Appendix 2-2 Construction Environmental Management Plan (CEMP)

Knockanarragh Wind Farm

Knockanarragh Wind Farm Limited

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Acronyms and Abbreviations

AIL	Abnormal Indivisible Load
AOD	Above Ordinance Datum
BS	British Standard
CEMP	Construction Environmental Management Plan
CIRA	Construction Industry Research and Information Association
CMS	Construction Method Statement
CTMP	Construction Traffic Management Plan
DMNR	Department of the Marine and Natural Resources
EcoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
EPPP	Emergency Pollution Prevention Plan
EQS	Environmental Quality Standards
ERP	Emergency Response Plan
FPM	Freshwater Pearl Mussel
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HASMP	Habitat and Species Management Plan
HGV	Heavy Goods Vehicle
HV	High Voltage
IEF	Important Ecological Feature
IPP	Independent Power Producer
ITM	Irish Transverse Mercator
KV	KiloVolt
M&WCC	Meath and Westmeath County Councils
NIS	Natura Impact Statement
NSR	Noise Sensitive Receptor
OPW	The Office of Public Works
PPE	Personal Protective Equipment
PSCS	Project Supervisor Construction Stage
PWS	Private Water Supply
QA	Quality Assurance
QI	Qualifying Interest
SAC/cSAC	Special Area of Conservation/ candidate Special Area of Conservation
SHWWR 2013	Safety, Health and Welfare at Work (Construction) Regulations 2013
TCC	Temporary Construction Compound

TDR	Turbine Delivery Route
TMP	Transport Management Plan
TSO	Transmission System Operator
WMP	Waste Management Plan
WQMP	Water Quality Monitoring Plan
WSI	Written Scheme of Investigation

1.0 Introduction

1.1 Background

This document presents an outline Construction Environmental Management Plan (CEMP) for Knockanarragh Wind Farm which sets out the principles and procedures for environmental management during construction and decommissioning of the wind farm (hereafter referred to as the Proposed Development).

In the event that An Bord Pleanála (ABP) decides to grant approval for the Proposed Development, the final CEMP will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by ABP. The CEMP would be used by the Contractor to ensure appropriate environmental management is implemented throughout the construction phase of the Proposed Development.

The document should be read in conjunction with **Chapter 2: Description of the Proposed Development**, of the EIAR and the required mitigation measures set out in **Chapter 17 Schedule of Mitigation Measures.**

The CEMP is a fluid document that would evolve during the different phases of the Proposed Development. As such it would be subject to constant review to address:

- any conditions required in the planning consent;
- to ensure it reflects best practice at the time of construction and decommissioning:
- 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.

1.2 Aims and Objectives

The CEMP would be maintained and updated on site and would be augmented by associated design specifications and Safety, Health and Welfare at Work (Construction) Regulations 2013 (SHWWR 2013) documentation such as the Project Supervisor Construction Stage's (PSCS's) Construction Phase Plan.

Where appropriate, the CEMP, or plans within the CEMP, would form part of the site induction which would be mandatory for all employees, contractors and visitors attending the site. All employees and contractors would need to familiarise themselves with the relevant contents of the CEMP and supporting appendices as directed.

Management practices and mitigation measures have been developed for those aspects of the construction works that could potentially affect the environment.

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 applicant's expectations to guide contractors on their requirements with regards to environmental commitments and environmental management.

1.3 Site Setting

The Proposed Development will be located west of the N52 National Road from Delvin to Clonmellon in the townlands of Clonmellon, Kilrush Upper, Kilrush Lower, Newtown, Ballinlig, Carnybrogan, Cavestown and Rosmead in County Westmeath and townland of Galboystown in Co. Meath. The Proposed Development Site is southwest of the village of Clonmellon and northeast of Delvin, in Co. Westmeath. The Proposed Development Site will be accessed directly from the L5542 and off the N52, a national primary road. The application boundary covers an area of 115.81 Ha.

The western boundary of the site extends across the Westmeath and Meath County administrative boundary, to include part of the River Boyne and Blackwater cSAC (Site Code: 002299). The River Stonyford and it's tributary D'arcy Crossroad Streams form part of this cSAC.

The area in which the Applicant has a beneficial interest in, includes private plantation and mixed woodland. The Proposed Development predominantly consists of a mixture of agricultural land, primarily grazing, and forestry. Some of the forestry is on land that was previously used for peat extraction.

The land is generally flat to gently undulating, with a very gradual slope from the west to c. the east. The lowest point is along Darcy's Crossroads Stream, which forms part of the northwest portion of the Proposed Development site, near turbine locations T1 and T2. The highest point in the site is at 106m AOD, southeast of turbine location T3.

There are several eskers running through the area, some of which show signs of having been locally used for sand and gravel extraction. There are no residential properties within the Proposed Development site and those dwellings located within 1km of it are shown on **Figure 4-2** of the EIAR. Heritage features within the site are identified in **Chapter 12** of the EIAR and include Rosmead House, a partially dismantled 18th century country house located within the southern end.

The Proposed Substation Site is located on the western outskirts of Clonmellon town, c. 200m from its settlement boundary in the townland of Galboystown. The site is accessed by the L6821 via an existing agricultural access.

1.4 Project Description

The Proposed Development is described in full in **Chapter 2** of the EIAR and would consist of the following main components:

- Construction of 8 No. wind turbines with an overall ground to blade tip height of between 175m – 180m inclusive. The wind turbines will have a rotor diameter ranging from 155m to 162m inclusive and a hub height ranging from 97.5m to 99m inclusive. Each turbine will have individual output of between 6.6MW to 7.2MW inclusive.
- Construction of temporary crane hardstands and permanent turbine foundations.

- Construction of permanent internal site access roads including passing bays and all associated drainage infrastructure
- Construction of 1 no. permanent 110 kV electrical substation west of Clonmellon, Co Meath to include 2 no. control buildings with welfare facilities, all associated electrical plant and equipment, security fencing and gates, all associated underground cabling, wastewater holding tank, and all ancillary structures, bunding and works.
- Construction of 33kV underground electricity cabling, including joint bays and ancillary works, along the L5542 and N52 connecting the Main Wind Farm Development Site: to the Proposed 110kV Substation at Clonmellon.
- Construction of a section of 110kV electricity cabling between the Proposed 110kV Substation and the existing overhead line at Clonmellon, inclusive of 110kV interface masts.
- Construction of an internal collector cable circuit within the Main Wind Farm Development Site, including directional drilling of (125m) cabling between Turbine 5 and Turbine 8.
- Construction of two construction compounds with associated temporary site offices, parking areas, welfare facilities and security fencing.
- The use of the construction compound in the Southern Cluster as a maintenance hub to facilitate the operational phase of development.
- Development of two borrow pits for the purpose of stone extraction.
- Undergrounding of approximately 610 metres of existing 10 kV overhead electrical power line in the vicinity of Turbine 6.
- Development of an internal site drainage network and sediment control systems.
- Improvements to an existing site entrance off the L5542/Carnybrogan local road to include localised widening of the road and creation of a splayed entrance to facilitate the delivery of abnormal loads and turbine component deliveries. Improvements will include removal of existing vegetation to accommodate visibility splays.
- A new site entrance and slip road from the L5542/Carnybrogan local road to facilitate the delivery of abnormal loads and turbine component deliveries to northern part of the site.
- Road improvements to L5542/Carnybrogan local road to facilitate the delivery of abnormal loads and turbine component deliveries.
- A new site entrance to T8 from the N52 via an existing agricultural access within the townlands of Cavestown and Rosmead.
- A new site entrance from the L6821 to the Proposed 110 kV Substation at Clonmellon.
- Ancillary forestry felling of between 19.62ha and 20.09ha to facilitate construction of the development.
- All associated site development works including berms, landscaping, and soil excavation and the ongoing maintenance and management of the biodiversity measures in accordance with the Habitats and Species Management Plan.
- Measures for biodiversity enhancement including wader scrapes for snipe, stockproof fencing and other measures.
- The enhancement and replacement of hedgerows and broadleaf trees and the planting of new hedgerows and trees.

- A 35-year operational life for the Wind Turbines from the date of commissioning of the entire Proposed Development.

This planning application seeks a 10-year construction period and will be accompanied by an Environmental Impact Assessment Report (EIAR) which includes an assessment of the likely significant effects of the Proposed Development as a whole and in combination with the relevant off-site or secondary developments which will occur as a direct result of the Proposed Development, including connection to the national electricity grid.

A **Natura Impact Statement** (NIS) will also be submitted to the planning authority with the planning application.

The Proposed Development Site is located in close proximity to sites on the Record of Monument and Places (RMP sites, WM009-004, WM009-018 and ME023-010) and the following structures that are included on the Record of Protected Structures (009-048 and 009-03).

2.0 Implementation

2.1 Implementation and Control

Compliance with the CEMP is the key control measure required during construction to mitigate environmental impacts. It documents the principles and processes to be followed to implement all relevant agreed environmental mitigation.

The PSCS would be required to prepare a series of method statements. These method statements would detail how the contractor intends to implement the mitigation set out in the CEMP and would be integrated with their detailed Construction Method Statements.

If any significant changes are required due to changing environmental sensitivities, results of pre-construction surveys, unforeseen events or for any other reason, these would be discussed and agreed with statutory bodies in advance of any amended works being carried out.

3.0 Roles and Responsibilities

During construction there would be key responsibilities for the applicant, the PSCS and their teams. Establishing roles and responsibilities in relation to construction would be important in order to ensure the successful construction of the proposed development, including the implementation of the CEMP. The personnel, who would implement, monitor and respond to the CEMP, would be the applicant construction team and the PSCS.

3.1 Safety and Health

The construction works would be undertaken in accordance with primary safety and health legislation, namely:

- Safety, Health and Welfare at Work Act 2005;
- Health and Welfare at Work (General Application) Regulations 2007; and
- Safety, Health and Welfare at Work (Construction) Regulations 2013.

The construction works for the proposed development would fall under the Safety, Health & Welfare at Work (Construction) Regulations 2013. It is a key appointment in the construction process and would be the ultimate responsibility of the Project Supervisor Construction Stage for the project (see below for full details of PCSC role and responsibilities. The PSCS would provide a Construction Phase (Safety & Health) Plan in accordance with the regulations. This plan would include (but not be limited to) a construction programme, emergency procedures, site layouts and fire plans, method statements and details of the proposed induction programme. This induction programme would include both the PSCS's site specific rules as well as the Client's requirements and would include instructions to all staff regarding the Emergency Pollution Prevention Plan (EPPP) and relevant procedures.

An induction would be required for all workers (permanent / temporary / contractor / subcontractor), site visitors, applicant representatives or other 3rd parties. Inductions would be documented.

Plant operators and construction staff would be trained by the PSCS with regard to spill prevention/mitigation measures and procedures and in the use of relevant mitigation material (e.g. spill kits).

Staff and subcontractors employed by the PSCS would be trained and have to prove certification for any plant, vehicle or use of specialist equipment such as electrical and hot works.

3.2 Construction Management Team

The applicant would appoint their own Construction Management Team, led by a Construction Site Manager. The team would include, as a minimum, a Resident Engineer.

Prior to appointment of a PSCS, the applicant would own the CEMP and the document would become uncontrolled copies when printed.

It would be the team's responsibility to ensure that the PSCS adheres to and complies with the principles of the CEMP and their Method Statements. This would likely be the responsibility of the Resident Engineer, the ECoW and the applicant's Construction Manager. The team would also be responsible for:

- regular liaison with the PSCS's Site Manager;
- maintaining environmental risk registers;

- communicating with regulators and consultees such as the EPA and the local planning authority regarding any changes that need to be made to the CEMP including the Schedule of Mitigation; and
- ensuring that any required changes are approved and updated within the CEMP.

The applicant Construction Manager and Resident Engineer would have the power to stop works at any stage should it be deemed necessary, i.e. if there were risks posed to environmental receptors from construction that could not be mitigated immediately.

3.2.1 Ecological Clerk of Works (ECoW)

An Ecological Clerk of Works (ECoW), would be appointed at periods during the period of construction and post-construction restoration. The appointment of the ECoW would be approved by ABP.

The purpose of the ECoW would be to provide environmental advice and monitor compliance, not implement measures. The ECoW would have a number of different tasks to carry out during construction and prior to the outset of each construction phase. They would be required to keep an active register of all issues that arise during the works and report as required to M An Bord Pleanála.

The ECoW would have sufficient powers to:

- oversee construction work and identify where mitigation measures are required;
- authorise temporary stoppage of works if required; and
- to review working methods and advise whether alternative or more appropriate working methods require to be adopted.

The ECoW would undertake the following activities:

- to work with the PSCS to induct all site personnel with regards to key environmental sensitivities and mitigation measures to be applied during construction. Toolbox talks shall be given by the ECoW throughout the construction period in the event that additional unforeseen issues arise that require alternative working methods;
- undertaking site walkovers, ensuring implementation of the water management plan with reference to water quality protection and appropriate locations for fuel and oil stores;
- liaising with contractors during the construction phase;
- inspecting working areas and ensuring compliance with the CEMP;
- undertaking water quality monitoring;
- providing advice on sediment and drainage management;
- communicating with all site personnel regarding any environmental issues and mitigation measures;
- oversee the need for all necessary licenses regarding protected species are obtained, if required and facilitating with the support of suitably qualified and experienced Ecologists; and
- documenting and reporting any environmental issues and incidents as required to the applicant and ABP.

3.2.2 Resident Engineer

The applicant would appoint a Resident Engineer for periods during the construction of the proposed development. The Resident Engineer would provide support to the applicant Construction Management Team and would have responsibility for monitoring the proposed development onsite on behalf of the Construction Manager.

The Resident Engineer would have a wide range of duties including but not limited to:

- overseeing construction works to ensure conformance with the specification, monitoring quality and progress and most importantly ensure that health, safety and the environment is given a high priority at all times. The Resident Engineer would effectively be Developer's eyes and ears on the site and would report directly to the applicant's Construction Manager;
- authority to stop the construction works in the case of a health and safety, environmental or quality issue. This would be applicable in situations where delay could lead to increased risk or damage.
- daily visual inspections of working areas to identify possible construction issues from a quality, environmental, programme and safety perspective. Any issues would be raised directly with the contractor;
- working closely with the ECoW to ensure that ecological and environmental requirements dictated by the CEMP, best practice and the planning conditions were adhered to by the works contractors;
- reviewing construction related documents from all contractors – including method statements and risk assessments and providing comments directly onsite to the PSCS; and
- reporting all environmental or health and safety incidents and near misses to the Construction Manager in a form and timescale required by the Construction Management Team.

3.3 Project Supervisor Construction Stage

The PSCS would be required to comply with and regularly review the CEMP throughout the construction period. This would include being aware of any changes or updates to the CEMP following the identification or any new environmental sensitivity or any proposed development changes. These changes would be controlled and implemented by the applicant Construction Management Team, as required.

The PSCS and their team (including any sub-contractors) would be responsible for:

- undertaking their duties in accordance with SHWWR 2013;
- liaising with the applicant's Construction Management Team;
- completing the construction of the proposed development in a manner which complies with all relevant laws, rules and regulations;
- acquiring licenses and permits as necessary for their works;
- ensuring that all method statements in line with the principals set out in the CEMP have been provided;
- planning, managing, monitoring and coordinating all pertinent activities relating to construction;

- liaising with and providing justification to the regulators and consultees such as ABP, the EPA and M&WCC if any significant changes are required from the Schedule of Mitigation;
- developing and implementing an Environmental Incident Response Plan and ensuring that all personnel (including sub-consultants and sub-contractors) understand and are aware of procedures to be undertaken should an environmental incident occur. This would sit as an additional appendix in the final CEMP;
- ensuring that all personnel receive training and are aware of the potential to damage to sensitive environmental receptors and procedures required to be implemented to avoid, minimise and mitigate against such damage;
- verifying the competence and resources of all personnel working on the proposed development and any sub-consultants and sub-contractors that were engaged on the proposed development; and
- implementing the mitigation measures set out in **Chapter 17** of the EIAR.

3.4 All Site Personnel

All site personnel, including all members of the applicant's construction and PSCS's team, all sub-contractors and sub-consultants would be required to:

- attend all inductions and site specific training including toolbox talks carried out by the ECoW; and
- implement control measures throughout the site, as required.

3.5 Communication

The applicant would inform ABP prior to any construction starting on site and communication would be maintained with updates of any incidents or significant changes notified within one week of occurrence. The applicant would provide contact details to ABP of:

- the Project Supervisor Construction Stage;
- the Resident Engineer – who would be on site for the majority of the construction phase;
- the applicant's Construction Project Manager;
- the Ecological Clerk of Works; and
- the applicant's communication contact.

Any resident who has a question regarding the construction of the proposed development would be directed to one of these contacts. All questions would be logged and responded to within a specified number of days.

Careful monitoring of any complaints received, including recording details of the location of the affected party, time of the disturbance and nature of the issue would assist with managing the works to reduce the likelihood of further incidents.

4.0 Construction Staging

4.1 Site Access

Those activities that may give rise to audible noise at the surrounding properties and heavy goods vehicle deliveries to the site would be limited to the hours 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 on Saturdays. Turbine deliveries would only take place outside these times with the prior consent of the Council and the Garda. Those activities that are unlikely to give rise to noise audible at the site boundary may continue outside of the stated hours.

The Site Manager will be responsible for developing and implementing a Site Traffic Management Plan as set out in **Chapter 14: Traffic**. The applicant will work in partnership with ABP and the supply chain to reduce the impact of the development on the local community.

Parking for staff and contractors will be situated within the boundary of the site for the duration of the works as far as is reasonably practicable. All vehicles will reverse park to improve safety on the site.

An appropriate speed limit would apply for vehicles onsite and would be selected, monitored and enforced by the PSCS. Maximum vehicle load capacities would not be exceeded.

4.2 Construction

The following phases would be taken into consideration for the construction works:

- Phase 1 – Site set-up:
  - Construction of access points;
  - construction of access track approach to compound location;
  - site compound set-up, including installation of welfare facilities;
- Phase 2 – Construction:
  - construction of access tracks;
  - construction of turbine foundations and crane hardstandings;
  - construction of substation, including all civil and electrical works;
  - installation of wind farm cabling;
- Phase 3 – Commissioning:
  - turbine delivery and construction;
  - wind farm commissioning;
  - turbine and wind farm reliability run;
- Phase 4 – Demobilisation:
  - take over;
  - snagging; and
  - decommissioning of temporary compounds / structures and restoration of the site.

A detailed construction programme would be provided by the PSCS as part of the final CEMP and the Construction Phase Plan. The proposed development would be constructed over a period of up to 10 years.

4.3 Post Construction Reinstatement

Good practice techniques for vegetation and habitat reinstatement would be adopted and implemented on areas subject to disturbance during construction as soon as practicable.

The following reinstatement works would be considered:

- re-use of turves;
- re-use of topsoil/peat where appropriate; and
- re-seeding with appropriate species.

For clarity, the following are definitions for the different soil make-up of the natural ground between the surface and rockhead (from top down):

(a) Vegetation:

This is typically plant matter that can be removed/stripped above the ground level (i.e. does not include roots/topsoil). This can vary depending on the nature of the vegetation encountered on site.

(b) Turf/Turves:

This is typically a layer of matted earth formed by grass and plant roots. The matted earth layer would normally be 30-50mm thick.

(c) Topsoil:

The upper layer of soil usually containing significantly more organic matter than is found in lower layers. This can vary in depth but is typically 200mm thick. This can be excavated with the turf and depends on whether the turf is required elsewhere, or the topsoil needs to exclude the turf.

(d) Superficial Soils:

This is a generic term used for all material between topsoil and rockhead. This can vary in depth and content throughout the depth profile at any location.

(e) Weathered Rock:

This is a layer that may exist above rockhead that is neither rock nor superficial material but a mixture of both. It can be mostly fractured rockhead as a result of physical and chemical weathering processes. When excavated it may have elements of fractured rock and superficial material as the boundary can be difficult to distinguish.

In some cases this can provide suitable engineering material for construction of foundations, embankments, tracks etc.

(f) Rockhead:

This is a naturally occurring solid aggregate of minerals which lies beneath the superficial soils.

5.0 General Construction Good Practice

5.1 Handling of Excavated Materials

The construction of tracks, turbine foundations and crane hardstanding areas as well as the establishment of the construction compound and substation compound would require the stripping and excavation of soil and its reuse or temporary storage. Excavations would generate material comprising vegetation/topsoil layer, soil and rock. A description of the existing land, soils and geological setting is provided in EIAR **Chapter 6 Land, Soils and Geology**. Surplus excavated subsoils would be used for reinstatement works associated with access tracks, cable trenches, turbine foundations, crane hardstandings and the temporary construction areas. The upper vegetated turves would be used to dress infrastructure edges and to replace stripped and stored turves.

Excavated material would be used as soon as practicable and as close as possible to the area it was excavated from, however some temporary storage would be required. Soils in areas taken for temporary use will ideally be stockpiled close to excavation location.

5.2 Materials Storage

Granular, non-organic material required to be stored temporarily would be compacted, to reduce the potential for erosion and transfer of sediment and stockpiled in designated areas at least 50m from a watercourse. Temporary stockpiles would need to be appropriately sited away from marshy grassland, bog or heath where possible, with the locations agreed in advance with the ECoW.

Where soils could not be transferred immediately to an appropriate restoration area, short term storage would be required. In this case, the following good practice would apply:

- soil would be stored around the turbine perimeters at a sufficient distance from the cut face to prevent overburden induced failure;
- local gullies, diffuse drainage lines (or very wet ground) and locally steep slopes would be avoided for storage;
- stored upper turves (incorporating vegetation) would be reinstated adjacent to similar habitats as advised by the ECoW;
- monitoring of stockpiles/excavation areas would occur during and following rainfall events; and
- if material is stockpiled on a slope, silt fences shall be utilised to reduce sediment transport in accordance with CIRIA guidance C532. Additional measures may also be necessary to control flow of water and sediment transport on site in accordance with this guidance.

Material excavated during new and upgraded access track construction would be stored adjacent to the track and Granular, non-organic material compacted in order to limit instability and erosion potential. Peat would not be allowed to dry out, through rewetting and monitored irrigation.

Silt fences shall be employed in combination with the measures described in ‘CIRIA Control of water pollution from construction sites. Guidance for consultants and contractors (C532)’ where required to minimise sediment levels in run-off.

All soils stripped from the borrow pit(s) would be retained in clearly demarcated stockpiles in locations immediately around the edges of borrow pit excavation.

5.3 The Management and Movement of Concrete

5.3.1 Accidental Spillage

An appropriately sized spill kit(s) would be provided and maintained onsite, consideration would be given to suitable locations across the active areas of the site (particularly 'hotspots' such as refuelling areas) and to having vehicles including plant carry a spill kit. This kit would contain materials, such as absorbent granules and pads, absorbent booms and collection bags. These are designed to halt the spread of spillages and would be deployed by construction workers in accordance with communicated site protocol should a spillage occur. A specialist spill response contractor would be commissioned should any major spillage occur. A controlled speed limit would apply for vehicles onsite and would be monitored and enforced by the PSCS. Maximum vehicle load capacities would not be exceeded.

5.3.2 Vehicle Washing

Wheel washing facilities will be provided at the entrance/exit point of the Proposed Development site to ensure materials from the Site are not transferred onto the highway, and road cleaning would take place when required to remove any deposits that are carried from the Site. It is anticipated that any road cleaning activities would remain local to the site access.

5.3.3 Concrete Pouring for Turbine Foundations

Pre-cast concrete will be used wherever possible during construction to avoid alteration of pH of water. To prevent pollution incidents, it is important that all necessary concrete pours are planned and specific procedures would be adopted in accordance with Construction Industry Research and Information Association (CIRIA) C532 Control of water pollution from construction sites: guidance for consultants and contractors. These procedures would include:

- ensuring that all excavations are sufficiently dewatered before concrete pours begin and that dewatering continues while the concrete cures. Construction good practice would be followed to ensure that fresh concrete is isolated from the dewatering system;
- ensuring that covers are available for freshly placed concrete to avoid the surface of the concrete washing away during heavy precipitation; and

perimeter drains with silt traps.

The bases of the foundations are excavated to a competent bearing strata. It is anticipated that foundations will be gravity based foundations consisting of a reinforced concrete base between 21.5 - 28.4 metres in diameter. Piles can be used where the underlying strata does not meet the criteria for gravity based foundations. However, based on site investigations carried out to date, it is considered that all turbine foundations shall be shallow gravity bases types and founded on either rock or glacial till. This will be confirmed with further site investigations prior to construction. Excavated soil will be placed in the temporary storage areas adjacent to the turbines. Formwork and reinforcement are placed, and the concrete poured. Once the concrete is cured to a suitable strength the earthing system is put in place and the foundation will be backfilled with compacted engineering fill to blend into the adjacent topography.

5.4 Surplus and Waste Material

5.4.1 Introduction

A Waste Management Plan (WMP) would be prepared in line with the relevant National Waste Management Guidelines and the European Waste Management Hierarchy, as enshrined in the Waste Management Act 1996, as amended.

The WMP would detail how all waste materials would be managed, including the management and definition of excavated materials.

It is the responsibility of the contractor for the main construction works, when appointed, to nominate a suitable site representative such as a Project Manager, Site Manager or Site Engineer as the Waste Manager who will have overall responsibility for the management of waste. The Waste Manager would take all reasonable steps to ensure that all waste from the site is dealt with in accordance with the requirements under the above Act and that materials would be handled efficiently, and waste managed appropriately.

A fully authorised waste management contractor will be appointed prior to the commencement of construction works. This contractor will provide the appropriate receptacles for the collection of the various waste streams able ensure regular emptying and/or collection of these receptacles. Appropriate licensed waste facilities in the surrounding area will be used as part of Waste Management arrangements.

5.4.2 Soils and Spoils

Any excess excavated material that will be used for fill, re-instatement, or similar activities, within the development site boundary is not categorised as a waste material under relevant waste legislation, rather this material is exempt from waste classification. Surplus material will be re-instated in its natural condition on the site from which it was excavated, this material is not considered as waste.

5.4.3 Hazardous and Other Wastes

Table 5-1 lists some of the waste types that may be generated during the construction works. Although some waste types may be generated in locations other than the construction compounds such waste materials would be stored within the construction compounds only. Waste materials generated outside the construction compounds would be taken to the compounds on a daily basis to be managed thereafter.

Table 5-1: Common Construction Wastes

EWC Code	Description
13 01 10*	Used mineral hydraulic oil (non-chlorinated)
13 02 08*	Other waste engine, gear or lube oil
13 02 05*	Waste engine, gear or lube oil (non-chlorinated)
13 02 08*	Other waste engine, gear or lube oil
16 01 07*	Oil filters
20 01 23*	Discarded equipment containing CFCs e.g. waste fridges & freezers
16 06 01*	Lead batteries
16 07 08*	Oily waste from transport and storage tanks
16 10 01*	Hazardous liquid wastes to be treated off-site
20 01 21*	Fluorescent tubes and other mercury-containing waste
20 01 33*	Hazardous batteries and accumulators that are collected separately
15 02 02*	Absorbents, filter materials, wiping cloths, clothing contaminated by dangerous substances
15 01 01	Cardboard or paper packaging

EWC Code	Description
15 01 02	Plastic packaging e.g. toner & ink cartridges, polythene sheeting
15 01 03	Wooden packaging e.g. timber pallets
15 01 04	Metallic packaging e.g. drink cans, paint tins
16 01 03	Tyres
16 01 15	Antifreeze fluids that do not contain dangerous substances e.g. Coolants
16 01 17	Ferrous metal from vehicles e.g. car parts
16 02 14	Non-hazardous waste electricals e.g. washing machines, power tools
16 05 05	Gases in pressure containers i.e. gas cylinders
17 01 01	Concrete
17 02 01	Wood from construction or demolition e.g. timber trusses, supports, frames, doors
17 04 11	Cables that do not contain dangerous substances e.g. electric cabling
20 01 01	Paper & card similar to that from households e.g. office paper, junk mail
20 01 30	Non-hazardous detergent e.g. flushing agent/universal cleaner
20 01 39	Separately collected plastics e.g. plastic containers, bottles
20 03 01	Mixed waste similar to that from households e.g. mixed office, kitchen & general waste
20 03 04	Septic tank sludge

*Denotes Hazardous Waste, as categorised by the European Waste Catalogue.

Foul water from the onsite facilities at the construction works compound would be removed from site by an appropriately licensed contractor (see also Section 7).

5.4.4 Regulatory Compliance

Waste would need to be transferred to a licensed waste management site or site with a waste exemption. The Waste Manager would need to check that the site is licensed and that the licence permits the site to take the type and quantity of waste involved. Copies of the waste management licence or waste exemption license would need to be held on file.

A record of waste movements must be completed by all parties involved and must be retained for a period of two years. Sub-contractors excavating and hauling waste offsite must complete their own waste movement records and copy them to the Waste Manager. A weekly or monthly report can be issued rather than a report for each load of waste.

It would be the ultimate responsibility of the PSCS to ensure that other parties involved in the transport, storage and disposal of waste were legally entitled to carry out their duties.

5.5 Dust Mitigation

Good practice measures as listed in below would be adopted during construction to control the generation and dispersion of dust such that significant impacts on neighbouring habitats should not occur. The hierarchy for mitigation would be prevention – suppression – containment:

- The internal access roads will be constructed prior to the commencement of other major construction activities. These roads will be finished with graded aggregate;

- A water bowser will be available to spray work areas (wind turbine area and grid connection route) and haul roads, especially during periods of excavations works coinciding with dry periods of weather, in order to suppress dust migration from the site;
- All loads which could cause a dust nuisance will be covered to minimise the potential for fugitive emissions during transport;
- Gravel will be used at the site exit point to remove any dirt from tyres and tracks before travelling along public roads;
- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- The access and egress of construction vehicles will be controlled to designated locations, along defined routes, with all vehicles required to comply with onsite speed limits;
- Construction vehicles and machinery will be serviced and in good working order;
- Wheel washing facilities will be provided at the entrance/exit point of the proposed wind farm site;
- The developer in association with the contractor will be required to implement a dust control plan as part of the CEMP. In the event the Planning Authority decides to grant permission for the proposed wind farm, the final CEMP will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by the Planning Authority.
- Receptors which receive dusting and soiling from local routes entering the site; and dwellings directly adjacent to the grid connection route construction that experience dust soiling, where appropriate, and with the agreement of the landowner, will have the facades of their dwelling cleaned if required should soiling have taken place;
- Ensure all vehicles switch off engines when stationary – no idling vehicles; and
- Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised through regular servicing of machinery.

5.6 Noise Management

The sources of construction noise are temporary and vary both in location and their duration as the different elements of the site are constructed, and arise primarily through the operation of large items of plant and equipment such as bulldozers, diesel generators, vibration plates, concrete mixer trucks, rollers etc. Noise also arises due to the temporary increase in construction traffic near the site. The level of noise varies depending on the different elements of the site being constructed.

The predicted noise levels from onsite construction activity from the Proposed Development are predominantly below the noise limit for the threshold of significance. Some taskshave the potential to exceed the limit for a period while construction activities are carried out at the closest point to Noise Sensitive Receptors (NSRs). To reduce the potential effects of construction noise, the following types of mitigation measures are proposed:

- Those activities that may give rise to audible noise at the surrounding properties and heavy goods vehicle deliveries to the site would be limited to the hours 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 on Saturdays. Turbine deliveries would only take place outside these times with the prior consent of ABP and the Gardaí.
- Construction works traffic will be restricted to the approved access routes.
- All construction activities shall adhere to good practice, guidance can be found in BS 5228 Construction and Open Sites Part 1 Noise, as is current best practice in the absence of any Ireland specific guidance.
- All equipment will be maintained in good working order and any associated noise attenuation such as engine casing and exhaust silencers shall always remain fitted.
- Where flexibility exists, activities will be separated from residential neighbours by the maximum possible distances.
- A site management regime will be developed to control the movement of vehicles to and from the Development site.
- Construction plant capable of generating significant noise and vibration levels will be operated in a manner to restrict the duration of the higher magnitude levels.

5.7 Site Lighting

Given the proposed size and scope of the development, it is most likely that the construction timetable would require elements of the works to be undertaken during periods of the year when natural daylight is limited. Therefore, temporary site lighting may be occasionally required for specific activities during permitted working hours to ensure safe working conditions. Where the need for temporary lighting is unavoidable, cowled lighting will be used to prevent light spill.

5.8 Vehicle Storage

The development plan includes the provision two construction compounds, both of which will have appropriate areas for staff and visitor vehicles to be parked and have safe and secure barriers to segregate all personnel from site plant and vehicle routes. No parking whatsoever would be allowed on public roads; all cars that are directed to the site parking area would be required to reverse park to comply with the Principal Contractors requirements.

6.0 Pollution Prevention Measures

6.1 Environmental Incident and Emergency Response Plan

The PSCS would be responsible for developing and implementing the Environmental Incident and Emergency Response Plan. The plan provides reference to procedures to be followed in the event of a specific incident. In general, if an environmental incident was to occur, the following would take place immediately:

- mitigation would be implemented to stop or reduce impacts from the incident;
- if these were ineffective, work in the area would cease immediately;
- if necessary, monitoring would be undertaken to identify the source of the incident;
- work would only recommence once it is considered that it would not continue to adversely impact sensitive environmental receptors; and
- provision of a full report by the PSCS and separately by the ECoW to the applicant following an incident occurring.

The Environmental Incident and Emergency Response Plan will be updated to reflects site-specific conditions/issues as experience of the site is developed. The PSCS will submit the detailed Plan to the applicant for approval prior to any construction works commencing onsite. The Plan would provide:

- a summary of local environmental sensitivities, e.g. environmentally designated areas, protected species or habitats and high amenity areas;
- an outline of the construction works and appropriate references to other environmental plans and construction method statements;
- an inventory of stored materials and emergency response spill kits;
- details on training requirements, evidence of training of site staff / plant operators in emergency response procedures including inclusion of Environmental Incident and Response training in site inductions and toolbox talks; and key staff contacts for environmental management and emergency response;
- detailed procedures to be taken in the event of an incident or emergency (including procedures for positioning and movement of plant) and identification of relevant personnel who would be responsible for implementing such procedures;
- contact telephone numbers for the emergency services and the EPA Pollution out of hours Lo Call number (0818 33 55 99); and
- detailed procedures for:
    - initial actions in the event of a fire
    - for testing of fire alarms and drills and maintenance/inspection of fixed and portable firefighting equipment
    - information to be provided to employees on fire safety and fire prevention, including risks of, and control measures to prevent, fire outbreak, evacuation procedures and those responsible for their implementation, and the use of firefighting equipment, in line with HSA guidance.

A plan of the site would also be provided, detailing:

- all areas of potential pollution sources including the locations of car parks, delivery and fuel / chemical storage areas, oil separator equipment, excavations, and any other high risk areas that could give rise to pollution;
- the location of potential sensitive environmental receptors, including sensitive habitats or species, surface watercourses, drains or culverts where pollution may travel to; and
- the location of spill kits and other pollution control or emergency response equipment, such as fire fighting equipment.

The procedures for responding to a major pollution incident would be a regular topic at onsite toolbox talks and management meetings in order to ensure that the incident response plan is fully understood by all personnel, and that all involved know their role in it. Any lessons learnt from any response to real incidents would be fed back into the plan to ensure that best practice is followed.

6.2 Re-Fuelling of Vehicles, Plant and Machinery

Re-fuelling of mobile plant and machinery would be carried out at a designated dry, sheltered, flat location, at least fifty metres from any aquatic zones and twenty metres from relevant watercourses. Refuelling would be carried out using an approved mobile fuel bowser with a suitable pump and hose. Absorbent material (spill kits) would be available onsite and would be deployed to contain drips and small spillages.

Storage of fuels/oils onsite will be limited and bunded to (110% bund capacity) to prevent fluid escaping.

Maintenance of mobile plant would take place within the construction compounds only and would comply with relevant the EPA guidance. Drip trays will be placed under all stationary vehicles which could potentially leak fuel/oils.

6.3 Spillage

Spillage of fuel, oil and chemicals would be minimised by implementation of the Emergency Response Plan (ERP). In the event of any spillage or pollution of any watercourse the emergency spill procedures as described in the ERP would be implemented immediately. Procedures developed in the ERP will be adhered to for storage of fuels and other potentially contaminative materials to minimise the potential for accidental spillage.

6.4 Other Storage

Stone material stockpiles would generally be limited to within work areas. This material would be transported and deposited directly to the point of use from the borrow pits.

Stripped topsoil/superficial soil would be stockpiled in a suitable location away from the area of movement of heavy vehicles, machinery and equipment, to minimise compaction of soil. Stockpiling of excavated material would be managed such that the potential contamination of down slope water supplies and/or natural drainage systems is mitigated / minimised.

Surplus excavated material would be placed in a continuous mound along the side of the tracks to blend into the surrounding landscape and will be grass seeded.

Areas of battery storage would be bunded and positively drained so that the quality of runoff within the bunded area can be visually monitored prior to release by tap, and contained if required;

6.5 Prevention of Sediments Entering Watercourses

To capture and control suspended sediment, silt traps would be installed within relevant watercourses. These would be constructed along and towards the point of outflow of mound drains, where a firm bank exists, and a ten-metre 'buffer zone' containing sufficient vegetation (e.g. grasses, reeds, and shrubs) to filter out any remaining sediment and nutrients can be implemented. Silt traps would be cleared out periodically to ensure they remain fully functional. The build-up of sediment would be emptied onto a level section of the forest floor several metres from any watercourse. Where it is necessary to cross watercourses/drains during harvesting operations, temporary crossing points would be required. These may comprise logs lined lengthwise and overlaid with a geotextile membrane and brash to capture falling soil from machinery wheels. The condition of temporary crossing points would be carefully monitored throughout operations, and these should be cleaned out and supplemented (as necessary). Where it is necessary to cross a watercourse, a clear span log structure must be implemented.

6.6 Waste and Litter

Waste storage/recycling materials would be stored at the designated location on site and in accordance with the Waste Management Plan. A waste hierarchy will be followed for waste minimisation, reuse, recycling and disposal of materials.

With respect to the control of litter on site, all such waste would be collected and stored within sealed containers within the site compound and serviced by a registered waste carrier. No disposal of litter would be permitted at other locations.

6.7 Hydrocarbon Contamination

6.7.1 Vehicle Maintenance

All plant and machinery would be regularly maintained to ensure that the potential for fuel or oil leaks/spillages is minimised. All maintenance would be conducted on suitable absorbent spill pads to minimise the potential for groundwater and surface water pollution. All machinery would be equipped with drip pans to contain minor fuel spillage or equipment leakages.

6.7.2 Fuel / Chemical Storage

All fuels, oils and other chemicals would be stored in secure, fit for purpose containers within bunded containment as appropriate and in accordance with EPA guidance. The bunded containment would have a capacity of 110% of the volume to be stored and would have impervious, secured walls and base.

The bunded area would be underlain by an impermeable ground membrane layer to reduce the potential pathways for contaminants to enter watercourses and groundwater.

7.0 Drainage and Surface Water Management

7.1 Introduction

Control of water is of great importance during construction to prevent exposed soils eroding and silting up surrounding drainage channels and watercourses. It is essential that the works have little or no impact on the existing hydrology in order to minimise potential impact on ecology and environmental quality of the surrounding area.

All works associated with the construction of the Proposed Development will be undertaken in accordance with the guidance contained within CIRIA Document C741 'Environmental Good Practice on Site' (CIRIA, 2015). Any groundwater encountered will be managed and treated in accordance with CIRIA C750, 'Groundwater control: design and practice' (CIRIA, 2016).

The following principles are intended to demonstrate measures that could be used across the site to adequately protect hydrological, and related, resources. Detailed proposals for such measures would be documented prior to construction and would provide the same or greater protection for the water environment as those described in this document. The measures are proportionate to the risk and, where greater risk is highlighted at specific locations prior to construction, specific measures would be agreed for those locations.

7.2 Site Induction and Training

All employees and contractors would undergo a site induction to ensure that they were familiar with the site rules prior to any work commencing on site. In addition, the PSCS would ensure that all operatives and contractors responsible for handling fuel, oil, concrete / cement, chemicals or other potential pollutants undergo a thorough induction programme with respect to the relevant proposed pollution control measures. The relevant programme would include, as a minimum, the following:

- waste management;
- emergency response plan procedures;
- materials management;
- habitat and species protection,
- surface water management;
- potential sources of pollution and their effects on the environment;
- requirements of the contract and legislation with respect to pollution;
- the PSCS's pollution avoidance plan;
- traffic management and routing, including areas where access is not permitted; and
- training in the use of pollution control equipment.

7.3 Site Drainage

During the construction phase of the proposed development, measures would be adopted, in order to prevent silt, chemicals and/or other contaminants from being washed into existing watercourses. Areas exposed due to the removal of existing structures and/or vegetation are more susceptible to erosion during heavy rainfall so areas would be reinstated as soon as possible to minimise this effect.

This would include specific guidance in relation to drainage (and control of pollution to the water environment) around the following aspects of site infrastructure:

- access routes;
- foundations;
- hardstanding areas and new structures

The appropriate methodologies to cover water control and the means of drainage from all hard surfaces and structures within the site are described in the following sections.

7.4 Management of Sediment and Surface Waters

Good practice construction techniques would be adopted for the management of sediment and surface water run-off generated during the construction phase of the proposed development. Sustainable Drainage Systems (SuDS) would be used where applicable.

Drainage from the site would include elements of SuDS design. SuDS replicate natural drainage patterns and have a number of benefits:

- SuDS would attenuate run-off, thus reducing peak flow and any flooding issues that might arise downstream; and
- SuDS would treat run-off, which can reduce sediment and pollutant volumes in run-off before discharging back into the water environment; and
- SuDS measures, such as lagoons or retention ponds, where appropriate and correctly implemented would produce suitable environments for wildlife.

Silt/sediment traps, silt busters, single size aggregate, geotextiles or straw bales will be used as required to filter any coarse material and prevent increased levels of sediment. Drainage systems will be designed to minimise sedimentation into natural watercourses - this includes buffer strips, silt traps, check dams and infiltration trenches. Further to this, activities involving the movement or use of fine sediment will avoid periods of heavy rainfall, as instructed by the ECoW.

A wet weather protocol would be implemented to manage activities during periods of heavy and prolonged precipitation to be approved by ABP in consultation with the EPA. In extreme cases, the above protocol will dictate that work onsite may have to be temporarily suspended until weather/ground conditions allow.

Heavy or prolonged rainfall during construction and operation may lead to sediment transport or vegetation causing blockage to infrastructure drainage channels or any temporary watercourse crossing structures. Regular monitoring and prompt maintenance of these assets will ensure that the drainage system continues to function as designed.

As per good practice for pollution and sediment management, prior to construction, section specific drainage plans will be developed and construction personnel made familiar with the implementation of these.

7.5 Foul Drainage

Effluent and waste from onsite construction personnel would be captured and stored for offsite disposal by a licensed contractor. The system would be designed for approval by the EPA prior to the construction phase of the proposed development.

8.0 Water Quality Monitoring and Contingency

8.1 Water Quality Monitoring

Water quality monitoring during the construction phase would be undertaken for the surface water catchments that serve the site, to ensure that none of the tributaries of the main channels are carrying pollutants or suspended solids. Monitoring would be carried out at a specified frequency on these catchments.

With regard to the protection of the water environment the following risks would be addressed:

- siltation of watercourses;
- discolouration of raw water;
- potential pollution from construction traffic due to diesel spillage or similar;
- alteration of raw water quality resulting from imported track construction material;
- excavation and earthworks;
- use of large quantities of concrete;
- site compound and associated drainage/foul drainage and diesel spill issues; and
- the PSCS would compile a monitoring and maintenance plan for the drainage system and surface water runs which would as a minimum include:
  - visual monitoring/inspections, during site works including and water crossing construction works, the relevant drainage/surface water runs potentially being impacted by these works would be inspected on a daily basis by the ECoW while works are ongoing in this area.

A Water Quality Monitoring Plan (WQMP) will be developed to form part of the Construction Method Statement (CMS), which would be submitted to the appropriate planning authorities and bodies such as the EPA prior to construction and development. The WQMP will be implemented to monitor surface water quality, fish populations and macroinvertebrate community prior to, during and post-construction. A robust baseline of water quality in surface watercourses / drainage channels downstream of construction works will be established prior to construction commencing and used a benchmark of water quality for the construction phase monitoring. As such, surface water monitoring is to be continued at the 13 no. riverine survey sites which were assessed for biological water quality through Q-sampling in July 2022 during the aquatic baseline survey (see **Appendix 5.4**).

The purpose of the WQMP is to:

- ensure that the commitments put forward in the EIA Report are fulfilled with regards to identified ground and surface water receptors;
- provide a specification for monitoring prior to, during and after construction;
- provide a record of water quality across the site that can be compared to rainfall and site activities;
- provide reassurance of the effectiveness of pollution prevention measures installed to protect surface watercourses throughout the construction period; and
- provide data to identify any potential pollution incidents, and to inform a structured approach to manage and control such incidences.

The WQMP will outline details for the monitoring of surface watercourses down gradient of works areas including watercourse crossings, access tracks, turbine foundations and borrow pits and at control sites (up gradient of works areas), and will include:

- Continued extensive surface water monitoring at the 13 no. riverine survey sites, as noted above;
- planning level monitoring locations;
- frequency of monitoring prior to, during and after construction;
- parameters for field hydrochemistry testing and laboratory analysis including as a minimum pH, electrical conductivity, suspended solids, dissolved metals, nutrients and hydrocarbons;
- sampling and analysis protocols;
- relevant Environmental Quality Standards (EQS);
- responsibilities for monitoring – it is expected that the ECoW will be responsible for daily monitoring of watercourses particularly around active works areas and watercourse crossings. Further monitoring on a less frequent basis (i.e. monthly) may be done by an external party;
- procedures to be followed in the event of an environmental incident; and
- recording and communicating of results.

A Private Water Supply (PWS) Action Plan would be developed and would include details regarding all water monitoring and reporting, pollution incident reporting and emergency mitigation measures to address a temporary or permanent material change in either the quality or quantity of an existing private water supply. The PWS Action plan shall include as a minimum:

- the provision of an emergency hotline telephone number for householders so that they can contact the project with any concern regarding water quality or quantity;
- the contact details of householders downgradient of work areas to alert in the event of a pollution incident;
- the provision of an alternative water supply, if required, during any periods of PWS disruption; and/or
- to supply affected properties with filters for particulate removal.

8.2 Laboratory Analysis

This monitoring would involve laboratory analysis of water samples taken at agreed locations across the site and would continue throughout the construction phase and immediately following construction. Monitoring would be used to allow a rapid response to any pollution incident as well as assess the impact of good practice or remedial measures. Monitoring frequency would increase during the construction phase if remedial measures to improve water quality would be required. Detailed water quality monitoring plans would be developed during detailed design in consultation with ABP and the EPA.

The performance of the good practice measures would be kept under constant review by the water monitoring schedule, based on a comparison of data taken during the construction phase with a baseline data set, sampled prior to the construction period and through the observance of any trends in water quality change over time.

8.3 Emergency Response

Drainage networks provide a conduit for rapid transport of silty water and potential contamination from surface spills of fuels / oils, concrete or chemicals. A pollution emergency incident would include any discharge to the drainage network that could potentially cause environmental damage. Examples of pollution emergency incidents include:

- fuel drips or spills during refuelling;
- leaking plant or equipment;
- leaks from fuel or chemical containers;
- contaminated water or sediment / silt entering a watercourse or drainage network;
- windblown dust and waste;
- excess silt deposition in drainage ditches, channels, culverts following heavy rainfall events;
- operational failures of pumps and pipelines; and
- failures of treatment or sediment controls.

The PSCS would be required to keep an updated Environmental Incident and Emergency Response Plan (Section 6.1**Error! Reference source not found.**) which would provide emergency response contacts, reporting procedures, and procedures for dealing with all potential pollution incidents during the construction of the proposed development.

8.4 Specific Measures for Protecting Groundwater Receptors

Areas of potential GWDTE are sustained by surface water and rainfall rather than by groundwater. Measures would be required to sustain surface water flow paths to maintain these habitats.

9.0 Construction Phase

9.1 Introduction

This section describes in more detail the key components of construction and the impact they may have on the environment.

The overall site design has been developed in accordance with recommendations adopted from the EIA Report and to reflect the requirements and specifications for transporting wind turbine components to the proposed turbine locations.

9.2 Temporary Compound

The works would include the construction of two Temporary Construction Compounds (TCCs), One TCC in the Northern cluster and one TCC in the Southern cluster.

The temporary construction compounds would be likely to contain the following:

- temporary modular building(s) to be used as a site office;
- welfare facilities;
- parking for construction staff and visitors;
- reception area;
- secure storage areas for tools; and
- waste storage facilities.

Welfare facilities would be provided for the duration of the construction period in accordance with the SHWW 2013.

Where and when compound lighting is required, it would be designed to minimise light pollution to the surrounding area as set out in Section 5.7.

The compound would also be used as a storage compound for construction materials.

The compound would be built by stripping topsoil and regrading, then laying geotextile and an imported stone layer. The stripped topsoil would be stored adjacent to the compound in a linear bund typically no greater than 2m in elevation. Superficial soil would be stripped and stored separately from the topsoil. This would be stored in a similar manner to the topsoil, but would depend on the volume which is required to be excavated.

It is proposed that uncontaminated surface run-off from the compound is accommodated in a swale or soakaway which would be constructed as a perimeter ditch to avoid contamination of watercourses should there be a spillage and from fines washout. All other run-off from the site would follow natural drainage patterns and newly installed drainage routes.

The compound area would be reinstated at the end of the construction period. Reinstatement would involve removal of the imported material and underlying geotextile. The exposed substrate would be gently ripped and the stored superficial soil and topsoil replaced. The surface would be re-seeded as required using the same seed mix as that used for the reinstatement of track verges and batter (in consultation with landowners).

Alternatively, if the ground conditions permit, all inert materials such as the imported stone could be retained, and the stored superficial soil and topsoil replaced. This area would be kept on record and could be used as the temporary construction compound during the decommissioning phase.

9.3 Welfare Facilities and Services

Welfare facilities would be provided in accordance with Safety, Health and Welfare at Work (Construction) Regulations 2013 during the construction period and would include mobile toilets with provision for sealed waste storage and removal. Sewage waste would be tankered offsite by a licensed approved waste contractor (see Section 7.5).

Potable water would be imported as bottled water. The water would be used for messing purposes during the construction phase.

The welfare facilities will most likely have in-built water bowsers to provide a water supply for sanitation etc.

Electricity would be provided by onsite generators. All electrical equipment and its installation and maintenance would be undertaken by a qualified and competent person.

9.4 Transport Routes

Both construction workers and materials needed for the construction works would be delivered to site using the public road network. A Construction Traffic Management Plan (CTMP) would be developed following appointment of the PSCS and identification of the material supply points and included in the final CEMP. A Framework CTMP is provided in **Appendix 14-3**.

The proposed abnormal load route required to transport turbine components to the site is shown on EIAR **Figure 14-5.** The turbine delivery route will leave Dublin port, with a route via the M50 and M4/N4. At junction 16 of the N4 close to Mullingar the transport will exit the N4 to head north east along the N52 towards the site. A Turbine delivery route review (TDR) has been undertaken and may be found in EIAR **Appendix 14-1.**

The proposed abnormal load route has been assessed and verified for the movement of wind turbine components (including blade, tower sections and nacelle), transported as abnormal loads. Abnormal indivisible loads (AILs) are those which exceed the length, weight or height criteria defined in 'Road Traffic (Permits for Specialised Vehicles) Regulations 2009, S.I. No. 147 of 2009', and 'Road Traffic (Specialised Vehicle Permits) (Amendment) Regulations 2010, S.I. 461 of 2010.

Full detail of the assessment of effects on the road network is provided in **Chapter 14.**

Once consent has been received and prior to construction, the route would be further inspected by suitable engineers, in conjunction with the police and the relevant highway authorities, with a view to finalising the CTMP and to obtaining a suitable licence for the movement of abnormal loads.

The CTMP would include (but not be limited to):

- a delivery schedule to ensure impacts on the road network are minimised;
- detailed design of temporary and permanent road improvements; and
- assessment of existing street furniture and bridge classifications and preparation of a schedule of temporary works along the access route.

9.5 Borrow Pits

1.1.1 General

In order to construct the access tracks, passing places and formation of new hardstanding areas such as crane pads, site construction compounds and laydown areas, crushed rock is required. It is proposed to source this material from two onsite borrow pits, to reduce the need to import materials.

In general, these borrow pits would be stripped back of topsoil which would be stored adjacent to it for future reinstatement.

9.5.1 Materials Storage

Prior to the excavation of the borrow pits and following construction of appropriate SuDS measures, vegetation and soils would be removed and stored in overburden stockpiles. Overburden stockpiles would be located adjacent to the borrow pits and compacted in order to limit instability and erosion potential. Silt fences would be employed to minimise sediment levels in runoff from the stockpiles.

Rock stockpiles would be stored in already-worked areas of the borrow pits or, before these are available, stockpiles would be located on safe and stable designated areas approved by a qualified engineer, identified on a plan of the working area of the borrow pits and agreed with the ECoW.

Overburden or rock stockpiles would be stored at least 50m from watercourses in order to reduce the potential for sediment to be transferred into the wider hydrological system.

9.5.2 Surface Water Management

Temporary interception bunds and drainage ditches would be constructed upslope of the borrow pit(s) to prevent surface water runoff from entering the excavation. Swales would also be implemented to convey and attenuate excess surface water flow away from borrow pit(s). These methods would be kept to a minimal depth and gradient, with check dams, silt traps and buffer strips also utilised where possible to minimise erosion and sedimentation at peak flows.

Infiltration trenches would also be placed downslope of the borrow pit(s) and overburden and rock stockpiles and would be designed to treat run-off before discharging back into the drainage network. Silt fences would be used to intercept sediment-laden surface run-off in addition to infiltration trenches.

9.5.3 Borrow Pit Dewatering

Limited dewatering of the borrow pit(s) may be necessary. Water would be treated by a settlement lagoon(s) and by discharge onto vegetated surfaces.

Outflow from settlement lagoon(s) in proximity to the borrow pit(s) would discharge to surface water drains.

Clean and dirty (silty) water encountered onsite during the construction works will be separated, and dirty water will pass through a number of settlement lagoons and silt/sediment traps to remove silt before re-entering the water environment through percolation to ground or discharge to the surrounding drainage system.

It is unlikely that groundwater ingress would be significant. However, the floors of the borrow pit(s) would have a gravity drain design. All floor water would drain to an adequately sized sump to allow sediment to settle out before discharge to surrounding vegetated surfaces.

Excavation machinery would be regularly maintained to ensure that there is minimal potential for fuel or oil leaks/spillages to occur. All maintenance would be conducted on suitable absorbent spill pads to minimise the potential for groundwater and surface water pollution.

9.6 Access Tracks

9.6.1 General

The extent of construction disturbance would be limited to around the perimeter of, and adjacent to, access track alignments, including associated earthworks, and would be monitored by the ECoW as required.

There is anticipated to be one new watercourse crossing and one upgraded watercourse crossing to facilitate the access tracks within the proposed development site.

It is anticipated that the requisite 6 km of new internal access tracks would largely be constructed as much as possible from aggregate won from onsite borrow pits and would be constructed to the best practices for wind farm access tracks.

All access tracks will be approximately 5 m wide. The tracks will be finished with a well graded aggregate. Existing drainage infrastructure will be maintained and upgraded where necessary. The full track construction (at formation level) will extend up to 11m wide to allow for cable trenches and surface water drainage ditches. Additional clearance may be required above ground level to allow for turbine oversail/swept path during turbine delivery. Gradients will be limited to no more than 1 in 12 (8%) and a stone layer provided, so as to provide suitable traction for turbine delivery vehicles and other larger indivisible loads. For the construction of tracks topsoil would be stored in a continuous mound along the side of the tracks to blend into the surrounding landscape and will be grass seeded. The material would then be reused for reinstatement in accordance with guidance.

9.6.2 New/ Upgraded Tracks

There would be up to approximately 6 kilometres of new site access tracks and associated drainage infrastructure as part of the proposed development. Existing drainage infrastructure shall be retained where possible and improved as necessary.

- Access track formation will consist of a proposed minimum 500m hard core on a geotextile membrane. The construction methodology for newly constructed tracks will be as follows:the formation will be prepared to receive the geotextile membrane.
- stone will be placed and compacted in layers to a proposed minimum 500 mm depth.
- a drainage ditch will be formed along the sides of the track (which will depend on the adjacent topography and track design).
- surplus excavated material will be placed in a continuous mound along the side of the tracks to blend into the surrounding landscape and will be grass seeded.

9.6.3 Cut Tracks and Drainage

Maintenance of the running surface would be carried out on a regular basis, as required, to prevent undue deterioration. Loose track material generated during the use of access tracks would be prevented from reaching watercourses by measures identified in Section 6 of this CEMP. Periodic maintenance of tracks by way of brushing or scraping would also be carried out to minimise the generation of wheel ruts, which could lead to some track material being washed away. In dry weather, dust suppression methods may be required for track and hardstanding areas. The site access tracks, hardstandings and trackside drains would be inspected on a regular basis by the Contractor.

9.6.4 Management of Surface Water

New access tracks would be designed to have adequate cross fall or camber to avoid ponding of rainwater and surface run-off. Run-off from the access tracks and existing drainage ditches would be directed into swales that would be designed to intercept, filtrate and convey the runoff.

Check dams would be installed within the swales and existing drainage ditches where required in order to increase the attenuation of run-off and allow sediment to drop out.

Permanent swales and drainage ditches adjacent to access tracks would have outlets at required intervals to reduce the volume of water collected in a single channel and, therefore, reduce the potential for erosion. Outfall pipes would drain into a bunded section of the drainage ditch to allow suspended solids to settle.

The PSCS would be responsible for the management of all surface water runoff, including the design and management of a drainage scheme compliant with SuDS principles.

9.6.5 Protection of Watercourse Crossings

Upgraded watercourse crossings would be appropriately designed so that they do not alter the natural drainage and can accommodate flow. All access road river/stream crossings will require a Section 50 application (Arterial Drainage Act, 1945). The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent.

9.6.6 Floating Tracks and Drainage

Floating track may be installed across areas of deep peat areas (in excess of 1m deep) and where the integrity of the peat allows;

Floating track construction essentially comprises the laying of a geosynthetic (geotextile mat or geogrid reinforcement) across the superficial soils prior to constructing the track. Where necessary, risk from run-off would be mitigated by directing drainage to settlement ponds. Erosion processes on the track side embankments and cuttings would be mitigated by ensuring that gradients are below stability thresholds, which would also enable effective regeneration of vegetation or reseeding with appropriate species. Sediment traps would be required in the early years following construction until natural regeneration/ reseeding is established. Should significant erosion or sedimentation, (which is not expected) take place at any location it would be addressed by re-grading of slopes.

Cut and fill should be avoided in peat greater than 1m deep if possible; if not, the following requirements on side long ground (across contours) should be adopted;

- Excavate to a sound stratum;
- The majority of construction surfaces to be essentially horizontal with a slight fall to aid drainage;
- Where the depth of cut is deemed unstable, employ a stepped or benched surface with the intention of minimising the exposed surface of the up-slope cut face;
- Protect all exposed peat surfaces from erosion and desiccation, by ensuring the integrity and moisture content of the peat is maintained; and
- The top of cut slopes should be provided with a small bund to retain the peat to prevent desiccation and maintain the local stability of the peat.

9.6.7 Onsite Vehicle Movements

Access tracks would be designed to be approximately 5m wide and passing bays will be incorporated.

The full track construction (at formation level) will extend to allow for cable trenches and surface water drainage ditches. Additional clearance may be required above ground level to allow for turbine oversail/swept path during turbine delivery. Gradients will be limited to no more than 1 in 12 (8%) and a stone layer provided, so as to provide suitable traction for turbine delivery vehicles and other larger indivisible loads.

During the periods of delivery of the large components, the Contractor would use appropriate site communications and access control techniques to enable safe one-way operation of the tracks.

9.6.8 Unstable Ground

In the context of the Site and known history, it is considered that the fen peat could lead to instability in the area of turbine locations T1 and T3. However, during construction peat will be excavated in the area of the turbine location, which will reduce the depth of peat at this location. The principal surface indicator of peat slide potential is cracking of the peat land surface and it is the identification of crack patterns in the field and the attendant causes of the cracking that is fundamental to a peat stability assessment. Advance warning signs of the failure such as cracking, change in levels or slumping of the foundations and concrete bases associated with the wind turbines would be visible during Site inspections and standard maintenance works. An appropriately experienced and qualified engineering geologist/geotechnical engineer would be appointed during the construction phase, to provide advice during the setting out and construction phases of the works. If any unstable ground is encountered during access track construction, the following procedure would be adopted:

- access track construction in the immediate area of the unstable ground would cease with immediate effect; and
- the Geotechnical Engineer and PSCS would immediately assess the situation and develop a solution

9.6.9 Signage

Sufficient signage would be employed onsite, for both site personnel and the public, to clearly define the boundary of the works where they coincide with areas accessible to the public.

9.7 Turbine Foundations

9.7.1 General

A total of 8 turbines would be erected on reinforced concrete gravity foundations, between 21.5 - 28.4 metres in diameter. Piles can be used where the underlying strata does not meet the criteria for gravity-based foundations. However, based on site investigations carried out to date, it is considered that all turbine foundations shall be shallow gravity base types and founded on either rock or glacial till.

Proposed turbine foundation locations would be inspected by the ECoW to ensure that all potential environmental constraints have been identified, demarcated and/or mitigated for prior to the on-set of construction in that area. The final location of the turbines would be within approved micrositing allowances of the consented positions in accordance with Planning Conditions. The regularity of inspections (daily, weekly, as appropriate) during construction would be determined in advance for each particular section, based on anticipated ground

conditions, known environmental sensitive receptors, prevailing weather conditions, and anticipated rate of progress.

During the construction phase, all works associated with the construction of the Proposed Development will be undertaken in accordance with the guidance contained within CIRIA Document C741 'Environmental Good Practice on Site' (CIRIA, 2015). Any groundwater encountered will be managed and treated in accordance with CIRIA C750, 'Groundwater control: design and practice' (CIRIA, 2016).

9.7.2 Construction of Turbine Foundations

Construction of the turbine foundations would be the responsibility of the Contractor.

The limits of each of the foundation excavations would be surveyed and pegged out in advance of any proposed works, and the ECoW would be consulted to ensure all necessary pre-construction checks have been completed.

The turbines require reinforced concrete foundations that measure approximately 21.5 - 28.4 metres in diameter in diameter. To facilitate the construction of this, an area up to 3m wider around the perimeter would be required e.g. approximately 24.5m – 31.4m total diameter to create a working area.

Depending on the stability of the material being excavated for the turbine bases, an additional area may be graded back from the foundation working area to ensure that the excavation remains stable during construction.

Drawing ABP - 314271-22.PL07 shows a planning level turbine foundation design.

The anticipated construction activities associated with the turbine foundations are detailed as follows:

- stripping of surface vegetation (turves) and careful stockpiling of this material as per CEMP requirements;
- excavating the remaining superficial soil and rock materials and stockpiling of this material as per CEMP requirements;
- the stockpiled materials are to be retained for restoration purposes;
- soil would be excavated until a suitable formation can be achieved. Where rock is encountered this would most likely be removed by mechanical excavation to the required depth and material stockpiled as described above. The potential impacts associated with the use of hydraulic breakers or other such vibratory equipment in the vicinity of sensitive ecological receptors or watercourses would be assessed and appropriate mitigation measures implemented where required in consultation with the ECoW;
- the foundation design is based on the most efficient use of materials and local ground conditions;
- temporary fencing would be erected at locations where there are safety implications for any persons likely to be present on the site e.g. around open excavations. Signage would be displayed clearly to indicate deep excavations and any other relevant hazards associated with the foundation excavation works;
- cut-off ditches would be used at the perimeter of foundation excavations to divert the clean water away from the work areas thereby reducing the volume of water potentially requiring pumping/treatment in silt traps/settlement lagoons. It is not anticipated that large scale dewatering would be required during the excavations. Water from dewatering of excavations would be pumped via surface silt traps to ensure that

sediment does not enter surrounding watercourses. Settlement lagoons would be employed in areas where the level of runoff is likely to exceed levels normally contained within a silt trap, however it is considered unlikely that these would be required. Wash-out areas at each base, (if required) would be lined and contained to prevent wash-out water entering drainage/surface waters. The material from the wash-out would be disposed of appropriately offsite;

- following excavation, levels would be set to allow the blinding concrete to be placed and finished to the required line and level;
- the steel reinforcement would then be finished to the required design specification. The steel reinforcement would then be delivered to site and stockpiled adjacent to the respective turbine base;
- the formwork would be pre-fabricated of sufficient quality and robustness to allow repeated use. Formwork would be cleaned after each use and re-sprayed or painted with mould oil within the blinded foundation excavation prior to being fixed in place. The placement of containers with mould oil would be strictly monitored to ensure that storage is only in bunded areas (i.e. in the TCC) on sealed hardstanding. Spraying of mould oil and storage of such sprayed materials would be undertaken in such a way as to avoid pollution;
- sulphate resistant concrete or other suitable concrete, as appropriate for the prevailing ground conditions, would be used in the turbine base. Prior to pouring the base concrete, the overall quality of the steel fixing would be checked to ensure there is sufficient rigidity to cope with the weight of personnel and small plant during the pour. The quantity, size and spacing of the reinforcement bars would be checked against the construction drawings to ensure compliance with the design detail. The position of the foundation insert, or other appropriately designed foundation mechanism supplied by the turbine manufacturer would be checked to ensure that the level is within the prescribed tolerances. A check would also be carried out to make sure the correct cover from edge of reinforcement to edge of concrete is maintained throughout the structure. A splay would be formed on all external corners;
- cable ducts would be checked so as not to leave sharp corners that would cause cable snagging and that all bend radius comply with the design illustrated on the construction drawing. All earthing cable or strip connections would also be examined to prove their adequacy to withstand the rigors of the concrete placing process;
- concrete would be batched onsite. As with all concrete deliveries, a record would be kept against each turbine to indicate the source of supply, type and consistency of the mix. A record would also be kept of the personnel involved, the time and date the pour commenced and finished;
- the concrete pour would commence after the blinding concrete has been cleaned of debris and other loose material. Vibrating pokers would have been checked to ensure they are fuelled by compressed air and in good working order. The pour would proceed under the control of the Contractor. Personal Protective Equipment (PPE) would be worn by the site operatives and as detailed in the Construction Phase Plan. Pouring would follow best working practice procedures and fresh concrete would be protected from hot and cold weather as required;
- shutters would be carefully loosened, removed and cleaned no earlier than 24 hours from the finish of the pour; and
- backfilling to the turbine base would proceed in layers of approximately 0.3m with compaction as necessary. Further layers of material would be laid until the original till level is attained. Soil would be replaced from the appropriate storage area until the

original ground level is reached, or a shallow mound (up to 500mm above existing ground level) is formed. In the event that there is limited onsite material to compact above the turbine foundation, then imported material may be required. This would typically be a well graded granular product.

A checklist for each foundation would be prepared to show compliance with the documents of each step of the installation process. These lists, once completed, would be stored in the contractor's QA file along with relevant cube test results, and be available for inspection at all times.

Following the completion of all construction activities, the area surrounding the base would be reinstated.

9.7.3 T1 Foundation

The foundation for T1 is located adjacent to the cSAC. The following consideration is to be given to the design and construction of the T1 foundation.

- During the construction phase, all works associated with the construction of the Proposed Development will be undertaken in accordance with the guidance contained within CIRIA Document C741 'Environmental Good Practice on Site' (CIRIA, 2015), which is current best practice. Any groundwater encountered will be managed and treated in accordance with best practice CIRIA C750, 'Groundwater control: design and practice' (CIRIA, 2016).
- A buffer distance of 50 m will be between watercourses and any proposed construction activities or infrastructure. Where the 50 m buffer cannot be provided at T1, a drainage report has been undertaken and mitigation measures provided for (see **Appendix 7-4**). The mitigation measures include the provision of a silt fence between the T1 construction area and the River Boyne and River Blackwater cSAC boundary (Site Code: 002299).
- Best construction management, as set out elsewhere in this CEMP, will be followed.
- Prior to construction of the turbine base at T1, a groundwater monitoring borehole will be extended to confirm the ground conditions and determine the depth to groundwater. Due to the presence of low permeability superficial deposits at the T1 area, shallow groundwater is not expected to be encountered and it is not expected that there would be any impact on groundwater levels in the nearby cSAC during construction. However, should significant dewatering be required during the construction of the turbine base at T1, sheet piling will be placed between the construction area and the cSAC, so that there would be no change in the groundwater levels within it.
- The T1 foundation will be excavated to provide a working area to facilitate the creation of a formation, then the associated placement of reinforcement and then pouring of concrete.
- During this phase of construction, any surface water will either be diverted from above the excavation or will be intercepted within the foundation and fall to a localised sump for pumping.
- Any sub-surface water that drains into the site via the sidewalls or up through the base of the excavation will similarly be drained to a localised sump to be pumped.
- Where the ingress of subsurface water appears to be significant, especially if draining from the cSAC side of the excavation, then the following options can be considered:

- The installation of sheet piling/caisson especially on the side of greater ingress. This will be to stem the flow, and any water draining into the excavation will still be pumped from a localised sump.
- Where ground levels permit, the ingressing water would be diverted to flow naturally back onto the land to infiltrate back into the ground.

- All pumped waters will be discharged back onto undisturbed ground, ideally downgradient to infiltrate back into the ground.

At all times, the volume of water ingress and assessment of cause shall be managed to ensure that the pumping system can adequately manage the volume of water.

9.8 Crane Pads

Crane pads would be required to allow installation and removal of the turbine components. Location and orientation would be optimised to make best use of the existing topography, prevailing wind conditions (to enable safe lifting) and the chosen erection procedure. Additionally, the crane pad orientation would take account of environmental constraints. As with access tracks, topsoil and superficial soil would be removed wherever possible and stored separately adjacent to the removal area for later reinstatement up to the edge of the hardstanding.

The area would be set out to the required dimensions and excavated to a suitable formation. Coarse rock fill would then be placed and compacted in layers using compaction equipment. Geotextile may be used depending on the suitability of the underlying strata. The final surface would be formed from selected granular material and trimmed to allow surface water run-off to drainage ditches. The crane pad would remain *in-situ* for the operational life of the proposed development.

9.9 Substation Compound and Control Building

9.9.1 Substation Compound

The main substation compound would include an area for car parking, electrical equipment, such as transformers and circuit breakers and a control building.

Lighting would be limited within the compound to lighting poles located around the substation and exterior wall mounted lights on the control buildings.

9.9.1.1 Control Building

The proposed substation will contain two control buildings, the Customer Switchgear Room (the IPP Building) will be operated and maintained by the Applicant while the Transmission System Operator (TSO) 'Control Building' (the EirGrid Building) will be operated and maintained by EirGrid.

The IPP Building will measure 17.83 metres by 7.6 metres and will have an overall height of 6.0 metres. It will house switchgear, associated electrical equipment and apparatus, storage and welfare facilities.

The EirGrid Building will measure 25 metres by 18 metres and will have an overall height of 8.55m. It will contain a control room, associated electrical equipment and apparatus and will also include storage and welfare facilities.

Welfare facilities including a toilet would be provided in the control building for the duration of the operation of the proposed development. Sewage waste would be tankered offsite by a licensed approved waste contractor.

A rainwater collection and purification system would be installed to service the welfare room, and electricity would be provided from a local electricity connection or a back-up diesel generator.

9.10 Cable Laying

The electricity generated from wind turbines within the Northern and Southern Clusters will be collected at a medium voltage 33 kV cable circuits of buried cables which will follow on site access tracks to the access points along the L5542. A 33kV collector circuit cable will be embedded within the public roadway between the clusters along the L5542 until it meets the N52 where it will follow this road north in the direction of Clonmellon. At Clonmellon it will then follow the L6821 east to connect with the off-site substation. The electricity will be exported to the grid via the 110 kV overhead line at this location.

Within the Main Wind Farm Development Site, cables would typically be buried in the verges of internal access tracks.

The typical 33kV cable trench detail for installation along existing / proposed access track and for installation along a public road is shown on the associated Planning Drawings. The minimum width of the cable trenches for the 33kV cable trench will be 0.6m and the minimum depth will be 1.248m.

Typical 110kV cable trench detail for the section of 110kV electricity cabling between the 110kV substation and the existing overhead line at Clonmellon, inclusive of interface mast, is shown on the associated Planning Drawings.

Cable-ducts will generally be laid when the track is being constructed and will follow the edge of the site access tracks. The trenches within these locations will generally be backfilled using the excavated material. The contractor will excavate cable trenches and then lay high density polyethylene (HDPE) ducting in the trench in a surround of cement bound material (CBM). A rope will be inserted into the ducts to facilitate cable-pulling later. The as-constructed detail of the cable duct locations will be carefully recorded. Cable marker strips will be placed above the ducts and the two communication ducts will also be laid. An additional layer of cable marker strips will be laid above the communication ducts and the trench back-filled. Back-filling and reinstatement in public roads will be to a specification to be agreed with the road authority and at least as good as the existing.

9.11 Soil Storage

Superficial soils would be excavated and stored temporarily. It is anticipated that most of the soil resources within areas directly affected by construction activities would be able to be stored and reinstated as close as possible to where they were excavated in accordance with best practice; so that the site would be restored with minimal movement of material from its original location.

At turbine foundations topsoil material would be stored adjacent to the base working area. Superficial soil would then be stripped and stored, keeping this material separate from the topsoil.

Following excavation of the turbine foundation area and construction of the foundation (concrete/reinforced steel) the area would be backfilled with spoil. The area would be reinstated using the retained topsoil/turf where appropriate materials are available. Where required a gravel area would be left around the tower base for access. Reinstatement at turbine foundations would begin as soon as possible after foundation and plinth installation is complete.

The risk of water pollution from excavation works in terms of sediment loss would be prevented / mitigated by the following measures:

- careful location of turbine bases and track line to minimise excavation where applicable;
- stripped topsoil/superficial soil would not be stored adjacent or in close proximity to watercourses, where a construction area requiring soil stripping is close to a watercourse the soil would be stored a suitable distance from the watercourse;
- soil would be stored in accordance with best practice in order to remain intact as the soil would be essential to the site reinstatement;
- where turf requires excavation for track construction an excavator would lift turf and place it to the side leaving space between the edge of the track and the embankment to be constructed. The excavator would then lift out the soil and would place it to the side of the proposed track. The soil stored by the side of the access track would be graded by an excavator and the turves would be replaced by the excavator over the graded soil beside the track. The timescale for this operation is short and the methodology has been successfully applied at other wind farms; and
- excavated soil would not be placed onto water reservoirs or placed where it would block established surface or drainage channels.

9.12 Watercourses

9.12.1 Watercourse Crossings

There is anticipated to be a total of two new watercourse crossings and four upgraded watercourse crossing to facilitate the proposed development:

Table 9-2: Watercourse / Ditch Crossings

Crossing Point	Existing / Proposed	X coordinate (ITM)	Y coordinate (ITM)	Crossing type	Watercourse
WF-HF1	Existing	663112	767688	Flatbed Culvert	Field Drain
WF-HF2	Existing	663072	767714	Piped Culvert	Field Drain
WF-HF3	Proposed	662835	767827	Piped Culvert	Field Drain
WF-HF4	Proposed	662698	767830	Piped Culvert	Field Drain
GCR-1	Existing	664687	768427	Piped Culvert	Kilskeer Stream
GCR-2	Existing	664293	768880	Box Culvert	Clonmellon Stream

Tracks have been routed to minimise any crossing of the watercourse, where possible. However, where track crossings are required, then these would be designed and constructed appropriately.

Chapter 7 of the EIA Report includes details of water crossings, and the biodiversity implications are addressed in **Chapter 5**.

All access road river/stream crossings will require a Section 50 application (Arterial Drainage Act, 1945). The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent.

All construction works on the site, and specifically construction works to be undertaken within and in the vicinity of the watercourse, would be completed in compliance with current legislation and best practice as detailed within this document.

The ECoW would be consulted on all watercourse crossing works. Surveys by the ECoW would be carried out immediately prior to construction of the crossing to identify areas of ecological interest and more specifically, mammal and fish activity in watercourses to ensure that adequate mitigation is built into the design.

9.12.2 Design Philosophy for Crossings

Where watercourse crossings are required for the purposes of the cable route, the most relevant of the following methodologies will apply, to be assessed on a case-by-case basis:

- Piped culvert crossings - where sufficient cover is available, the cable ducts will be laid above the culvert with a minimum separation distance of 300 mm. Where sufficient cover is not available, cable ducts will be laid under the culverts with a separation distance of 300 mm.
- Flatbed formation over culvert - where the cable duct is to be installed over or below an existing culvert where sufficient cover is not available, the ducts will be laid in a much shallower trench the depth of which will be determined by the location of the top of the culvert. The ducts will be laid in this trench in a flatbed formation over the existing culvert and it will be encased in 6 mm thick steel galvanised pleat with the concrete surround as per EirGrid specification.

New crossings will be designed to convey 1% AEP MRFS (Annual exceedance probability Mid-range future scenario) storm event with minimum 300mm freeboard level. This is in line with the OPW requirements.

In accordance with OPW guidance, the watercourse crossing would be designed on a case by case basis to be appropriate for the width of watercourse being crossed, and the prevailing ecological and hydrological situation (i.e. the “sensitivity” of the watercourse). A number of factors, both environmental and engineering would influence the selection of structure type and the design of the crossing.

9.12.3 Protection of Watercourses

The following is a summary of the relevant mitigation measures and general good practice associated with the protection of watercourses:

- appropriate care would be given to the construction of watercourse crossings and all loose materials left from construction would be collected and disposed accordingly;
- the proposed drainage infrastructure prevents the significant discharge of surface runoff and suspended solids into the watercourse adjacent to the tracks.
- the watercourse crossing would be designed to avoid disruption and / or habitat loss to aquatic systems or to affect free passage of fish; and
- A site wide buffer distance of 50m is sought between watercourses, including the gravel ponds, and any proposed construction activities or infrastructure. Where the 50 m buffer cannot be provided at T1, a specific drainage report has been undertaken and mitigation measures provided.

In relation to forestry clearance, the following measure to protect water quality are proposed:

- A 50m buffer distance between watercourses and any proposed development including construction activities including fuel storage has been applied to those watercourses within the Site.
- To capture and control suspended sediment, silt traps must be installed within relevant watercourses. These should be constructed along and towards the point of outflow of mound drains, where a firm bank exists, and a ten-metre 'buffer zone' containing sufficient vegetation (e.g. grasses, reeds, and shrubs) to filter out any remaining sediment and nutrients can be implemented. Silt traps must be cleared out periodically to ensure they remain fully functional. The build-up of sediment should be emptied onto a level section of the forest floor several metres from any watercourse.
- To further reduce the risk of run-off and sediment mobilisation, felling and extraction of timber should, as far as possible, be conducted during periods of dry weather.
- The refuelling and chemical/fuel storage area on-site must be sited in a dry, sheltered, flat location, at least fifty metres from any watercourse.
- Where it is necessary to cross watercourses/drains during harvesting operations, temporary crossing points are required. These may comprise logs lined lengthwise and overlaid with a geotextile membrane and brash to capture falling soil from machinery wheels. The condition of temporary crossing points must be carefully monitored throughout operations, and these should be cleaned out and supplemented (as necessary). Where it is necessary to cross a watercourse, a clear span log structure must be implemented.

9.13 Biodiversity Protection During The Construction Phase

To protect biodiversity during the construction phase, it is essential to undertake several mitigation measures. These measures include the use of root protection zones (equivalent to a circle with a radius 12 times the diameter of the tree's trunk at 1.5 m above ground level). to avoid damage to hedgerows and treelines. This will ensure that the roots of trees and hedgerows are not damaged during the construction activities.

Dust suppression bowsers will also be used to manage dust generated during dry weather (no rainfall), preventing any damage to trees and hedgerows caused by dust accumulation.

Invasive Species Management Plan (IMSP) will be implemented to avoid the spread of non-native and invasive plant species and aquatic crayfish plague. This plan will help in the conservation of natural habitats.

To limit suitability for nesting birds, the area where vegetation has been removed from the works corridor will be retained in a condition that is unsuitable for them. This will be achieved by cutting vegetation or tracking over it with an excavator, making it unsuitable for ground nesting birds.

Exit points for excavations will be provided to ensure that mammals don't become trapped during the construction activities. Additionally, soft-felling of trees with moderate to high potential roost features for bats will be carried out, which will be confirmed through emergence/tree inspection surveys to check whether it's an important roost. This measure will help in the conservation of bat habitats.

Amphibian-proof fencing will be used close to ponds/pools to prevent amphibians from accessing parts of the proposed development that are most hazardous to them during construction. This measure will help in the conservation of amphibian habitats.

All these measures will be included implemented to ensure that biodiversity is protected during the construction phase.

10.0 Pre-Construction Surveys, Protected Species and Monitoring

10.1 Pre-Construction Surveys

Prior to the commencement of the construction of the proposed development, detailed site investigations would be undertaken to inform the designers/engineers of the development components. Preconstruction habitat and protected/ notable mammal surveys would be required to inform appropriate management and protection plans. Additional surveys for protected species will be undertaken by the ECoW in tune with the locations and programme of works. Survey outcomes will inform the designers/engineers in selecting appropriate working methods.

10.1.1 Water Quality Monitoring

Prior to the works commencing, baseline water quality monitoring would be undertaken by an appropriately qualified and experienced independent consultant to establish the water quality prior to any interference from the works.

The monitoring shall be undertaken in accordance with the WQMP developed by the Project Supervisor Construction Stage (PSCS) and as detailed within Section 8.0.

This water quality monitoring is to be agreed and reviewed by the Developer in advance of the works commencing to ensure that the conditions during the monitoring and the testing undertaken are representative and allow a suitable benchmark to be established.

10.1.2 Archaeology/ Cultural Heritage

Pre-construction archaeological investigation, specifically strip, map and sample, has been proposed within the substation Site prior to construction activities which would destroy potential remains associated with the ringfort (ME023-010).

10.1.3 Ecology

To prevent accidental disturbance to resting places of mammals (badgers, red squirrel, pine marten, otter and hedgehog), an ecological walkover survey will be undertaken prior to any construction activities within the development footprint.

Similarly, trees and structures within the works corridor will be re-assessed for bat roosting potential, with any inspections or emergence surveys carried out as required under licence.

Checks for nesting birds will be required for construction undertaken during the bird breeding season. If nests are recorded, ongoing monitoring and appropriate exclusion zones will be implemented to determine when and where works can proceed. If exclusion zones cannot be implemented, NPWS will be contacted and based on their advice, additional mitigation and compensation will be implemented, with relevant licences applied for if required.

All site personnel shall be briefed upon the presence of sensitive habitats and potential/confirmed presence of protected species as well as agreed appropriate working methods. An emergency response procedure will be communicated in the event of site personnel suspecting or detecting the presence of a protected species during works. In the event that a protected species is encountered within or near the working area, works will cease and the ECoW be contacted immediately for advice on appropriate working methods and when works can safely proceed.

In addition to the measures mentioned earlier, further surveys for marsh fritillary butterfly (late summer) and spawning amphibians (around Feb) will be conducted, and buffer zones or

translocation will be implemented in accordance with appropriate NPWS licences. It is important to note that surveys for invasive plants should be carried out during pre-construction checks. The locations of these sensitive habitats should be physically marked out, and the ISMP should be followed to ensure that these measures are adhered to.

An Invasive Species Management Plan (ISMP) will be implemented to prevent the spread of invasive and non-native species. In particular, cherry laurel and snowberry must not be spread during construction works.

A pre-construction walkover survey of the works corridor will confirm the presence of any invasive/non-native species that may have escaped into the area since the baseline surveys were conducted.

A method statement will be prepared in relation to cleaning machinery and the avoidance of importing/spreading non-native invasive plant species. Any plant or equipment that may have worked in environments where invasive species are present (including but not restricted to crayfish plague), will be suitably cleaned by high pressure hose, disinfected and dried before being used on site to prevent the spread of invasive species. Water used for this washing process will always be intercepted and prevented from draining back into watercourses.

11.0 Reinstatement/ Decommissioning

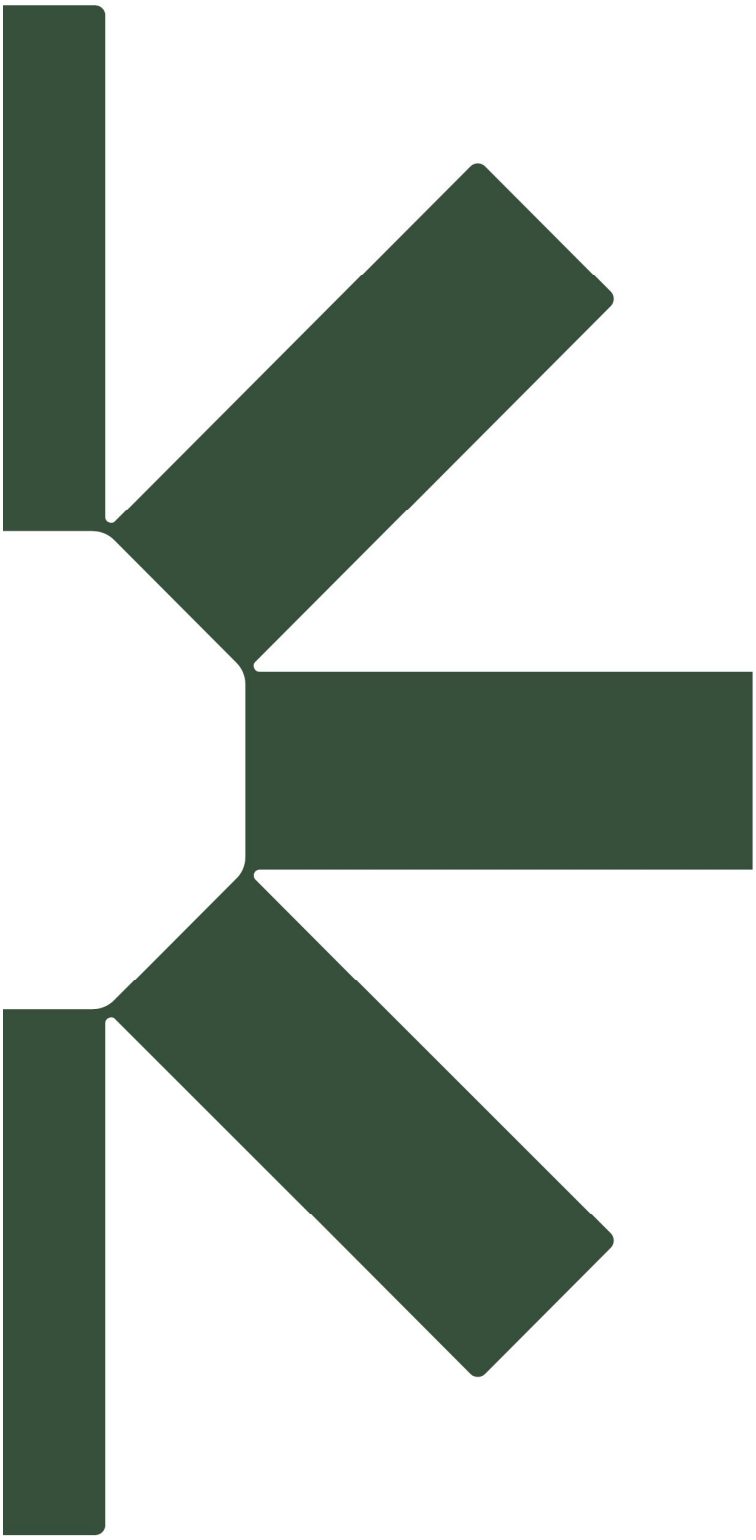
During construction of the infrastructure elements (detailed in Section 9), the vegetated layer will be stripped over the area of the excavation and stored locally with the growing side up. The remaining organic topsoil and subsoils will be excavated down to formation level, or a suitable stratum, and again will be stored local to the point of excavation but shall remain segregated to avoid mixing of materials.

Where areas can be reinstated, immediate aftercare provision would include an inspection of reinstated areas after completion of the reinstatement work at each location. Proposed methods would be finally agreed and confirmed with ABP following appointment of the PSCS. The operator would make regular maintenance visits to the site and would visually monitor the success of re-vegetation. If required, landscaping services will be sought by the operator.

Erosion processes on embankments and cuttings would be mitigated by appropriate design, including suitable gradients and stabilisation measures, which would also enable effective regeneration of vegetation or establishment of areas which are reseeded. Sediment traps would be required in the early years following construction until natural regeneration is / reseeding areas are established. Should significant erosion or sedimentation, which is not expected, take place at any location it would be addressed by re-grading. Any disturbed ground situated along the edges of tracks would be reinstated to match adjoining ground as soon as practicable to avoid unsightly scarring of the landscape, particularly along the main access track.

If seeding is required, this would be via cutting and strewing of heather brash or via the use of treated heather seeds only.

When the Proposed Wind Turbines have reached the end of its operational / planning life, this CEMP document, as updated throughout the life of the development, will be the basis of the Decommissioning Environmental Management Plan.



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