored in bunded areas (110% capacity) with impermeable bases.	
			Spill response protocols include secondary containment, drip trays, supervised refuelling, and impermeable refuelling zones will be implemented.	
			Topsoil & subsoil will be stored separately (max. 3 m height), protected from contamination, and handled in dry conditions.	
MM34	Potential for contamination - Concrete/cement management	EIAR Chapter 8	Contractors will be required to provide a designated bin for washing down the chutes of concrete lorries on site.	As required by the Contractor's CEMP.
			Wash down and washout of concrete transporting vehicles will not take place on site. It is proposed to washout at the (offsite) source concrete batching site to prevent cementitious material and water entering the surface water network.	
			Waste material will be removed from site to an appropriate waste permit facility.	
			Disposal of excess concrete on any part of the construction site will be prohibited.	
MM35	Soil Compaction and Erosion	EIAR Chapter 8	Landscaping areas will be sealed and levelled using the back of an excavator bucket to minimise the potential for erosion. The upper vegetative layer will be stored with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface to prevent erosion.	As required by the Contractor's CEMP.
			The borrow pit deposition area surfaces will be stabilised by the establishment of natural vegetation.	
			Where mineral soil is not directly suitable for construction it will be used for reinstatement works and will be geo-engineered as necessary.	
			The construction traffic will utilise the permanent access road network for access and egress, and this access will be constructed in advance of other ground works in a sequential manner.	

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			Soils, overburden, and rock will be reused on site to reinstate any excavations where appropriate.	
			Access tracks will be constructed first to allow for access within the proposed project. Vehicular movements will be restricted to the footprint of the proposed project, particularly with respect to the newly constructed access tracks. This means that machinery must be kept to the tracks and aside from advancing excavations do not move onto areas that are not permitted for the development, such as areas which have not been designated for access or infrastructure.	
			Construction of internal electricity transmission cables will present similar, but lower-level risks, to the construction risks outlined above, and the same mitigation measures will be adopted as above. Surplus material from the onsite roads will be reused on site in the borrow pits or on road upgrades.	
MM36	Proposed grid connection and works areas of the proposed TDR	EIAR Chapter 8	The majority of the proposed GCO One cabling will be laid in the public road. Construction method statements and templates will be implemented to ensure that the proposed GCO infrastructure is installed in accordance with the correct requirements, materials, and specifications of ESBN and EirGrid. The ducts will be installed and the trenches will be reinstated in accordance with ESBN/EirGrid, private third-party landowners and County Council specifications.	As required by the Contractor's CEMP.
			For concrete and asphalt/bitmac road sections, it is proposed to carry out immediate permanent reinstatement in accordance with the specification and to the approval of the local authority and/or private landowners, unless otherwise agreed with the local authority. Surplus excavated bitmac material will be brought to a recycling facility for processing in accordance with the circular economy approach.	
			For offroad i.e. access tracks/grass sections, the cable section will be laid within an existing access track. Silt fences will be utilised along the offroad sections. Short sections (<50m) will be excavated and reinstated on a phased basis with suitable excavated material to ground level and finish in a gravel track as per the EirGrid/ESBN specification. By limiting the excavated sections, the potential for compact or erosion is limited.	
Hydrology and Hydrogeology				
MM37	Surface Water Quality	EIAR Chapter 9	The SWMP will be implemented by the appointed contractor and will be regularly audited throughout the construction phase. The Environmental Manager will be required to stop works on site if he/she	As required by the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			is of the opinion that a mitigation measure or corrective action is not being appropriately or effectively implemented.	
			Local surface water features at the proposed wind farm site boundary will be monitored pre-construction and during construction to take account of any variations in the quality of the local surface water environment as a result of activities related to the proposed wind farm site. Inspections of silt traps are critical after prolonged or intense rainfall while maintenance will ensure maximum effectiveness of the proposed measures. Stockpiles will be evaluated and monitored and kept stable for safety and to minimise erosion. Turbidity monitors/alarms will be strategically placed upgradient and downgradient of the works to assess the effects, if any, of the main construction works including bridge crossings and turbine base construction. Elevated turbidity could result from a number of on-site construction activities or from off-site sources i.e. erosion, forestry or agricultural activities. Where elevated turbidity is noted both upstream and downstream, visual checks will be undertaken. All monitoring equipment will be calibrated regularly to ensure that results are accurately measured. Corrective Actions would include: • Investigate whether channels used to convey water are protected with vegetation, erosion control blankets, or a similar erosion control measure. If not, implement appropriate erosion control measures. • Check all outlets and locations of turbidity monitors • Stop dewatering if the downgradient area shows elevated turbidity or erosion. • Check outlet protection or a velocity dissipation device. • Ensure a stable, erosion-resistant surface (e.g., well-vegetated grassy areas, clean filter stone, geotextile underlay) in place at outlets. • Check for leaking pumps, hoses, and pipe connections and fix same if identified.	

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			A programme of inspection and maintenance will be designed, and dedicated construction personnel assigned to manage this programme. A checklist of the inspection and maintenance control measures will be developed, and records kept. During the construction phase, field testing, sampling and laboratory analysis of a range of parameters will be undertaken at adjacent watercourses, specifically following heavy rainfall events (i.e., weekly, monthly and event-based as appropriate). Monitoring and maintenance as required throughout the construction stage.	
			All near-stream construction activities will be conducted in compliance with Inland Fisheries Ireland's (IFI) guidance document "Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites" (2016).	
			For each stream crossing, two lines of silt fence will be erected to provide a physical separation, which will trap suspended sediment from the works area. Silt fences will be inspected routinely, and inspections will be increased after runoff events. A clear span bridge will be utilised on the smaller Smithstown_15 stream and Smartscastle stream. Commercial forestry drains will be crossed using standard culverts.	
MM38	Forestry: Felling	EIAR Chapter 9	The Standards for Felling and Reforestation describe the universal standards that apply to all felling (thinning, clear felling) and reforestation projects on all sites. The standards will be implemented under a felling licence issued by the Department of Agriculture, Food & the Marine.	
			In accordance with the Forestry and Water Quality Guidelines (Forestry Service, 2000), buffer zones will be identified and marked out on the ground. These guidelines deal with sensitive areas, erosion, buffer zone guidelines for aquatic zones, ground preparation and drainage, chemicals, fuel and machine oils. Construction activities will be curtailed within the buffer zones in order to reduce erosion and sedimentation and, therefore, to protect surface water quality. Buffer zone widths vary from 10 m to 25 m, depending on slope and soil erosion classification.	
			The slopes across the proposed wind farm site are predominantly moderate (<1:10) with steeper slopes to the southeast and northeast. As the soil type varies across the proposed wind farm site, in line with	

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			the Forestry Service Guidelines (2000) a 10 m to 20m buffer zone is appropriate.	
			All associated tree felling will be undertaken using good working practices as outlined in the Forestry Report and the CEMP, the Forestry Harvesting and Environment Guidelines (Forestry Service, 2000) and the Forestry and Water Quality Guidelines (Forestry Service, 2000). Brash mats will be used to support harvesting and forwarding machinery. The brash mats reduce erosion of the surface and will be renewed as they become used and worn over time.	
MM39	Forestry: Silt fencing / sediment traps	EIAR Chapter 9	During any near stream construction work, silt traps and double row silt fences will be placed immediately down-gradient of the construction area for the duration of the construction phase.	
			Sediment traps will require monitoring and maintenance throughout the construction stage. Sediment traps will be constructed and maintained in line with the requirements of the Forest Road Manual and Forest Drainage Engineering – A Design Manual (Forestry Schemes Manual, 2011).	
MM40	Forestry: Drainage	EIAR Chapter 9	With reference to the COFORD 2002 guidance , the following measures will be implemented in relation to the existing forest drainage: • Minimise the crossing of drains during felling and extraction and restrict machine activity to brashed extraction racks and forwarding routes; • Where a drain crossing is needed, based on the size of the forest drain one of the following methods will be selected that prevents the breakdown and erosion of drain sides, namely: o For larger drains, deploy a heavy-duty plastic culvert lengthways into the channel and cover with brash material. The culvert must be of a diameter approximating the depth of the drain, to avoid any unnecessary undulation along the extraction route. o Where required, a solution for smaller drains is to temporarily lay log sections lengthways into the channel and overlay with brash. Again, logs will be that approximate to the depth of the channel to be crossed.	
MM41	Watercourse crossings	EIAR Chapter 9	Minimise the crossing of streams during felling and extraction by choosing alternative routes which avoid the watercourses/aquatic zones.	

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			Direct crossing over the stream bed will not be permitted. Water features will be crossed at a right angle to the flow of water. Any necessary crossing will be via an appropriate structure that spans proud of the flow of water and prevents the breakdown and erosion of the banks.	
MM42	Concrete Management	EIAR Chapter 9	Concrete is required for the construction of the turbine bases and foundations. Wash out of the main concrete mixing drum will not be permitted on site; wash out is restricted only to chute wash out. Wash down and washout of the concrete transporting vehicles will take place at an appropriate facility off-site. Cement and raw concrete will not be spilled into watercourses. Ready-mixed supply of wet concrete products and emplacement of pre-cast elements such as culverts and the clear span bridges across watercourses will take place. During the delivery of concrete on site, only the chute will be cleaned on-site. Chute cleaning will be undertaken at lined cement washout lagoons. The collected concrete washout water and solids will be emptied on a regular basis. Washout will be undertaken at the construction compounds. These lagoons will be cleaned out by a licensed waste contractor. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Weather forecasting will be used to plan dry days for pouring concrete. The pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event.	As required by the Contractor's CEMP.
MM43	Fuels & Chemicals	EIAR Chapter 9	With regards to on-site storage and handling of potentially pollutant materials: • All on-site refuelling will be carried out by a trained competent operative. • Mobile measures such as drip trays and fuel absorbent mats will be kept with all plant and bowsers and will be used as required during all refuelling operations; • A spill kit will be stored with the bowser and the person operating the bowser will be trained in its use; • All equipment and machinery will have regular checking for leakages and quality of performance and will carry spill kits; • Any servicing of vehicles will be confined to designated and suitably protected areas such as construction compounds; and	As required by the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			• Additional drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site.	
MM44	Drainage Management	EIAR Chapter 9	Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained.	As required by the Contractor's CEMP.
			Track edge drainage/swales will be implemented to control run-off from the running surface to lower water levels in the subgrade, to control surface water and to carry this flow to outlet points. Swales along access tracks will be installed in advance of the main construction phase.	
			Swales will provide additional storage of storm water, located along gradient. Given the steep longitudinal gradients on some sections of access track, regular check dams will be employed within the trackside swale on these sections to reduce the flow velocity and provide settlement opportunity. Swales will re-vegetated following excavation. Vegetation will reduce the flow velocity, treat potential pollutants, increase filtration and silt retention.	
			Settlement ponds will be located downstream of road swale sections and at hardstand locations, to manage/buffer volumes of runoff discharging from the drainage system during periods of high rainfall, thereby reducing the hydraulic loading to watercourses. Settlement ponds are designed in consideration of the greenfield runoff rates. The settlement pond design is based on primary settling out of suspended solids from aqueous suspension. Settlement ponds will be installed alongside with the formation of the road and will be fenced off for safety. Only the proposed onsite access roads will be used for project-related traffic.	
MM45	Borrow Pit reinstatement areas/ deposition areas	EIAR Chapter 9	Excavated material will be reused on site. The stockpiling of materials will be carefully supervised. Surplus material will be placed in the borrow areas.	As required by the Contractor's CEMP.
			The nature of the spoil deposition areas is an important measure in mitigating against suspended solids in run-off. The spoil deposition areas are all >50 m from rivers and relatively flat. This mitigates against potential stability issues.	

Ref No.	Related to	Location	Mitigation Measure	Monitoring
MM46	Stream crossings / Proposed GCR and works areas on the proposed TDR	EIAR Chapter 9	For the stream crossings, two lines of silt fence will be erected to provide a physical separation, which will trap suspended sediment from the works area. Silt fences will be inspected routinely and inspections will be increased after runoff events. Clear span bridges will be used to cross streams/rivers on site. Commercial forestry drains will be crossed using standard culverts.	As required by the Contractor's CEMP.
			Silt fencing will be erected at the location of stream crossings along the proposed GCOs. Appropriate steps will be taken to prevent soil/dirt generated during the accommodation works to the proposed TDR from being transported on the public road.	
			Appropriate steps will be taken to prevent soil/dirt generated during the accommodation works to the proposed TDR from being transported on the public road. Road sweeping vehicles will be used as required, to ensure that the public road network remains free of soil/dirt from the location of the proposed TDR works areas when required. This will reduce the potential for sedimentation of surface watercourses locally.	
MM47	Groundwater Quality	EIAR Chapter 9	During the construction phase, all works associated with the construction of the wind farm site will be undertaken in accordance with the guidance contained within CIRIA Document C741 'Environmental Good Practice on Site' (CIRIA, 2015). Groundwater pumped from excavations will be treated to remove silt by the use of silt bags. Water will discharge from the silt bags into settlement ponds and the SuDS network.	As required by the Contractor's CEMP.
			Groundwater encountered will be managed and treated in accordance with CIRIA C750, 'Groundwater control: design and practice' (CIRIA, 2016). All personnel working on the proposed project will be responsible for the environmental control of their work and will perform their duties in accordance with the requirements and procedures of the CEMP.	
			The dewatering operations will be inspected once each day when dewatering is taking place to ensure that dewatering treatment controls are working correctly and to evaluate whether there are observable indicators of sediment discharges. Where any issues are encountered, action will be undertaken to correct any problems at the proposed project or with the dewatering controls that may have contributed to the discharges.	

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			Regular monitoring of groundwater (levels and quality) will take place using existing monitoring boreholes during the construction phase. The existing groundwater well on site will be monitored on site during construction and for a period following cessation of construction activities (to be agreed with the relevant authorities).	
Material Assets				
MM48	Telecommunications	EIAR Chapter 11	In the unlikely event that a communication underground cable or link is damaged or interfered with during construction, the operator will be contacted to agree a repair which will be carried out as soon as possible at the developers cost. In addition, the developer has signed an agreement with 2RN prior to commit to restoring service to any end users that may have their service disrupted as a result of the proposed project. This is standard industry practice and will eliminate any potential effects in this regard.	As agreed with 2RN.
MM49	Aviation	EIAR Chapter 11	The following standard practices will be undertaken: • An aeronautical warning light scheme will be agreed with the IAA and Irish Air Corps; • The final as-constructed coordinates and dimensions of each turbine be mapped and provided to Kilkenny County Council and other stakeholders, including the IAA, Irish Air Corps, and Waterford Airport, prior to erection of turbines to ensure that maps and databases are up-to-date for flight navigation; • 30 days' notice will be given to the IAA prior to any crane operations commencing during the construction phase.	As required by the Contractor's CEMP.
MM50	Waste Management (including wastewater)	EIAR Chapter 11	Segregation of waste will be carried out to maximise the potential for waste recycling and minimise potential effect on waste services. Suitably permitted commercial waste collectors will be employed to remove any waste arisings generated from construction to the nearest appropriately licensed waste management facilities.	As required by the Contractor's CEMP.
			Wastewater from the staff welfare facilities will be managed by means of a sealed storage tank, with all wastewater being tankered off-site occasionally (as required) by a permitted waste collector to a wastewater treatment plant. The permitted waste collector will also be responsible for ensuring clean water storage tanks are topped up. The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. It is proposed to use low volume flush toilets (such as those in commonly used port-a loos) and low volume sink faucets to significantly reduce the volume of waste water produced.	As required by the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
Noise & Vibration				
MM51	Noise and Vibration	EIAR Chapter 12	A schedule of noise control measures has been formulated in accordance with best practice guidance, and the contract documents will require the Contractor to implement these measures.	As required by the Contractor's CEMP.
Air Quality and Climate				
MM52	Dust Management / Air Quality – Communications	EIAR Chapter 14	An Environmental Manager (EM)/Clerk of Works will be in assigned by the appointed contractor. The EM will be responsible for co-ordinating the day-to-day management of environmental impacts during the construction phase. The EM will be responsible for performing inspections as deemed necessary and manage responses to environmental incidents. The name and contact details of the EM will be responsible for construction dust management and air quality issues will be displayed at the construction compound/site boundary hoarding, as well as head/regional office contact details. A complaints register will be kept by the appointed contractor detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out.	As required by the Contractor's CEMP.
MM53	Dust Management / Air Quality – Construction area works management	EIAR Chapter 14	Construction compounds will be laid out so that machinery and dust causing activities such as stockpiles are located away from receptors, as far as is practicable. The appointed contractor will provide a site hoarding of 2.4 m height along noise sensitive boundaries, at a minimum, at the Construction Compounds, which will assist in minimising the potential for dust impacts off-site. Construction works area fencing, barriers and scaffolding will be kept clean using wet methods. Stockpiles will be covered to prevent wind whipping. Any chutes and conveyors will be enclosed and skips will be covered. Drop heights from any conveyors, loading shovels, hoppers and other loading or handling equipment will be minimised. Fine water sprays will be used on such equipment where visible dust plumes are generated. Cutting, grinding or sawing equipment will be fitted with or used in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems. Equipment will be readily available in the construction works areas site to clean any dry spillages. Spillages will be cleaned up as soon as reasonably practicable after the event using wet cleaning methods.	As required by the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			An adequate water supply for effective dust or particulate matter suppression and mitigation will be ensured, and non-potable water will be used where possible and appropriate. Construction works area runoff of water or mud will be managed as per the project SWMP and CEMP.	
MM54	Dust Management / Air Quality – Operating Vehicles / Machinery	EIAR Chapter 14	Engines of all vehicles will be switched off engines when stationary - idling vehicles are not permitted. The use of diesel- or petrol-powered generators will be avoided and mains electricity or battery powered equipment will be used where practicable. The Traffic Management Plan will be adhered to be the appointed contractor.	As required by the Contractor's CEMP.
MM55	Dust Management / Air Quality – Earthworks Activities	EIAR Chapter 14	Materials with the potential to produce dust, such as excavated material, will be removed from the construction works area as soon as possible, unless being re-used within the construction works area. Areas exposed by earthworks will be re-vegetated to stabilise surfaces as soon as practicable. Hessian, mulches or trackifiers will be used where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. Cover will only be removed in small areas during work and not all at once. During dry and windy periods and when there is a likelihood of dust nuisance (defined under "Monitoring" measures below), water-based dust suppression (e.g. bowser) will operate to ensure soil moisture content is high enough to increase the stability of the soil and thus suppress dust.	As required by the Contractor's CEMP.
MM56	Dust Management / Air Quality – Construction Activities	EIAR Chapter 14	Sand and other aggregates will be stored in bunded areas and will not be allowed to dry out, unless this is required for a particular process. Smaller supplies of fine power materials bags will be sealed after use and stored appropriately to prevent dust escaping.	As required by the Contractor's CEMP.
MM57	Dust Management / Air Quality – Measures specific to trackout	EIAR Chapter 14	A speed restriction of 15 kph will be applied as an effective control measure for dust for on-site vehicles. Vehicles transporting loose materials (e.g. spoil or sand) entering and leaving the works areas and construction compounds will be covered with tarpaulin to prevent escape of materials during transport. Before entrance onto public roads, trucks will be checked to ensure the tarpaulins are properly in place. Where construction work area or construction compound conditions result in large amounts of mud building up on truck wheels, wheel	As required by the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			washing will be carried out for trucks before they use the public road network. Water-assisted dust sweeper(s) will be used at the access points to a construction compound and the immediate adjoining local road, to remove, as necessary, any material tracked out of the compound. Any on-site haul routes will be inspected for integrity and necessary repairs to the surface will be carried out as soon as reasonably practicable.	
MM58	Embodied carbon	EIAR Chapter 14	Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. Best practice measures to reduce the embodied carbon of the construction works will be implemented: • Appointing a suitably competent contractor who will undertake waste audits detailing resource recovery best practice and identify materials can be reused/recycled; • The use in construction plant and equipment of sustainably sourced Hydrotreated Vegetable Oil (HVO) as a 100% replacement of fossil fuels. HVO use is considered a stepping stone towards the use of electric construction plant as they become available in the market; • The replacement, where feasible, of standard concrete containing Portland cement concrete with an alternative concrete mix with lower associated embodied carbon, as per the Climate Action Plan. This will be a minimum of 30% GGBS replacement, or concrete with equivalent or lower associated embodied carbon; • Procurement contracts will ensure that material choices with lower associated embodied carbon relative to standard construction materials are considered favourable during tender; • Materials will be reused on site where possible; • Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods; • Ensure all plant and machinery are well maintained and inspected regularly;	As required by the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			• Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site; • Where practicable, opportunities for materials reuse will be incorporated within the extent of the proposed project including the use of reclaimed asphalt and recycled aggregate, which will reduce the virgin material needs; and • Sourcing materials locally where possible, such as local quarries for aggregates required on site to reduce transport related CO2 emissions.	
MM59	Climate Change	EIAR Chapter 14	In terms of impact on the proposed project due to climate change, during construction the Contractor will mitigate against the effects of extreme rainfall/flooding through site risk assessments and method statements. The Contractor will mitigate against the effects of extreme wind/storms, temperature extremes through site risk assessments and method statements. All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures and the Contractor will ensure that these are complied with. Temperatures can affect the performance of some materials, and this will require consideration during construction. During construction, the Contractor will mitigate against the effects of fog, lighting and hail through site risk assessments and method statements.	As required by the Contractor's CEMP.
Archaeology and Cultural Heritage				
MM60	Topsoil / Excavations	EIAR Chapter 15	A suitably qualified archaeologist will be appointed to monitor all stripping of topsoil across the proposed project. All stripping of topsoil across the proposed project, including excavations as part of the proposed GCO One within the ZoN of AH02 (church, graveyard, mill, redundant record), the c. 2.5 km section of greenfield included in GCO One, accommodation works along the proposed TDR and townland boundary crossings will be monitored by a suitably qualified archaeologist. Should any features of archaeological potential be discovered during the course of the works further mitigation will be implemented as required and agreed with the National Monuments Service.	As required by the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
Traffic and Transportation				
MM61	Traffic Management Plan (TMP)	EIAR Chapter 16	The Traffic Management Plan (TMP) is a comprehensive set of mitigation measures that will be put in place by the Contractor before and during the construction phase of the project to minimise its effects. The TMP proposed for the Ballyfasy Wind Farm is included in EIAR Appendix 16-1. The following mitigation has been incorporated into the TMP: • Traffic movements will be limited to 07:00 – 19:00 Monday to Friday and 07:00 – 14:00 Saturday, unless otherwise agreed in writing with Kilkenny County Council. • HGV movements will be restricted during peak road network hours (including school hours) from 08:00 – 09:00 and 17:00 – 17:00 Monday to Friday, unless otherwise agreed in writing with Kilkenny County Council. • Clear construction warning signs will be placed on the public road network to provide adequate warning to road users of the presence of the construction site and slower-moving vehicles making turning manoeuvres. • Haul route selection to avoid sensitive receptors. • The existing and widened internal access roads facilitate queuing of construction vehicles off the public road. • Traffic Management Operatives (TMOs) will be provided by the principal contractor in accordance with the Traffic Management Plan at the site access during peak construction traffic activities. • Wheel washes will be provided on site as per the site layout drawings to prevent the build-up of mud on public roads.	As required through the TMP.
			Only essential deliveries will be scheduled to occur on the same days as the concrete pours.	As required by the Contractor's CEMP.
			Maintenance of the hedgerows within the visibility splays shall be undertaken to maintain the required visibility splays and mitigate the potential for overgrown vegetation which may result in inadequate visibility at the access and crossing points during the construction activities.	As required by the Contractor's CEMP.
			Mitigation measures on the haul roads and cable route includes: • Selection of a viable route with the lowest impact on the road network. • Avoidance of sensitive receptors and urban settings	As required by the Contractor's CEMP.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			○ The site access route encourages the use of the existing infrastructure in the area while avoiding the local road and potential sensitive receptors. ○ Turbine delivery route along national roads with largest capacity to accommodate the vehicles. ○ The typical construction materials are obtained from borrow pits onsite and from local quarries in the proximity of site. ○ Restricting HV movements during peak sensitive times on the road networks (i.e., at school times). ○ The grid connection route will be carried out at off-peak times. • To mitigate the impact of the AIL delivery on the road network, the advanced works will be undertaken (i.e., hardstanding, making signs demountable, utility diversions etc).	
MM62	Traffic – GCO One/ road closures/ reinstatement	EIAR Chapter 16	Should GCO One be constructed, the appointed Contractor shall consult and comply with the Roads Authority, An Garda Síochána and other Emergency services to agree a suitable diversion route prior to implementing a road closure. To mitigate the impact of the cable laid within the public road, the reinstatement works will be backfilled and reinstated as soon as practicable. The reinstatement works will be undertaken in accordance with the "Purple Book" best guidance and practices. The proposed reinstatement and construction details and phasing will be agreed with associated Local Authorities in advance of the works. The Contractor will be responsible for arranging for the required road opening licences.	As required by the Contractor's CEMP.
Operational Phase				
Description of Proposed Project				
MM63	Operational Health and Safety	EIAR Chapter 2	Access to the turbines is through a door at the base of the structure, which will be locked at all times outside maintenance visits.	As required through the project Operational Management Plan / Health and Safety Plan.
			Signs will be erected at suitable locations across the site as required for the ease and safety of operation of the wind farm.	As required through the project Operational Management Plan / Health and Safety Plan.
			The components of a wind turbine are anticipated to have a useful lifespan of 35 years or more and are equipped with a number of safety devices to ensure safe operation during their lifetime. During the operation of the wind farm regular maintenance of the turbines will be carried out by the turbine manufacturer or appointed service	As required through the project Operational Management Plan / Health and Safety Plan.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			company. A project or task specific Health and Safety Plan will be developed for these works in accordance with the site's health and safety requirements.	
Population and Human Health				
MM64	Health and Safety	EIAR Chapter 5	All activities carried out during the operational phase will be in accordance with the requirements of the Safety, Health and Welfare at Work Act 2005 as amended and Regulations made under this Act.	As required through the project Operational Management Plan.
Ornithology				
MM65	Bird protection	EIAR Chapter 7	Where construction works are required during the breeding bird season (1st March to 31st August inclusive), mitigation measures to limit the impact of vehicular disturbance will be implemented. This will include no idling of vehicles, appropriate speed restrictions and dust suppression measures on site.	As required through the Contractor's CEMP.
			If significant operational works (for example widespread track upgrades or turbine replacement) be required during the breeding bird season (1st March to 31st August inclusive), the mitigation measures outlined for the pre-construction and construction phases will be implemented.	
Land, Soils and Geology				
MM66	Contamination Management	EIAR Chapter 8	Oil containing components of the wind turbines will be periodically refurbished and replaced.	As required by the project Operational Management Plan.
			Fuel and oil storage and handling requirements will be as detailed for construction, with permanent fuel and oil storage located within permanent covered bunds.	
			Welfare facilities will be provided at the substation location. These welfare facilities will produce foul effluent and these effluents will be stored in a holding tank prior to removal to an approved treatment facility.	
Hydrology and Hydrogeology				
MM67	Surface Water Management Plan	EIAR Chapter 9 and EIAR Appendix 2-8	The Surface Water Management Plan will continue to be implemented in the operational phase.	As required through the SWMP.
Shadow Flicker				

Ref No.	Related to	Location	Mitigation Measure	Monitoring
MM68	Turbine Shutdown	EIAR Chapter 10	Due to the potential for shadow flicker to affect receptors within the shadow flicker study area, it is proposed that a shadow control system will be installed on each of the wind turbines that have the potential to cause shadow flicker for sensitive receptors. The control system will detect and calculate, in real-time: • Whether shadow flicker has the potential to affect nearby properties, based on pre-programmed co-ordinates for the properties and turbines outlined in this assessment; • Wind speed (can effect how fast the proposed turbine will turn and how quickly the flicker will occur); • Wind direction; • The intensity of the sunlight. When the sunlight is strong enough to cast a shadow, and the shadow falls on a property or properties, then the proposed turbine will automatically shut down; and will restart when the potential for shadow flicker ceases at the affected properties.	As required through the Turbine Shutdown Scheme.
			A Turbine Shutdown Scheme will be the primary mitigation measures for the shadow flicker effect and will be implemented for the proposed project based on the predicted shadow flicker at each shadow flicker receptor. The Turbine Shutdown Scheme will be employed to ensure that shadow flicker does not occur at the affected property(s). A process will be established by the proposed wind farm operator whereby local residents can highlight any concerns or complaints about the operation of the scheme. All concerns raised will be investigated by the proposed wind farm operator and the turbine shutdown software adjusted accordingly, to ensure that the turbines shut down at the appropriate time. After adjustments are made to the software, the flicker occurrence will be monitored where the residents still report flicker occurrence. This will determine any further adjustments that might be required to shut down times for any given turbine.	
			If there is sufficient existing screening at a shadow flicker receptor, the Turbine Shutdown Scheme may not be necessary for that receptor. The Applicant will engage with any affected residents to investigate options for new or additional screening measures (such as planting vegetation to act as a screen or installation of suitable window blinds in the affected rooms of the residence) where appropriate and agreeable to the affected residents. If screening is not acceptable	

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			and/or will not be effective the Turbine Shutdown scheme as set out in Chapter 10 will be implemented to ensure 'near zero shadow flicker'. Where agreed screening measures are implemented, the effectiveness of the measures will be monitored and if the measures are not functioning to the satisfaction of the property owner/occupant, they will be included in the Turbine Shutdown Scheme as set out in Chapter 10.	
Material Assets				
MM69	Aviation	EIAR Chapter 11	The following standard practices will be undertaken: • The turbines will be included in the IAA Electronic Air Navigation Obstacle Dataset; • Lighting of the proposed wind turbines in the interest of aviation safe-guarding (i.e., an aeronautical warning light scheme), as the proposed project would be considered as an en-route obstacle, will be required, will be agreed with the IAA, and Irish Air Corps prior to operation; and • As-constructed coordinates of the turbines will be provided to the IAA.	To be agreed with the relevant stakeholders.
Noise and Vibration				
MM70	Noise and Vibration	EIAR Chapter 12	In the event of a complaint indicating potential excessive amplitude modulation or tonality associated with the proposed project, the operator will fully investigate the complaint in collaboration with the turbine manufacturer, through review of the meteorological periods and conditions during which the reported AM or tonality occurs. A noise monitoring protocol would be established, in consultation with the local authority, which would set out the location and analysis methodology to be employed for the noise monitoring. This can be secured via a planning condition. If an ongoing issue with excessive AM is established, a mitigation strategy to reduce the level of AM will be implemented through engineering methods, operational changes and/or curtailment of specific turbines. The operator would first appoint a qualified acoustic consultant to objectively assess the level of AM in accordance with the methods outlined in the Institute of Acoustics IOA Noise Working Group (Wind Turbine Noise) Amplitude Modulation Working Group Final Report: A Method for Rating Amplitude Modulation in Wind Turbine Noise (9 August 2016) or subsequent revisions.	As required by the project Operational Management Plan.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			The measurement method outlined in the IOA AMWG document, known as the 'Reference Method', provide a robust and reliable indicator of AM and yield important objective information on the frequency and duration of occurrence, which can be used to evaluate different operational conditions including methods3, determined in liaison with the turbine manufacturer, to minimise the occurrence of excessive AM. Examples of mitigation measures which could be considered include turbine blade modifications, the implementation of specific operational controls for the relevant turbine type or operating turbines in different operational modes or turbine curtailment under specific operational conditions. The aim of the mitigation would be to minimise adverse impacts from excessive AM associated with the proposed project as much as is reasonably practicable. Similarly, if the complaints suggest the potential occurrence of clearly audible tonality in the wind turbine noise, the audibility of the tones will be investigated from measured data with a robust, objective method such as that included in ISO 1996-2:2017. If persistent occurrence of clearly audible tonality is identified, then the operator would liaise with the turbine manufacturer to investigate and implement measures to mitigate or minimise the occurrence of tonality as much as is reasonably practicable. This may also involve engineering methods or turbine operational changes for example. The commitment outlined to control amplitude modulation (AM) from wind turbines are considered best practice. The proposed approach provides a clear commitment that additional adverse impacts from excessive amplitude modulation (AM) or tonality associated with the operation of the proposed project will be effectively managed and minimised by the operator.	
MM71	Noise - Amplitude Modulation	EIAR Chapter 12	Prior to the commissioning of the wind farm, the developer will submit a Noise Complaint Monitoring Programme (NCMP) to the planning authority for written agreement. The NCMP will include a detailed methodology for noise measurement procedures for recording results and a protocol for managing complaints. Compliance noise surveys will be undertaken to verify compliance with any noise conditions applied to the development. It is common practice to commence surveys within six months of a wind farm being	

[3] See for example: Cand M. and Bullmore A. (2015), Measurements demonstrating mitigation of far-field AM from wind turbines. 6th International Meeting on Wind Turbine Noise Glasgow, 2015.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			commissioned. The guidance outlined in the IOA GPG and Supplementary Guidance Note 5: Post Completion Measurements (July 2014) will be taken into account. In the unlikely event that an exceedance of the noise criteria is identified as part of the commissioning assessment and relevant corrective actions taken. For example, implementation of noise reduced operational modes resulting in curtailment of turbine operation can be implemented for specific turbines in specific wind conditions to ensure turbine noise levels are within the relevant noise criterion or conditions turbine noise limits. Such curtailment can be applied using the wind farm SCADA system with a marginal reduction of the wind turbine performance.	
Air Quality and Climate				
MM72	Air Quality / Monitoring	EIAR Chapter 14	To determine if any short-term dust impacts will occur, a minimum of daily visual inspections for dust soiling of receptors (including roads, and surfaces such as street furniture, cars and windowsills) adjoining the construction works areas will be undertaken. Inspection results will be recorded in the site inspection log. Cleaning will be provided if necessary, such as in the event of a dust complaint resulting from the Proposed Scheme construction works. The potential for dust generation increases when rainfall is less than 0.2 mm/day and at wind speeds of greater than 10 m/s. To determine if these conditions are likely to affect the site, the weather forecast will be consulted daily, specifically the hourly forecasts for wind speeds as well as 12 hour rainfall radar showing anticipated amounts of precipitation in mm. The frequency of site inspections by the Environmental Manager responsible for dust management will be increased to a minimum of twice daily during the above conditions. The effectiveness of dust control methods will be monitored via visual inspections and work that would generate dust (e.g. moving materials from stockpiles, or transferring loose dry materials from trucks) will be limited in so far as is practicable during these weather conditions.	As required by the Operational Management Plan
Traffic and Transportation				
MM73	Operational Traffic	EIAR Chapter 16	In the event that a turbine requires replacing in the future, the proposed TDR at the construction phase will be considered, and the	As required by the project Operational Management Plan.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			swept path analysis will take into account any road improvements and changes to the network.	
Decommissioning Phase				
Population and Human Health				
MM74	Decommissioning Activities	EIAR Chapter 5	All activities carried out by the appointed Contractor during the decommissioning phase will be in accordance with the requirements of the Safety, Health and Welfare at Work Act 2005 as amended and Regulations made under this Act.	As required by the agreed decommissioning plan / mitigation measures agreed at the time of decommissioning.
Biodiversity				
MM75	Decommissioning activities	EIAR Chapter 6	Decommissioning impacts are expected to be of a similar type and magnitude to those anticipated during the construction phase, but generally of a shorter duration and scale. The mitigation measures implemented during the construction phase are applicable for the decommissioning phase too.	As required by the agreed decommissioning plan / mitigation measures agreed at the time of decommissioning.
Ornithology				
MM76	Bird protection	EIAR Chapter 7	The mitigation measures outlined for the pre-construction and construction phases regarding works during bird nesting season will be implemented to ensure compliance with relevant legislation.	As required through the Contractor's CEMP.
Land, Soils and Geology				
MM77	Decommissioning activities	EIAR Chapter 8	The risks arising from the decommissioning of the proposed project would be less than those for construction. Mitigation measures for decommissioning would conform to those given for construction in Chapter 8 and would be anticipated to be fully protective of the environment. There are no works proposed in relation to decommissioning phase works for the proposed GCO or on the works areas of the proposed TDR.	As required by the agreed decommissioning plan / mitigation measures agreed at the time of decommissioning.
Hydrology and Hydrogeology				
MM78	Decommissioning activities	EIAR Chapter 9	Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant. Some of the significant potential effects will be avoided by leaving elements of the proposed wind farm site in place. The hydrocarbon interceptor will be in place at the proposed substation site with regular inspection and maintenance, to ensure optimal performance. Given the requirement for sanitary facilities during decommissioning works, wastewater effluent will continue to be directed to the on-site holding tank, from where it will be tankered off-site to a suitably licensed wastewater treatment plant.	As required by the agreed decommissioning plan / mitigation measures agreed at the time of decommissioning.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			The decommissioning phase will not require any significant works that will potentially affect the drainage network. A fuel management plan to avoid contamination by fuel leakage during decommissioning works will be implemented as per the construction phase mitigation measures. 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 in Chapter 9.	
MM79	Surface Water Quality	EIAR Chapter 9	SuDS measures will remain in place during the decommissioning period.	As required by the agreed decommissioning plan / mitigation measures agreed at the time of decommissioning.
Material Assets				
MM80	Waste management	EIAR Chapter 11	Appropriately permitted waste collectors will be employed to remove any municipal waste, wastewater, or demolition waste generated within the wind farm site. The majority of wastes from decommissioned infrastructure will be recyclable, and the large items (turbines, met mast) will be collected and processed by appropriately licensed specialist companies with the capability to process these items correctly.	As required by the agreed decommissioning plan / mitigation measures agreed at the time of decommissioning.
			Appropriately permitted waste collectors will be employed to remove any municipal waste, wastewater, or demolition waste generated within the wind farm site. The majority of wastes from decommissioned infrastructure will be recyclable, and the large items (turbines, met mast) will be collected and processed by appropriately licensed specialist companies with the capability to process these items correctly.	
Noise and Vibration				
MM81	Noise and Vibration	EIAR Chapter 12	In relation to the decommissioning phase, similar overall noise levels as those calculated for the construction phase would be expected, as similar tools and equipment will be used. The noise and vibration impacts associated with any decommissioning of the proposed project can be considered comparable to those outlined in relation to the construction phase albeit less works will be required as only above ground structures will be removed. The Contractor undertaking the construction and decommissioning works will be obliged to adopt best practice noise abatement measures contained in British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites	As required by the agreed decommissioning plan / mitigation measures agreed at the time of decommissioning.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			– Noise and BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Vibration.	
Air Quality and Climate				
MM82	Air Quality: Decommissioning activities	EIAR Chapter 14	The same mitigation measures implemented during the construction phase will be applied during the decommissioning works for the management of dust.	As required by the agreed decommissioning plan / mitigation measures agreed at the time of decommissioning.
Traffic and Transportation				
MM83	Decommissioning Activities and Traffic	EIAR Chapter 16	A detailed TMP will be undertaken and will consider any road improvements and changes to the network. The plan will also consider the future baseline traffic in order to minimise the decommissioning phase effects in the vicinity.	As required by the agreed decommissioning plan and TMP / mitigation measures agreed at the time of decommissioning.

Table 7-2: Natura Impact Statement (NIS) Mitigation Measures

Ref No.	Related to	Location	Mitigation Measure	Monitoring
MM1	Management of sedimentation	NIS	• No instream works will take place. Clear span bridges will be erected at five locations. The foundations of the clear span bridges will be positioned at least 2.5 m from a watercourse (IFI, 2016). • All temporary crossings of watercourses will ensure the passage of water, fish and macroinvertebrates and will ensure erosion and sedimentation do not occur (IFI, 2016). • Silt fences and double row silt fences will be erected along all areas where the construction works are within 20 m of the Arrigle_010 River, Arrigle_020 River, the Blackwater (Kilmacow)_020 River, the Smartscastle Stream_010 and/or within 10 m of a drainage ditch and 10 m around stockpiled material. All silt fences will be erected outside of flood zones. The silt fencing will remain in position during the full construction phase of the proposed project. • Silt fences will be constructed using a permeable filter fabric (Hy-Tex Terrastop Premium silt fence or similar approved). No mesh type silt fences will be permitted. Silt fencing will be installed as per the manufacturer's guidelines (the bottom section buried at least 10 cm deep) prior to any ground disturbance works. • All silt fencing will be installed under the supervision of an Ecological Clerk of Works (ECoW) who will employed by the contractor. • Surface water or water released to watercourses will be within prescribed water quality limits (i.e. ≤25 mg/L Total Suspended Solids [TSS] in accordance with the Freshwater Fish Directive [2006/44/EC] and Salmonid Waters Regulations [1988]).	Monitoring will be undertaken by the appointed ECoW.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			• The excavated subsoil will be utilised on site and used to create bunds around the proposed facilities to create surface water runoff barriers. • Excavation works will not be carried out during or following heavy rainfall (i.e., if there is a yellow weather warning or higher in place or 5 mm in a 1-hour period). • A minimum 10 m untouched vegetated buffer zone will be retained between the silt fence and the watercourse. • No permanent storage of excavated material will be permitted within 50 m of the any watercourse within the Proposed Project or within 10 m from drainage ditches. • Stockpile management to prevent siltation of watercourses which will include; the establishment of vegetation on the exposed soil, silt fencing at the base of stockpiled material and direct runoff to the sites drainage system.	
MM2	Management of Pollutants	NIS	• Refuelling of plant and vehicles and the addition of hydraulic oil or lubricants to vehicles/equipment will be done on impermeable and bunded areas, not within 10 m of a non-sensitive watercourse or within 50 m of a sensitive watercourse. A drip tray will be used beneath the fill point during refuelling operations in order to contain any spillages that may occur. Spill-kits and hydrocarbon-absorbent packs will be stored in the cabin of each vehicle and operators will be fully trained in the use of this equipment. An oil spill response plan will be developed for the construction works. • An accidental spillage emergency plan will be created for the construction phase of the proposed project. All site personnel will receive appropriate training to apply the accidental spillage emergency plan. • All machinery will be regularly maintained and checked for fuel, oil or hydraulic fluid leaks. • Servicing of machinery will only be undertaken within the construction compound or offsite. • All concrete will be mixed off site and poured in place at site. All concrete browsers will be washed down at a dedicated concrete washout onsite not within 10 m of a non-sensitive watercourse or within 50 m of a sensitive watercourse 50 m. • Concrete washings will not be disposed of onsite to any surface or ground water feature. All washings will be removed offsite and treated at a licensed facility. No chemicals that are deleterious to aquatic organisms will be used in cleaning works. All raw, uncured waste concrete will be cured at a designated location, 50 m of surface water conduit. • Waste will be removed from the proposed project and disposed of by an approved waste contractor in accordance with prevailing waste management regulations. • On completion of the works, all apparatus, plant, tools, offices, sheds, surplus materials, rubbish and temporary erections or works of any kind will be removed from the site.	Monitoring will be undertaken by the appointed ECoW.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
MM3	Surface Water Monitoring	NIS	Pre-construction, construction and post-construction phase surface water monitoring will be carried out. All surface water features will be monitored in order to record any variations in the quality of the local surface water environment related to the proposed project. The main water parameters in terms of their potential to cause damage to aquatic life, ecosystems and water quality in the receiving waters are outlined in NIS Table 6-1.	Monitoring will be undertaken by the appointed ECoW.
MM4	Clear span bridges	NIS	• The bridge construction works will be undertaken outside of the Annual Close Season for instream works (NRA, 2008b) (i.e., no works will be undertaken between October to April. • The works programme will also take account of weather forecasts and predicted rainfall. All large excavations, subsoil and vegetation stripping will be avoided during adverse weather. • A Method Statement detailing the proposed works will be prepared in advance by the contractor, and in agreement with Inland Fisheries Ireland (IFI). • The foundations of the clear span bridges will be positioned at least 2.5 m away from the edge of the riverbank. Temporary fencing will be erected, allowing a 3 m setback buffer from the riverbanks, creating an exclusion zone. The exclusion zone will protect the riverbanks and maintain safe passage of wildlife (otter) along the banks. The fences will also act as a safe working zone for construction personnel. The fencing will also ensure that no material is stored in proximity to the river's edge. All material will be stored a minimum of 20 m from the bank of the river. • Silt fences will be installed between the abutment works and the edge of the riverbank, on either side of the banks. The silt fencing will be erected as per the manufacturer's guidelines, under the Ecological Clerk of Works (ECoW) supervision and will be maintained until all ground disturbance has ceased and vegetation re-established. Once installed, the silt fence will be inspected regularly during construction and more frequently during heavy rainfall events. • The false bridge decking and fine mesh netting, which will be established below the existing bridge will ensure that any debris from the cutting of the existing bridge deck and abutments, will be captured on the decking and collected and removed offsite. No debris will be allowed to deposit within the watercourse. • Appropriate dust suppression system to prevent dust and debris from entering the watercourse will be used during the duration of the works. The dust suppression system will consist of electrical tools with continuous supplied water to supress dust. A suitable vacuum system will be put in place on the bridge decking to remove the slurry from the cutting surfaces and ensure none is deposited within the watercourse. • All concrete will be mixed off site, not within 10 m of a non-sensitive watercourse or within 50 m of a sensitive watercourse, and will be brought in as required and poured in place at site. All concrete works will be scheduled during dry weather conditions	Monitoring will be undertaken by the appointed ECoW.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			only. Only once the concrete has adequately cured, the precast bridge decks will be installed using a crawler crane positioned outside the exclusion zone on the west bank. • Only water and environmentally friendly joint sealants will be used on the bridge. • Riparian vegetation will be left intact where practicable in consultation with the ECoW and will not occur within the boundary of any European site. Protection will be afforded to riparian vegetation by fencing prior to commencement of the works. The natural channel width will be maintained, which will ensure the adequate water depth and velocity for fish passage at all times during the duration of the works. • All construction lighting will be reviewed by the ECoW and will be directed away from watercourses to ensure a dark corridor is maintained. • Following the completion of the works, all material will be removed from site. The false bridge decking will be carefully cleaned, before dismantling, to ensure any residual debris does not deposit within the watercourse.	
MM5	Horizontal Directional Drilling (HDD)	NIS	• A competent and experienced Contractor will be appointed to undertake the HDD works. • The Contractor will prepare a HDD Method Statement which will outline the standard approach for the construction. The Method Statement will include a contingency plan for frac-out and for excessive ground settlement. • The Contractor will undertake the directional drilling in accordance with industry best practice including British Standard EN 16191:2014 Tunnelling machinery, safety requirements and CIRIA C648 '*Control of water pollution from linear construction projects Technical Guidance*' (CIRIA, 2006a). • The contractor will ensure that all personnel working on site are trained in pollution incident control response. A regular review of weather forecasts of heavy rainfall will be carried out. The Contractor will prepare contingency plan for before and after such events. • Weather conditions (e.g. prolonged heavy rainfall) will be considered when planning construction activities to minimise the risk of runoff from site. • There will be no storage of fuels within 30 m of the watercourse. • Provision of exclusion zones and barriers (silt fences) between any excavated material and any surface water features will be installed to prevent sediment washing into the receiving water environment. Silt fences will be installed and the contractor will ensure that silt fences are regularly inspected and maintained during the construction phase. • If dewatering is required as part of the works (e.g., in trenches for underground cabling or in wet areas), water will be treated prior to discharge in line with CIRIA C750 'Groundwater control: design and practice (CIRIA, 2016). • To prevent loss of bentonite or 'frac-out' from occurring, a series of actions will be implemented; the drill fluids operator will monitor drill fluid density, viscosity and solids	Monitoring will be undertaken by the appointed ECoW.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			content on an ongoing basis, to ensure that the fluid does not increase in viscosity, requiring additional pressure to maintain mobility. • In critical cases, viscometers will be used to measure drill fluid gel strength and shear strength. Filtrate will also be measured to calculate the amount of filter cake building up on the internal wall of the bore. Any increases in pump pressure experienced by the drill operator will be investigated immediately to prevent the risk of pressure build up within the annulus. In some circumstances, dependant on the drilling equipment used, the pilot drill borehole assembly will be fitted with a down hole pressure monitor to measure pressure in the annulus between the drill and the bore wall. This will give an early indication of pressure build up in the hole and allow the drill operator to prevent a 'frac-out'. If there is a risk of a 'frac-out' a number of measures will be implemented consisting of: ○ pumping a pill of drilling fluid with a higher density to the risk zone; and ○ circulate and pump loss circulation material (typically cork or manufactured inert polymers) to the risk zone to seal the risk zone, grouting of the risk zone, and, or launch a packer before the risk zone. • The Contractor will implement procedures to maximise the recirculation or reuse of drilling fluid to minimise waste disposal. • Disposal of drilling fluids will be the responsibility of the Contractor to an approved and licenced waste facility. • Monitoring of the drilling operations will be undertaken at all times by the Contractor. The monitoring will include visual inspection of the pits and monitoring of the volume of returns flowing back to the entry pit. The monitoring personnel will be in constant communication with the drilling rig operator and thus will be able to immediately cease drilling if necessary. • Buffer strips of natural uncleared vegetation will be preserved between construction activity and watercourses and will be demarcated by the ECoW. Reception pits will be situated outside of the riparian zone. A buffer zone width for smaller channels (<10 m) of 20 m or greater will be maintained.	
MM6	Disturbance/ displacement of Qualifying Interest Species	NIS	• Pre-construction confirmatory surveys prior to the commencement of any works will be carried out by a competent ecologist to identify any changes in otter activity or the presence of holt/couch locations within the Proposed Project. Otter surveys will be undertaken no more than 10—12 months in advance of the construction works as per the advice in NRA Guidelines for the Treatment of Otters during the Construction of National Road Schemes (NRA, 2008a). • Twilight working hours (i.e., time between dawn and sunrise and dusk and sunset), especially at the clear span bridge locations, will be restricted as far as possible. Otter are crepuscular species and as such disturbance will be reduced by restricting the amount of twilight working hours.	Monitoring will be undertaken by the appointed ECoW.

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			• All construction and operational phase lighting will be reviewed by the ECoW and will be directed away from watercourses to ensure a dark corridor is maintained. • As discussed, mitigation measures to prevent the degradation of water quality is also applicable to prevent the disturbance/displacement of species (e.g., displacement of species due to unfavourable water quality as a result of construction impacts). In the event that a new holt (established within the interim period) is identified within the footprint of the works during the pre-construction confirmatory survey and the following mitigation measures will be applied in accordance with the NRA *Guidelines for the Treatment of Otters during the Construction of National Road Schemes* (NRA, 2008a) as follows: • No wheeled or tracked vehicles (of any kind) will be used within 20 m of active, but non-breeding, otter holts (NRA, 2008a). Light work, such as digging by hand or scrub clearance will also not take place within 15 m of such holts, except under licence. • No works will be undertaken within 150 m of any holts at which breeding females or cubs are present unless the NPWS confirms that the works can proceed subject to additional mitigation measures as agreed with the NPWS. Breeding may take place in any season, so activity at a holt will be determined on a case-by-case basis by the ECoW. • A prohibited working area associated with otter holts will be fenced and appropriate signage erected under guidance of the ECoW. • If holts are found to be inactive prior to construction, exclusion of holts and their subsequent destruction may be carried out during any season under licence with the NPWS. To prevent the reoccupation of holts the entrances will be soft blocked (using vegetation and a light application of soil) for a period of five days (NRA, 2008a). • If holts are found to be active, otters will be evacuated from the holts prior to any closures. Otters with cubs however will not be evacuated until the otters have vacated the holt themselves naturally. Once the otters have left the holt, the entrance will then be soft blocked. In some cases, the installation of one-way gates on the entrances to the holt may be required and a monitoring period of 21 days will be carried out to ensure the otters have left the holt prior to removal (NRA, 2008a). All works will be done under licence with the NPWS.	
MM7	Ecological Clerk of Works (ECoW)	NIS	An ECoW will be appointed. The role of the ECoW is defined by British Standard BS 42020:20131[4] as "*person who has the ecological qualifications, training, skills and relevant experience to undertake appropriate monitoring and to provide specialist advice to "development" site personnel on necessary working practices required to i) safeguard ecological features on site and ii) aid compliance with any consents and relevant wildlife legislation related to the works.*" The requirements of the ECoW role is to be fulfilled by a single individual with support and assistance provided by technical specialists and senior colleagues when required. The ECoW	Monitoring will be undertaken by the appointed ECoW.

[4] BS 42020:2013 is the Biodiversity — Code of practice for planning and development. Published by British Standards Institute (Currently being updated by BSI).

Ref No.	Related to	Location	Mitigation Measure	Monitoring
			(individual or team of individuals) will therefore have appropriate qualifications, training and experience to meet the requirements of the role and in addition, where needed, can access support from senior ecologists within the company with the required qualifications, training and experience. The ECoW will have the power to 'Stop Works' at any time they deem it necessary to do so. The ECoW will be responsible for monitoring compliance with the mitigation measures and construction phase monitoring requirements relating to ecology/biodiversity as set out in the project NIS, EIAR, CEMP and SWMP. The ECoW will have authority over the content of routine reports and will act independently in determining instances of non-compliance with the consents and licenses or any breaches of environmental legislation. The ECoW will also document activities using photographs and log information to registers/logs. The role of the ECoW includes tasks such as, but not limited to, the following: • Pre-construction confirmatory surveys for otter; • Consultation with NPWS, if required; • Monitoring and exclusion of otter holts, if required; • Demarcation of riparian habitats to be maintained; • Review of construction phase lighting plans; • Supervision of works in ecologically sensitive areas as required to ensure compliance with environmental legislation and the requirement of the schedule of works and EIAR; • Preparation of Method Statements for ecological tasks such as those described above; and • Provide a briefing on environmental protection measures and ecological sensitivities of the Proposed Project to all site personnel in advance of commencement of enabling works.	

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