LETTER WIND FARM LTD

LETTER WIND FARM

CO. LEITRIM

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

DECEMBER 2023

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DOCUMENT APPROVAL

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	Prepared by	**Reviewed /Approved by**
Document Final	Name Shauna Conlon	Name David Kiely
Date December 2023	Signature Shauna Conlon	Signature David Kiely

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CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

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1 INTRODUCTION

1.1 BACKGROUND TO REPORT

Jennings O'Donovan & Partners Limited, on behalf of Letter Wind Farm Ltd., has prepared this Construction Environmental Management Plan (CEMP) for the construction of the proposed 4 turbine, Letter Wind Farm, and the construction of 6.4km of underground electricity cables to connect the proposed wind farm substation to the National Grid at Corderry 110kV substation. The Development, as proposed, has been designed to ensure that any environmental impacts which may arise can be appropriately mitigated such that there will be no likely significant environmental effects.

This document has been prepared on this basis and will be further developed and expanded following the appointment of the Contractors for the main construction works. Some items of this CEMP can only be finalised with appropriate input from the Contractors who will actually carry out the main construction works. This CEMP identifies, for the incoming Contractors, the key planning, environmental and contract document constraints that must be adhered to in order to deliver optimum environmental reassurance for the site.

The preparation of this document, and its continued development, is considered to be an appropriate mechanism to address the requirements to of the aforementioned condition to ensure the appropriate management of construction activities in accordance with the relevant environmental requirements.

This document should be read in conjunction with the Appropriate Assessment Screening Report, Natura Impact Statement, Environmental Impact Assessment Report (EIAR), Planning Report, Planning Drawings.

1.2 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP): AIMS & OBJECTIVES

This CEMP has been developed in accordance with the Institute of Environmental Management and Assessment Practitioner "*Environmental Management Plans*", Best Practice Series, Volume 12, December 2008.

The principal objective of this CEMP is to avoid, minimise and control adverse environmental impacts associated with the development of the wind farm. As such, the Contractors commit to safeguarding the environment through the identification, avoidance

and mitigation of the potential negative environmental impacts associated with the Development.

This CEMP aims to define good practice as well as specific actions required to implement mitigation requirements as identified in the EIS, the planning process and/or other licensing or consenting processes.

The CEMP will be developed further, and/or amended where necessary, to take account of any additional information which may be made available from the detailed design process or site surveys etc.

The CEMP will form part of the main Civil Balance of Plant Construction works Contract as well as the Electrical Balance of Plant Construction works content. The Contractors will take account of the structure, content, methods and requirements contained within the various sections of this CEMP when further developing this document (to include environmental plans) as required by their Contract.

While this version of the CEMP provides a benchmark for good practice, where avoidance or further minimisation of risks to the environment can be demonstrated through use of alternative methods or improvements to current practices, the Contractors will implement these wherever possible, subject to approval from environmental monitoring personnel.

1.3 CEMP DEVELOPMENT & IMPLEMENTATION

The CEMP has been prepared as part of the planning application for Letter Wind Farm. It is a live document on site and will be developed further by the Contractors with site specific method statements and plans as required prior to each phase of the works. It is also effectively a document management system for recording information and data relating to environmental checks, reports, surveys, monitoring data and auditing. Upon completion of the construction works, the Contractors will submit a complete electronic copy of the final CEMP to the client for their records. This final CEMP will include electronic scans of all hard copy reports, data, field records and correspondence which are gathered over the course of the construction works.

While version numbers will remain fixed depending on the stage of the project, it is acknowledged that the CEMP is a continually evolving document which can be updated in part or whole, at any stage of the project. Hence, revision and document distribution records

are included at the front of each CEMP document to enable individual documents to be updated at any time. A summary of the CEMP development process and the required input from the main parties involved in the post planning and construction of the wind farm are indicated in **Figure 1.1**. The Contractors will be responsible for further development of the CEMP in line with other relevant licenses and consents. This may involve liaising with statutory bodies where appropriate.

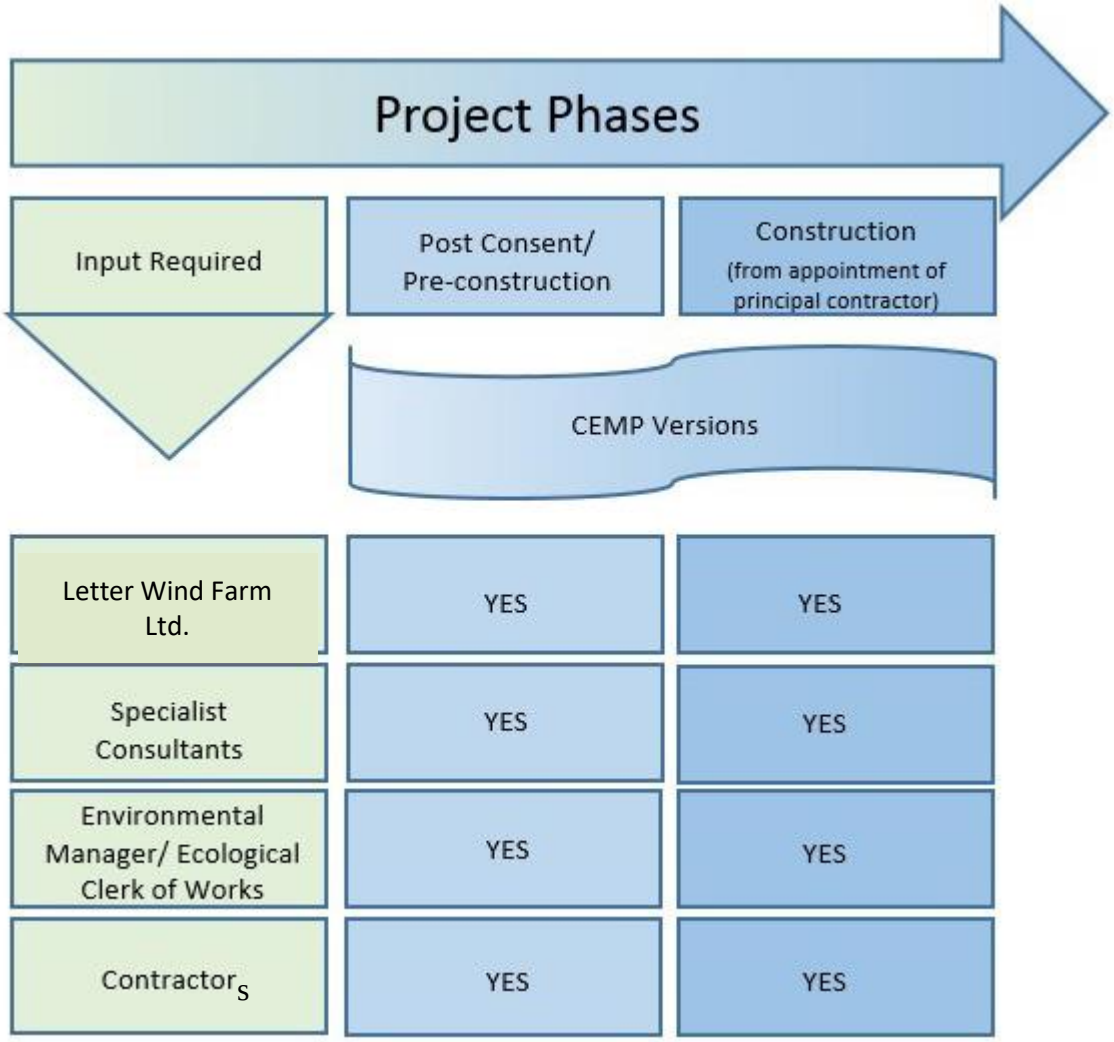

Figure 1.1 Summary of CEMP Development Process

1.4 CEMP ROLES & RESPONSIBILITIES

Prior to commencement of construction works, the Contractors will identify a core Environmental Management Group, comprising of specific project personnel. The Contractor shall appoint an Environmental Manager for the project who shall liaise with the Ecological Clerk of Works. The Environmental Management Group will meet monthly to discuss the monthly environmental report and will advise site personnel on areas where

improvements may be made on site. The group will draw on technical expertise from relevant specialists where required, including the Owners Engineer and will liaise with other relevant external bodies as required.

The Developer will appoint an Ecological Clerk of Works who will be responsible for coordination, compliance monitoring and continued development of the CEMP and any other surveys, reports or method statements required. The Ecological Clerk of Works will also review the Contractors' method statements and environmental plans as required by the CEMP, carry out compliance auditing during the construction phase and coordinate the Environmental Management Group and required liaisons between Letter Wind Farm Ltd the Contractors, the Planning Authority and other statutory authorities.

1.5 CEMP STRUCTURE

The CEMP is divided into discrete Sections which are designed to be filed as separate documents / folders if required. A copy of the CEMP documents / folder(s) will be kept in the site offices for the duration of the site works and will be made available for review at any time. The Contractors Ecological Clerk of Works will be responsible for the CEMP and will keep all sections updated throughout the construction phase.

Where a Contractor has standard documents within his own company / corporate Environmental Management Plans which cover a particular requirement of this CEMP, these will either be inserted or cross referenced within the relevant Section of this CEMP. The CEMP Sections are listed in **Table 1.1** as follows:

Table 1.1: CEMP – Document Structure

Section	Title & Brief Description	Contractors Development Required
1	**Introduction**	No (Information purposes only)
2	**Project Information** Provides details on site location, scheme description and a summary of the environmental sensitivities at the Site (as derived from the Appropriate Assessment Screenings and other information where available).	No (Information purposes only)
3	**Environmental Controls**	**Yes**

Section	Title & Brief Description	Contractors Development Required
	Provides details on relevant Planning Consent Conditions and mitigation measures outlined in the EIAR and NIS. Any documents prepared by Letter Wind Farm Ltd in response to Consent Conditions will be recorded in Table 3.9. Table 3.10 contains a record of all Scheme Amendments and Table 3.11 a Register of Variations.	Any documents prepared by the Contractors in response to Consent Conditions will be recorded by the Contractors in Table 3.9 and inserted in the CEMP where necessary. Any Scheme Amendments and / or Variations to the CEMP required during the works will be recorded by the Contractors in Tables 3.2 and 3.3.
3	**Environmental Communications Plan** Contains details on specific requirements relating to: • Contact details for Letter Wind Farm Ltd, personnel, technical specialists, Contractor's personnel, regulators, landowners, other stakeholders etc.; • Meetings, reports and consultations; • Roles and responsibilities; and • General reporting procedures and tasks.	Yes The Contractors will: i) Insert contact information for regulatory authorities and other stakeholders (where not already provided) into Table 4.1 ii) Refer to Table 4.2 for details on requirements for meetings, reports and consultations iii) Insert information on Contractor's appointments and responsibilities relating to environmental management and implementation of this CEMP into Table 4.3. iv) Refer to Figure 4.1 for a summary of the main communication lines.
5	**Correspondence, Records, Reports** This Section relates to document control and retention of records. The information at the start of Section 5 provides: • A list of all documents to be retained / filed within the CEMP. Table 5.1 provides a record of all Environmental Consents, Licenses and Permits issued for the project.	**Yes** The Contractors will complete Table 5.1. Throughout the duration of the Contract, the Contractors will insert / file all communication records, data, field records and reports associated with Environmental Management and implementation of this CEMP into this Section 5. This Section may be sub-divided into sub-folders for specific information relating to discrete areas of Environmental Management (such as waste management, pollution prevention,

Section	Title & Brief Description	Contractors Development Required
		water quality monitoring, ecology etc). Alternatively, this information may be filed within the individual Management Plans in Section 6. The filing method selected by the Contractors will be made explicit at the start of Section 5.
6	**Management Plans & Available Information** Management Plans include the following: • MP1 Emergency Response Plan (ERP) • MP2 Water Quality Management Plan (WQMP) • MP3 Surface Water Management Plan • MP4 Peat and Soil Management Plan • MP5 Waste Management Plan • MP6 Decommissioning Plan • MP7 Traffic Management Plan	**Yes** The Contractors is required to develop the Management Plans and/or include additional information or method statements as appropriate and where required by the Contract. The Development of the Management Plans will generate more site-specific documents which address particular environmental management procedures applicable for works in specified areas of the Site. These Management Plans form the Contractors' Environmental Plans (for example, Spoil Management Plan). Table 6.1 lists all Management Plans and provides information on Contractor's responsibilities.

2 PROJECT INFORMATION

2.1 SITE LOCATION AND SCHEME DESCRIPTION

The Site, as shown in **Figure 2.1**, is located within an agricultural and forested landscape, approx. 2.9km west of Drumkeeran, Co. Leitrim and approximately 21km southeast of Sligo Town.

The Site is located within the townlands of Letter, Boleybaun and Stangaun.

The overall length of the grid connection between the onsite substation and the existing Corderry 110kV substationis 6.4km, of which 100m is within the Site. The remaining 6.3km is located within the public road network across the townlands of Letter, Greaghnadarragh, Stangaun, Corralustia, Turpaun, Gortnasillagh West, Lugmeeltan, Leckaun, Lisgavneen, Treannadullagh, Drumcashlagh and Corderry.

Temporary works will be required to accommodate the delivery of turbine components. These temporary works are not included as part of the planning application but are assessed as part of this EIAR. Further details on these works can be found in **Chapter 15: Traffic and Transportation.**

The Site extends to 45 hectares of which 19.83 hectares is comprised of forestry plantation. Tree felling will be required as part of the project. To facilitate the site infrastructure, 2 hectares of forestry will need to be clearfelled.

The remainder of the Site is primarily used for upland grazing.

There are 17 dwellings within 1.5km of the proposed turbines. The closest inhabited dwelling is (H3) which is located 710m from the nearest turbine.

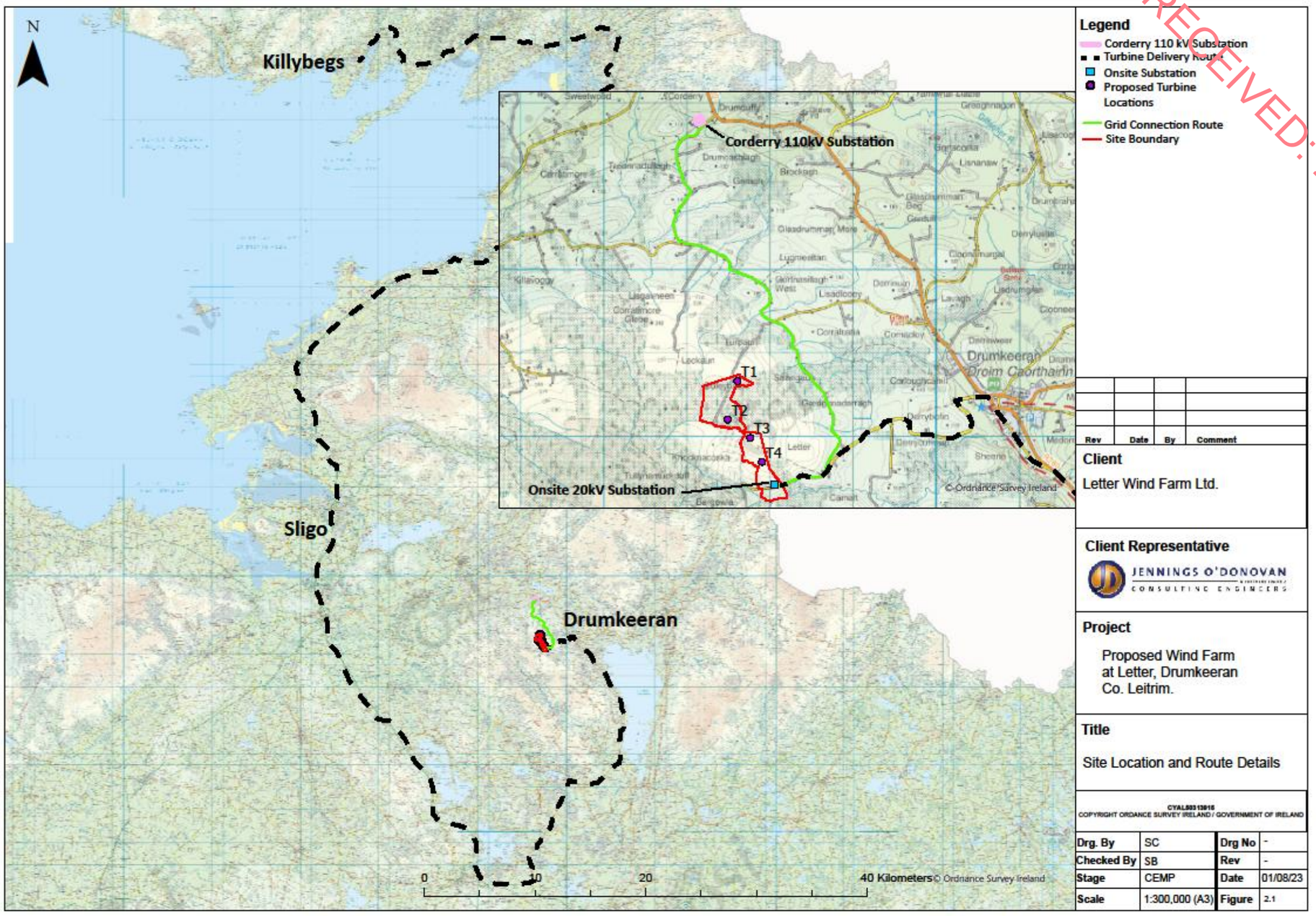

Figure 2.1: Map showing the location of Letter Wind Farm and Grid Connection

The proposed development will consist of the following:

- Construction of 4 No. wind turbines with an overall ground to blade tip height ranging from 149.85m to 150m inclusive. The wind turbines will have a rotor diameter ranging from 115.7m to 117m inclusive and a hub height ranging from 91.5m to 92m inclusive.
- Construction of permanent turbine hardstands and turbine foundations.
- Construction of a bottomless bridge culvert across a minor stream on site (EPA River Segment Code: 26_4053).
- Construction of one temporary construction compound with associated temporary site offices, parking areas and security fencing.
- Installation of one (40-year life cycle) meteorological mast with a height of 50m and a 4m lightning pole on top.
- Construction of new internal site access tracks and upgrade of a section of existing internal Site track, to include all associated drainage.
- Improvement of existing site entrance with access via the L4282.
- Development of an internal site drainage network and sediment control systems.
- Construction of 1 no. permanent 20kV electrical substation
- All associated underground electrical and communications cabling connecting the wind turbines to the wind farm substation.
- All works associated with the connection of the wind farm to the national electricity grid, which will be via 20kV underground cable connection approximately 6.4km in length to the existing ESB Corderry 110kV Substation in the townlands of Letter, Greaghnadarragh, Stangaun, Corralustia, Turpaun, Gortnasillagh West, Lugmeeltan, Leckaun, Lisgaveen, Treannadullagh, Drumcashlagh and Corderry
- Ancillary forestry felling to facilitate construction of the development.
- All associated site development works including berms, landscaping, and soil excavation.
- Installation of battery arrays located within container units (2 no. units) and associated electrical plant for grid stabilisation adjacent to the substation building.
- Development of one on-site borrow pit.

A 10-year planning permission and 40-year operational life from the date of commissioning of the entire wind farm is being sought. This reflects the lifespan of modern-day turbines.

3 ENVIRONMENTAL CONTROLS

This CEMP is informed by Planning Conditions where the Project is granted planning consent, mitigation measures set out in Environmental Impact Assessment Report (2023) and associated documents and by the guidance documents and best practice measures listed below. This CEMP will be adhered to and further developed by the Contactor and will be overseen by the project representative/foreman.

Guidance Documents

- Construction Industry Research and Information Association (CIRIA) (2006) Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London.
- CIRIA (2006) Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006).
- COFORD (2004) Forest Road Manual – Guidelines for the Design, Construction and Management of Forest Roads.
- CIRIA (2015) SuDS Manual, (CIRIA Report C753, 2015)
- Coillte (2009): Forest Operations & Water Protection Guidelines.
- Department of Agriculture, Food and the Marine (2018) DRAFT Plan for Forests & Freshwater Pearl Mussel in Ireland – Consultation Document.
- Forestry Commission (2004) Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh.
- Forest Services (2006) Draft Plan for Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures.
- Forest Service (2000) Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford.
- IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters.
- GPP1 (2020) Understanding your Environmental Responsibilities – Good environmental Practices, NetRegs.
- GPP 5 (2018) Works and Maintenance In or Near Water, NetRegs.
- GPP21 (2021) Pollution Incident Response Planning, NetRegs.
- GPP 22 (2018) Dealing with Spills, NetRegs.

3.1 HUMAN BEINGS AND COMMUNITY

The assessment set out in **Chapter 4: Population & Human Health** has not identified any likely significant effects from the Development on population or human health. The Development has been assessed as having the potential to result in effects of slight positive, long-term impact overall. Cumulative effects are predicted unlikely.

The main mitigation measure is by design or avoidance. A suitable separation distance from turbines and other key infrastructure to properties has been embedded in the EIA Development design. Additional mitigation to protect site personnel and the public will also be implemented in the event of damage to a turbine and subsequent likely turbine or turbine component failure.

These are:

- Turbines will be procured from a reliable manufacturer and will have undergone vigorous safety checks during design, construction, commissioning and operation.
- Physical and visual warnings such as signs will be erected as appropriate for the protection of site personnel and the public.
- Facility for remote turbine deactivation will be provided.
- Access to turbines for site personnel will be restricted in storm events. Where access by site personnel is required, safety precautions may include remotely shutting down the turbine, yawing to place the rotor on the opposite side of the tower door and parking vehicles at a distance of at least 100 m from the tower. All personnel will be fitted with appropriate Personal Protective Equipment. Regular maintenance and inspections will take place during the 40-year operational phase. The final turbine model chosen will be in line with International Electrotechnical Commission 61400-1 safety standards. Maintenance visits will take place as needed with the Supervisory Control and Data Acquisition (SCADA) control system monitoring turbine performance remotely. If a fault occurs, then a message is automatically sent to the operations personnel preventing emergency situations. Warning signs and security infrastructure will be in place around the onsite switchgear and control building to provide for public safety.
- Access to the turbines will be via the door at the base of the turbines. The turbine access door will otherwise be securely locked at all times.
- Measures are set out in **Chapter 15: Transport and Transportation** relating to how delivery of goods and services would be managed during works to minimise impacts.

Once the above mitigations are taken into account, the residual risk on population and human health is assessed to be an imperceptible, long-term effect.

3.2 ECOLOGY

3.2.1 Terrestrial Ecology Mitigation Measures

3.2.1.1 Protection of Important Habitats

The project will result in the loss of areas of blanket bog and wet heath habitat that have links to Annex 1 habitat. It is essential that the direct loss of such peatland habitat is fully minimised (notably also taking account of the international/national nature conservation value of these habitats) and so mitigation by avoidance is essential to limit such losses within the footprint of the wind farm, and its zone of influence. Mitigation in this respect is:

- The full extent of the infrastructure footprint will be marked out prior to the commencement of works, with an appropriately robust and visible fencing / marker system. Where this meets Annex I habitats, this will also be the full extent of the works corridor, with no machinery access (access will only be allowed on foot and only for the purposes of silt / pollution control if required), storage or other works allowed outside this area.
- The efficacy and coherence of the marker system (and required remediation) will form an essential part of the Site operations.

A pre-construction Invasive Species Survey will be conducted during the optimal growing season (May to August immediately prior to works occurring at this site for the Development) and shall include data on all locations, extents and potential construction impacts in relation to scheduled and non-scheduled Alien Invasive Species (IAS). This survey will be completed along with reporting on the best course of action to be implemented to avoid the spread of such IAS on the Site or further afield. The management of IAS identified as occurring within the proposed development site will be undertaken in accordance with best practice management guidelines as set out in the TII guidelines “The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads” (2010).

3.2.1.2 Protection of Non-volant Mammals

The Ecological Clerk of Works for the construction phase will complete a pre-construction survey of the construction footprint in order to confirm the continued absence of mammal breeding and resting places within the construction footprint and within 50m of the construction footprint or identify the presence of newly established breeding/resting places.

Based upon the results of these surveys, the ECoW will establish whether or not there is a need at that stage for the implementation of further mitigation measures and the requirement for protected species licences. An example of where such a need could arise is where a badger sett becomes established along or in the immediate vicinity of a hedgerow that will be intersected by the proposed access track.

3.2.1.3 Protection of Bats

Any trees and treelines along approach roads and planned site access tracks will be retained unless felling is unavoidable. Retained trees should be protected from root damage by an exclusion zone of at least 7 metres or equivalent to canopy height. Such protected trees will be fenced off by adequate temporary fencing prior to other works commencing.

No structures will be demolished as part of the construction phase of the proposed development and there will be no disturbance to confirmed bat roost structures occurring within and adjacent to the proposed wind farm site boundary.

3.2.1.4 Protection of Herpetofauna

The Ecological Clerk of Works for the construction phase will complete a survey of the construction footprint during spring (late February / March / early April) ahead of the proposed works in order to identify any key amphibian breeding areas. This will allow wildlife barriers to be installed where necessary to minimise impacts upon such features where these are likely to be indirectly affected by the works.

3.2.1.5 Prevention of Spread of Invasive Alien Species

The following biosecurity measures will be implemented to prevent the introduction and spread of IAS during the operation phase of the project.

- All vehicles or personnel that will be required to undertake work will be cleaned before being used at the wind farm site. The cleaning will include the following:
- All plant material and soil will be removed from the vehicles using shovels and brushes. Special attention shall be paid to tracks and prior to arrival on site, the Contractor's vehicles and equipment must be thoroughly cleaned. High-pressure steam cleaning, with water > 40 degrees C, is recommended for vehicles and equipment where reasonably feasible. Many roadside garages provide these facilities. If it is not possible to steam clean the equipment, a normal power hose must be used. After cleaning, a visual inspection of the equipment will be carried out to ensure that all adherent material and debris has been removed.

- Vehicles shall only leave the wind farm site and be re-used for other construction work when they have been properly cleaned, in line with the approached set out in Point No. 1 above.

3.2.1.6 Protection of Bats

A “bat buffer” area will be implemented around all turbines such that the buffer area will remain free of suitable foraging habitat, consisting of hedgerows, treelines, scrub or conifer plantation edge. This will require the clearance of conifer plantation within the vicinity of the proposed turbines T1 and T2. The clearance of conifer plantation to satisfy this requirement will amount to approximately 3Ha.

All structures associated with the proposed Letter Wind Farm such as the substation will be built in a manner to ensure no roosting opportunities are present to bats. Also, no structured vegetation will be permitted to establish at these locations during the operational phase of the turbines.

Turbines will operate in a manner which restricts the rotation of the blades as far as is practicably possible below the manufacturer’s specified cut-in speed. This is usually achieved by feathering the blades during low wind speeds; the angle of the blades is rotated to present the slimmest profile possible towards the wind, ensuring they do not rotate or ‘idle’ when not generating power.

Turbine blades spinning in low wind can kill bats, however bats cannot be killed by feathered blades which are not spinning. The feathering of turbine blades combined with increased cut-in speeds have been shown to reduce bat fatalities by up to 50%. As such, the feathering of blades to prevent ‘idling’ during low wind speeds is proposed for all turbines.

3.2.1.7 Protection of Bats

3.2.1.7.1 Cut-In Speeds/Curtailment

Increasing the cut-in speed above that set by the manufacturer can reduce the potential for bat/turbine collisions.

Species with elevated risk of collision (Leisler’s bat, soprano and common pipistrelle) in particular would benefit from increasing the cut-in speed of turbines, as dictated on a case-by case basis depending on the activity levels recorded at each turbine.

Cut-in speeds should be increased during the bat activity season (April-October) or where temperatures are optimal for bat activity to 5.5 m/s from 30 minutes prior to sunset and to 30 minutes after sunrise at turbines where surveillance shows high bat activity levels for High and Medium-Risk species and/or if bat carcasses are recorded.

The duration required depends on the level of mitigation required for each individual turbine i.e. a full bat activity season or only spring and autumn (duration will be determined by the first year of surveillance).

Cut-in speeds restrictions will be operated according to specific weather conditions:

- When the air temperature is greater than 7°C (as bat activity does not usually occur below this temperature).
- Generally, bat activity peaks at low wind speeds (<5.5m/s). As such, it has been shown that curtailing the operations of wind turbines at low wind speeds can reduce bat mortality dramatically, particularly during late summer and the early autumn months.

Due to the considerable unnecessary down time resulting from the proposed “blanket curtailment” (above) and the advances in smart curtailment a focused curtailment regime is further proposed from the year two of operation.

This will focus on times and dates, corresponding with periods when the highest level of bat activity occurs within the Site. This includes the use of the SCADA (Supervisory Control and Data Acquisitions) operating system (or equivalent) to only pause/feather the blades below a specified wind speed and above a specified temperature within specified time periods.

Post-constructions surveys will be undertaken for the first three years of operation to confirm if blanket curtailment restrictions can be amended in line with post-construction activity levels. The post construction surveys will be used to update the current curtailment regime (blanket curtailment) designed around the values for the key weather parameters and other factors that are known to influence collision risk. This will include all of the following:
Wind speed in m/s (measured at nacelle height)

- Time after sunset
- Month of the year
- Temperature (ºC)
- Precipitation (mm/hr)

3.2.1.8 Monitoring

An ECoW will be appointed prior to the commencement of construction. The ECoW will be an ecologist with experience of baseline ecological surveys, pre-construction surveys and construction phase supervision. The ECoW will be responsible for completing pre-construction surveys and supervising construction works and advising on the implementation of biodiversity enhancement measures that will be commenced during the construction phase.

Pre-construction confirmatory surveys required in advance of the construction phase will include as a minimum:

- Otter surveys along the Owengar River. Surveys to be completed will pay particular attention to identifying the presence/absence of otter holts/couches within 150m of the proposed wind farm infrastructure. In the event that otter holts or couches identified within 150m of the proposed development the status of the breeding/resting place will be confirmed. Where the holt/couch is identified as a breeding site, then, in the absence of a derogation licence, no works will be permitted to proceed within a 150m radius of the breeding place, whilst it is still actively used as a breeding site. In the event that a non-breeding active holt or couch is identified within 50m of the proposed development, then, in the absence of a derogation licence, no works will be permitted to proceed within a 50m radius of the non-breeding but active holt or couch.
- Non-native invasive plant species surveys: An up-to-date confirmatory non-native invasive plant species survey of the Site and adjacent areas will be completed during the growing season immediately prior to the commencement of construction works.
- Confirmatory surveys for the presence of plant species of conservation interest. These surveys shall be completed during the growing season immediately prior to the commencement of the construction phase. The surveys shall be completed to identify the presence of any new stands of rare or threatened species. In the event that new stands of these species are identified as occurring within the footprint of the proposed wind farm, stands of these plants will be required to be translocated to a suitable receptor area either within the proposed development site or an alternative suitable location. Such translocations will only be permitted to proceed upon receipt of a derogation licence.

- The ECoW will ensure that best practice construction methods and mitigation measures detailed in this EIAR and accompanying planning documentation including the CEMP and NIS are implemented in full.
- The ECoW will be responsible for ensuring that the construction phase contractor is aware of key biodiversity receptors. The ECoW will inspect the construction works throughout the construction phase and will pay particular attention to the implementation of all biodiversity related mitigation measures.
- The ECoW will provide monitoring inspection reports during the construction phase and will also provide a close-out report following the completion of the contract construction works.
- Where necessary the ECoW will liaise with relevant authorities such as Leitrim County Council, the IFI and the NPWS with respect to construction phase activities that relate to biodiversity.
- As part of the ECoW terms of appointment, the ECoW will be vested with the authority to stop works where activities have been identified on site that are not in accordance with the mitigation measures outlined in this EIAR, the NIS and/or the CEMP prepared for the planning application for the proposed development.

3.2.2 Aquatic Ecology Mitigation Measures

3.2.2.1 Protection of Watercourses

The Project has been designed to ensure that an adequate buffer zone is provided for between this infrastructure and watercourses. In addition, the design has sought to minimise the requirement for new watercourse crossings. This has been achieved by restricting the need for a total of one new crossing of the upper Owengar River within the proposed wind farm site, and no new crossings along the proposed grid connection route or at the proposed turbine delivery route widening locations. The buffer zone implemented between all large-scale infrastructure associated with the wind farm site, such as turbines, hardstand, and access tracks has provided for a set-back of a minimum distance of 50m from any watercourses, except for where the access track crosses the Owengar River. In addition, the best practice construction measures that are described above are designed to avoid impacts on areas that are outside the site including watercourses.

A Surface Water Management Plan (**Management Plan 3** of **Appendix 2.1**) has been prepared for the proposed wind farm and this plan ensures the implementation of a suite of measures that will avoid negative impacts to water quality and the hydrological regime of the Owengar River.

3.2.2.2 Mitigation by Design & Reduction

3.2.2.2.1 Wind farm Site Earthworks

Mitigation measures to avoid the potential for adverse impacts arising from earthworks and management of spoil will comprise:

- Management of excavated material will adhere to the measures related to the management of temporary stockpiles.

- No permanent or semi-permanent stockpiles will remain on the Site during the construction, operational, or decommissioning phase of the Development. Any surplus spoil remaining at the end of the construction phase will be taken off site and disposed of at a licenced waste facility.

- Construction activities will not be carried out during periods of sustained heavy rainfall events[1], or directly after such events. This will allow sufficient time for work areas to drain excessive surface water loading and discharge rates to be reduced.

- Following heavy rainfall events, and before construction works recommence, the Site will be inspected to confirm that conditions are suitable for construction activities to recommence.

- An emergency response plan (ERP) (**Management Plan 1**) has been prepared as part of the CEMP and SWMP (**Management Plan 3**) for the Project, both of which are provided under separate cover as part of the planning application documentation associated with the EIAR. All measures outlined in the ERP will be implemented throughout the construction phase of the project. This plan includes for 24-hour advance meteorological forecasting linked to a trigger-response system. When a pre-determined rainfall trigger level is exceeded such as a very heavy rainfall at >25mm/hr, planned responses will be undertaken. These responses will include cessation of construction until the storm event, including storm runoff has ceased.

- Sediment fencing will be erected along proximal and paralleling areas of watercourses, such as along the upper Owengar River and drainage channels occurring within the

[1] As per the Met Office National Meteorological Library and Archive Fact Sheet 3 – Water in the atmosphere (Met Office, 2012) a heavy rainfall event for: rain (other than in showers) is assigned to an event where rates of accumulation are greater than 4mm/hour; and for rain showers is assigned to an event where rates of accumulation are >10mm/hour.

proposed Site, channels and drains spanned by the works to reduce the potential for sediment laden run-off to reach sensitive receptors.

- No direct flow paths between stockpiles and watercourses will be permitted at the Site.
- Excavated material will be backfilled and transported to the spoil storage area as soon as is reasonably practicable to prevent long duration storage at the Site which increases the risk of adverse effects on aquatic environments.
- All mitigation measures related to surface water quality will be implemented before excavation works commence.

3.2.2.2.2 Temporary Stockpile Management for Wind Farm Site Works

Whenever possible, soil and rock will be re-used on the Site immediately, thereby reducing the need for double handling, which will also reduce the requirement to stockpile soils. Generally excavated rock will be used immediately for Site Access Track construction. Whenever possible stockpiles will be avoided. Where stockpiling is required, it will be stored in the designated temporary spoil stockpile area. Temporary stockpile locations will be situated outside of Surface Water Buffer Zones. Silt fencing is to be erected around the base of the temporary mound. Soil will be reinstated on completion of drilling and jointing operations. Temporary storage areas will require bunding and management of runoff likely contaminated with suspended solids.

3.2.2.2.3 Excavation Requirements for the Proposed Grid Connection Route

The following mitigation measures will be implemented during excavations for the proposed grid connection route:

- The timing of grid connection cable laying will be carried out during metrologically dry seasons/periods.
- An Ecological Clerk of Works (ECoW) will be onsite in order to lessen environmental disruption and confirm site integrity is maintained. The ECoW will also be responsible for routine environmental monitoring and report writing.
- Excavated material will be temporarily stockpiled adjacent to the section of trench, with appropriate material used as backfill.
- Excess/unsuitable material will be immediately removed and disposed of at a licenced waste disposal facility.

- Appropriate siltation measures, as per the measures set out in the subsequent sections below will be put in place prior to excavations.
- Stockpiles will be temporarily stored a minimum of 25m back from rivers/streams on level ground with a silt barrier installed at the base.

For all grid connection trenching along the local road, any unsuitable backfill material excavated will be immediately taken away from the works area in trucks and disposed of under license to an authorised waste disposal facility. This will prevent any contaminated run-off to roadside drains during heavy rainfall.

3.2.2.2.4 Excavation Dewatering Requirements for the Wind Farm Site

The following mitigation measures will be implemented for dewatering activities at the Site:

- Areas of subsoils to be excavated will be drained ahead of excavation works. This will reduce the volumes of water encountered during excavation works and will therefore reduce the volume of water that is required to be dewatered whilst excavations are being carried out.
- Engineered drainage and attenuation features outlined in the Surface Water Management Plan (**Management Plan 3** of **Appendix 2.1**) will be established ahead of excavation works.
- Dewatering pumping rates will be controlled by an inline gate valve or similar infrastructure which will facilitate a reduction of loading on the receiving environment, thus enhancing the attenuation and settlement of suspended solids.
- The direct discharge of dewatered loads to surface waters will not be permitted under any circumstances.
- All dewatering will follow a strict procedure of pumping to a settlement tank and then to a dewatering bag, or settlement ponds prior to discharging to receiving environment for overland flow.
- Geofabric lined settlement ponds will buffer the run-off discharging from the drainage system which will reduce the hydraulic loading to watercourses. Settlement ponds will be designed to reduce flow velocity to 0.3 m/s at which velocity silt settlement generally occurs. In areas of the Site where the placement of settlement ponds is not feasible, other mitigation measures described below will be implemented.
- Check Dams will be constructed across drains and will reduce the velocity of run-off which will, in turn, promote settlement of solids upstream of potential surface water receivers. An additional benefit of check dams is that they will reduce the potential for

erosion of drains. Rock filter bunds may be used for check dams, wood or hay bales can also be used if properly anchored. It is recommended that multiple check dams are installed, particularly in areas immediately down gradient of construction areas.

- Overland flow paths of the final dewatered discharge will be maximised to the greatest practical extent to avoid prematurely draining to drainage channels or surface waters. This approach will allow for enhanced settling out of suspended solids entrained in the run-off.
- All pumps, tanks, settlement ponds, dewatering bags and check dams used in the dewatering process will be regularly inspected and maintained as necessary to ensure surface water run-off is appropriately treated.
- Sediment fencing will be installed up gradient of water courses which may receive the final overland flow.
- The final treated dewatered discharge will be directed towards heavily vegetated areas to allow for further natural filtration of suspended solids.
- A programme of water quality monitoring will be implemented during the construction phase which is outlined in detail in this CEMP.
- No extracted or pumped water will be discharged directly to the surface water network associated with the Site (this is in accordance with Local Government (Water Pollution) Act 1977 as amended).
- Any discharges of sediment treated water will meet the requirements of the Surface Water Regulations 2009, as amended.

3.2.2.3 Watercourse Crossings

3.2.2.3.1 Wind Farm Site

At the wind farm site, one new watercourse crossing will be constructed. The required crossing will be a crossing of a small stream that is representative of the headwater of the Owengar River. The following measures provide for the planning and consideration of this watercourse as part of the overall approach to watercourse crossing to ensure potential impacts are adequately mitigated.

- The design of the proposed crossing and a method statement for the proposed construction will be agreed in advance with Inland Fisheries Ireland (IFI).

- Crossings have been designed to minimise, in so far as practical, the disturbance or alteration of water flow, erosion and sedimentation patterns and rates.

- Vehicles and plant used in the construction of the proposed crossing will only be refuelled at the Site's bunded and designated refuelling area, no refuelling will be permitted within 50m of any watercourse at the Site.

- To mitigate against the potential risk of accidental leaks or spillages from plant and equipment, the following measures will be implemented: Multiple spill kits will be maintained on the Site at all times within the cabs of vehicles and placed strategically at environmentally sensitive locations across the Site. Spill kits will be routinely inspected to ensure that they are fully stocked with oil absorbent booms and pads at all times. Oil absorbent booms will be installed downstream of channel crossing work areas within 25m of the works location prior to the commencement of works.

3.2.2.3.2 Proposed Grid Connection Route

The proposed grid connection route includes the crossing of 7 no watercourses. The crossings will be via existing bridge formation with one short section of overhead line.

The following mitigation measures will be implemented during the installation of the grid connection route over the existing bridge formation:

- Excavated road and soil will be stored in an area at least 10m from the crossing structure and watercourse, and preferably down gradient of the watercourse crossing but up-gradient of the excavated trench so that, after rainfall, material in run-off is contained in the trench.
- Silt fencing and silt capture structures such as straw bales will be deployed along either side of a watercourse crossing beyond the full width of the pipe, culvert or bridge structure. Silt fencing will be installed so that the wooden posts and attached fence is buried at least 300mm below the surface of road-side vegetation.
- Gullies that lead directly to a watercourse either side of a structure are key pathways for run-off conveyance, and these will be blocked to ensure that the direction of potential run-off is conveyed to vegetated verges to allow for infiltration and trapping.
- A pre-emptive site drainage management plan will be applied to take account of predicted rainfall so that large excavations adjacent to watercourse crossing can be suspended or scaled back when heavy rain is forecast.

These measures will prevent the run-off of excess sediments via the key watercourses intersecting the cable route to key adjoining downstream watercourses that connect the crossing points to watercourse and sensitive rivers and lakes downstream such as the

Greagh River, Diffagher River, Owengar River, Belhavel Lough, Lough Gill and Lough Allen. The mitigation measures also will apply to any small drains that represent a pathway for conveyance of sediment to watercourses to these waterbodies.

3.2.2.3.3 Release & Transport of Suspended Solids

The following mitigation measures will be implemented at the wind farm site during the construction and decommissioning phase to prevent the release and transport of silt-laden surface water runoff:

- Collector drains and soil berms will be implemented to direct and divert surface water runoff from construction areas such as temporary stockpiles into established settlement ponds, buffered discharge points and other surface water runoff control infrastructure. This planning and placement of these control measures will be of fundamental importance, especially for the areas where works within the 50m buffer zone of surface waters and significant drainage features.

- Sediment control fences will be implemented significantly upgradient of potential receiving waters and as part of the drainage network. Sediment control fences will also be established upgradient of the Site's pre-existing natural and artificial drains in addition to degraded areas of peat that are likely to receive surface water runoff. This practice will reduce the potential for elevated suspended solids entrained in surface water runoff to discharge to surface waters.

- Multiple silt fences will be used in drains discharging to the surface water network. This will be especially important for the areas where works occur within the 50m buffer zone of surface waters and significant drainage features.

- A dedicated silt fence will be established along all sections of the wind farm access track that are within the 50m buffer zone of the Owengar River and all other small streams or drainage channels occurring at the wind farm site.

- The drainage, attenuation and other surface water runoff management systems will be installed prior to the commencement of construction activities. Whenever possible, drainage and attenuation control measures will be installed during seasonally dry conditions to limit the potential for sediment laden run-off to discharge to surface waters during the installation of these measures.

- Surface water runoff will be discharged to land via buffered drainage outfalls that will contain hardcore material of similar composition to the geology of the bedrock at the Site. This mitigation measure will promote the capture and retention of suspended sediment.

- Buffered drainage outfalls also promote sediment percolation through vegetation in the buffer zone, reducing sediment loading to adjacent watercourses and avoiding direct discharge to the watercourse.

- Buffered drainage outfalls will be placed outside of the 50m buffer zone and will not be positioned in areas with extensive erosion and degradation.

- A high number of discharge points will be established to decrease the loading on any one particular outfall. Discharging at regular intervals mimics the natural hydrology by encouraging percolation and by decreasing individual hydraulic loadings from discharge points.

- This CEMP will mandate regular inspections and maintenance of pollution control measures. Contingency measures outlining urgent protocols to repair or backup any breaches of designed mitigation measures are also incorporated into the CEMP.

- In the event that mitigation measures are failing to reduce suspended solids to acceptable levels, construction works will cease until remediation works are completed.

- Fine solids or colloidal particles are very slow to settle out of waters. Therefore, coagulant or flocculant will be used as appropriate to promote the settlement of finer solids prior to discharging to surface water networks. Flocculant gel blocks can be placed in drainage channels. These are passive systems that are self-dosing, self-limiting and are environmentally friendly. Flocculant gel blocks bind elevated levels of silt and associated contaminants into masses that are easily separated, captured and then removed from the water.

- Surface water runoff controls will be checked and maintained on a daily basis. Check dams and settlement ponds will be maintained and emptied prior to the build-up of

excessive sediment. The frequency of maintenance and emptying will be dictated by levels of sediment accumulation.

The adoption of precautionary principles and the implementation of mitigation measures listed above will ensure that the risk of elevated suspended solids to surface waters is low. This in turn will ensure that potential risks to sensitive receptors is also low. Nevertheless, should a significant discharge of suspended solids to surface waters occur, the absence of immediate proximity to designated sites and the assimilative capacity of the localised surface waters will act as a natural hydrological buffer in terms of suspended solids loading. Should such a discharge occur, the dilution and retention time of suspended solids in the localised surface water network will reduce potential impacts on highly sensitive downstream designated sites. It should be noted that this natural mitigation measure is not to be adopted as a first principle and will not be relied upon to prevent adverse impacts on designated sites.

A detailed design of required drainage, collector drainage, stilling ponds and other listed mitigation infrastructure is contained in the Surface Water Management Plan (**Management Plan 3**).

3.2.2.4 Release of Hydrocarbons

The following mitigation measures will be implemented during all construction and decommissioning phase works for the proposed development to prevent the release and transport of hydrocarbons to receiving surface waters:

- Refuelling of vehicles will be carried out off site to the greatest practical extent. This refuelling policy will mitigate the potential for impacts by avoidance. Due to the remote location nature of the Site, it is unlikely that implementation of this refuelling policy will be practical in all circumstances. In instances where refuelling of vehicles on Site is unavoidable, a designated and controlled refuelling area will be established at the Site. The designated refuelling area will enable low risk refuelling and storage practices to be carried out during the works. The designated refuelling area will contain the following attributes and mitigation measures as a minimum requirement:
    - The designated refuelling area will be located a minimum distance of 50m from any surface waters or Site drainage features.

- The designated refuelling area will be bunded to 110% volume capacity of fuels stored at the Site.
- The bunded area will be drained by an oil interceptor that will be controlled by a pent stock valve that will be opened to discharge storm water from the bund.
- Management and maintenance of the oil interceptor and associated drainage will be carried out by a suitably licensed contractor on a regular basis.
- Any oil contaminated water will be disposed of at an appropriate oil recovery plant or licensed tip site.
- Any minor spillage during this process will be cleaned up immediately.
- Vehicles will not be left unattended whilst refuelling.
- All machinery will be checked regularly for any leaks or signs of wear and tear.
- Containers will be properly secured to prevent unauthorised access and misuse. An effective spillage procedure will be put in place with all staff properly briefed. Any waste oils or hydraulic fluids will be collected, stored in appropriate containers and disposed of offsite in an appropriate manner.

Notwithstanding the management of refuelling and fuel storage at the designated refuelling area, the potential risk of hydrocarbon spills from plant and equipment or other general chemical spills at other areas of the Site remains. To mitigate against potential spills at other areas of the Site, the following mitigation measures will be implemented:

- Oil absorbent booms and spill kits will be available adjacent to all surface water features associated with the Development. The controls will be positioned downstream of each construction area and at principal surface water drainage features. Oil booms deployed will have sufficient absorbency relative to the potential hazard.
- Spill kits will also be available at construction areas such as at turbine erection locations, the temporary site compound, on-site substation, spoils storage areas and met mast location etc.

- Spill kits will contain a minimum of oil absorbent pads, oil absorbent booms, oil absorbent granules, and heavy-duty refuse bags for collection and appropriate disposal of contaminated matter.

- Should an accidental spill occur during the construction or operational phase of the Development, such incidents will be addressed immediately. This will include the cessation of works in the area of the spillage until the issue has been resolved.

- Spill kits will be kept in each vehicle at the Site and will be readily available to all operators.

- No materials, contaminated or otherwise will be left on the Site.

- Suitable receptacles for hydrocarbon contaminated materials will also be available at the Site.

- A detailed spill response plan is provided as part of this CEMP.

Implementation of the above mitigation measures will significantly reduce the risk of hydrocarbon contamination being released to the surface water network. Nevertheless, the potential risk cannot be entirely eradicated. Therefore, precautionary measures and emergency response protocols have been prepared and are provided as part of the CEMP.

3.2.2.5 Release of Cementitious Materials

The following mitigation measures will be implemented during all construction and decommissioning phase works for the proposed development to prevent the release and transport of cementitious material to receiving surface waters:

- The procurement, transport and use of any cement or concrete will be planned fully in advance and supervised by appropriately qualified personnel at all times.

- Vehicles transporting cement or concrete to the Site will be visually inspected for signs of excess cementitious material prior to being granted access to the Site. This will prevent the likelihood of cementitious material being accidentally deposited on the Site Access Tracks or elsewhere at the Site.

- Drivers of such vehicles will be instructed to ensure that all vehicles are washed down in a controlled environment prior to the departure of the source site, such as at concrete batching plants.

- Precast concrete will be used wherever possible. However, the use of pre-cast concrete is not viable option for large structures such as Turbine foundations and so concrete will be delivered to the Site.

- Concrete will not be poured during periods of rainfall or if any kind of precipitation is forecast. This policy will limit the potential for freshly poured concrete to adversely impact on surface water runoff.

- Raw or uncured waste concrete will be disposed of by removal from the Site.

- Washout of concrete trucks shall be strictly confined to the batching facility and shall not be located within the vicinity of watercourses or drainage channels. Only the chutes will be cleaned prior to departure from Site and this will take place at a designated area at the Temporary Site Compound.

- Spill kits will be readily available to Site personnel, and any spillages or deposits will be cleaned up as soon as possible and disposed of appropriately.

- Pouring of concrete into standing water within excavations will be avoided.

- Excavations will be prepared before pouring of concrete by pumping standing water out of excavations to the buffered surface water discharge systems in place.

- Any surplus concrete will not be stored or deposited anywhere on Site and will be returned to the source location or disposed of appropriately at a suitably licensed facility.

- Any required shuttering installed to contain the concrete during pouring will be fully secured around its perimeter to minimise any potential for leaks.

3.2.2.6 *Proposed Turbine Delivery Route Widening Locations*

A drainage ditch has been identified as present adjacent to the proposed turbine delivery route widening location no. 3 along the R285 regional road. The drainage ditch is ephemeral in nature but is nonetheless connected to the Arigna River and could function as a pathway for the conveyance of contaminated surface water runoff, should it be generated at the widening location, downstream to the Arigna River.

All relevant mitigation measures set out above with respect to the control and treatment of surface water runoff for suspended solids, hydrocarbons and cementitious materials will be implemented in full, wherever applicable, during the construction works associated with the widening at the TDR widening location no. 3.

Management of spoil arising at the widening locations will be undertaken in accordance with the approach to spoil management measures set out above for the wind farm site and grid connection route, as applicable to the widening location.

3.2.2.7 *Water Quality Monitoring*

The following water quality monitoring will be implemented to mitigate against potential impacts on the surface water receiving environment:

- A programme of water quality monitoring outlining the selected parameters and monitoring frequency will be agreed with Inland Fisheries Ireland and Leitrim County Council prior to the commencement of construction.

- In order to assist in the detection of any deviations from the baseline hydrochemistry conditions at the Site, regular periodic monitoring of the Site's surface waters will be carried out prior to and during construction.

- It is proposed that a programme of operational phase water quality monitoring is also implemented at a monitoring frequency agreed with Leitrim County Council in order to aid the detection of any potential operational phase impacts on surface water quality.

- As a minimum requirement, field measured parameters such as pH, conductivity, total dissolved solids (TDS), temperature, dissolved oxygen (DO) and turbidity will be included in the water quality monitoring programme. The results will be compared to the applicable EQS to determine if adverse impacts on water quality are occurring.

- Water quality will be monitored for trace metal concentrations prior to, during and after the construction phase.

- Water quality monitoring locations will include both upstream and downstream points relative to the works locations. The locations of the water quality monitoring points will be flexible and will be moved as the construction phase progresses so that monitoring points remain representative of the most likely construction impact receptor points.

- The watercourses within and adjacent to the proposed spoil storage area will be included within the water quality monitoring programme.

- The downstream monitoring locations will be positioned as close as possible downstream of the works location, and another positioned further downstream. This approach will allow for an assessment of the dilution of potential contaminations (if present) as the distance from the point of diffuse source location increases.

- Watercourses which do not have year-round flows such as artificial drains, ditches or ephemeral streams will be avoided as water quality monitoring locations.

- During the construction phase, daily visual inspections of excavations, dewatering procedure, settlement ponds, silt traps, buffered outfalls and drainage channels etc. will be carried out by a suitably qualified person. Any excess build-up of sediment at settlement ponds, drains or at any other drainage features that may decrease the effectiveness of the drainage feature will be promptly removed.

- During the construction phase of the Development, all development areas will be monitored on a daily basis for evidence of groundwater seepage, water ponding and wetting of previously dry spots.

- Following the completion of the construction phase, inspection of silt traps, buffered outfalls and drainage channels will be periodically inspected during maintenance visits to the Site when the operational phase water quality monitoring will also be carried out.

- The proposed watercourse crossings will be monitored daily during construction and during each Site visit during the operational phase. The watercourse crossings will be

monitored in terms of their impacts (if any) on the receiving watercourses and in terms of their structural integrity to identify any signs of erosion or potential for sediment release.

- It is proposed that a handheld turbidity meter is available at the Site to accurately measure the quality of water discharging from the Site. The meter will be maintained and calibrated frequently.

- A detailed inspection and monitoring regime to be agreed with Inland Fisheries Ireland and Leitrim County Council will be included in the CEMP.

- Any discharges of sediment treated water will meet the requirements of the Surface Water Regulations 2009, as amended.

3.2.2.8 Emergency Response

Mitigation measures outlined in the previous sections of this chapter will significantly reduce the potential for contamination of surface water or groundwater associated with the Project. Nevertheless, as is the case with all construction projects, a risk of accidental chemical spillages, sediment overloading of control measures or leaks of contaminants from plant or equipment remains a possibility. Emergency response procedures to potential contamination incidents have been prepared as part of the CEMP and will be implemented at the Site prior to the commencement of the construction phase. The following is a non-exhaustive list of potential emergencies and respective emergency responses:

- Spill or leak of hazardous substances (less than 20 litres);
    - All spill incidents will be dealt with immediately as they arise.
    - Spill kits will be prepared and available in vehicles associated with the construction phase of the Project.
    - Spill kits will also be prepared and made available at primary work areas such as at proposed turbine, hardstand, substation, met mast and construction compound locations.
    - Disposal receptacles for hydrocarbon contaminated materials will also be available at the Site.

- Major spill of hazardous or toxic substance off Site or to environmentally sensitive areas:
    - Immediate escalation measures will be implemented for all major spill events.
    - Escalation measures may include installation of temporary sumps or drains to control the flow or migration of hydrocarbons or other chemicals.
    - Attempts to be made to limit or contain the spill using sandbags to construct a bund wall, use of absorbent material, temporary sealing of cracks or leaks in containers, use of geotextile or silt fencing to contain the spill.
    - Excavation and disposal of contaminated material will be immediately carried out following any such incidents.
    - Evacuation procedures will be implemented to remove non-essential personnel from the area.
    - Data gathering and an investigation will commence immediately after the emergency is contained.
    - If a significant hydrocarbon spillage does occur, the contractor on behalf of the developer will have an approved and certified clean-up consultancy available on 24-hour notice to contain and clean-up the spill.
    - All major spills of this nature will be reported to Leitrim County Council immediately following such instances.
- Flooding of low-lying areas of the Site:
    - Immediately remove all chemicals, fuels and other hazardous substances from low lying areas of the Site
    - Immediately remove plant and equipment from low lying areas
    - Recover materials washed from Site including sediment and other waste.

- Review and address the potential for excess water entering the Site.
- Review and maintain erosion and sedimentation controls.

- Spills of cementitious material:
  - Cement / concrete contamination incidents will be cleaned up immediately as they arise.
  - Spill kits will also be established at key construction areas and they will also be readily available in the cabs of plant and equipment.
  - Suitable receptacles for cementitious materials will also be available at the Site.

3.2.2.9 Operational Phase

3.2.2.9.1 Protection of Watercourses

The following measures are required in order to ensure the ongoing protection of watercourses:

- Re-seeding / re-vegetation of all areas of bare ground or the placement of Geo-jute (or similar) matting will take place as practically possible at the start of the operational phase to prevent run-off.
- Silt traps erected during the construction phase within roadside and artificial drainage will be replaced with stone check dams for the lifetime of the project. These stone check dams will only be placed within artificial drainage systems such as roadside drains and not natural streams or ditches.
- A full review of construction stage temporary drainage will be undertaken by the Developer (in conjunction with the Project Hydrologist/ Site Engineer and the Project Ecologist) following the completion of construction, and drainage removed or appropriately blocked where this will not interfere with infrastructure.
- The operational phase compound / office must house all chemicals within a secure bunded COSSH (Control of Substances Hazardous to Health) store for the operational phase of the project.

3.2.2.9.2 Hydraulic Loading During the Operational Phase

The proposed wind farm will lead to an increase in impermeable surface area through the construction of hard stand areas within the Site. This in turn will lead to an increase in hydraulic loading by surface water runoff. However, water balance calculations indicate that the worst-case net increase in surface water runoff volumes will be approximately 30.06l/s/ha, or 2.61% relative to the area of the Site. Therefore, this is considered an imperceptible impact representative of a non-significant impact.

As a consequence of the estimated low significance of the impact of hydraulic loading during the operational phase and in light of the issues relating to increases in hydraulic loading as set out above, mitigation measures to facilitate a reduction in surface water runoff are limited to ensuring that pre-existing and newly established drainage infrastructure is sufficiently maintained for the discharge rates associated with all areas of the Site. Once identified, any and all blockages which may adversely impact upon the drainage regime at the Site will be immediately removed during the operational phase of the proposed Development. No other additional impacts are anticipated during the operational phase of the Development.

3.2.2.9.3 Decommissioning Phase

The decommissioning phase of the Project will result in the removal of Site infrastructure such as wind turbines and the Met Mast etc. No new additional mitigation measures, over and above those proposed for the construction phase, which will also be required to be implemented during decommissioning, are required for the decommissioning phase of the Development. The decommissioning phase and associated removal of major infrastructure components is anticipated to result in similar potential risks to surface water as those that will be encountered during the construction phase of the Development.

The excavation of greenfield land is not expected to be required during the decommissioning phase. In addition, the movement of plant, vehicles and equipment is not expected to be required during the decommissioning phase since all of the project's hardstand areas will be pre-existing by the time the decommissioning phase is being carried out. As a result, the risk of elevated suspended solids being discharged in surface water run-off to the downstream receiving environmental is expected to be low. However, the potential risk remains for spills of fuels hazardous chemicals which is a common risk to all developments. The mitigation measures outlined in this chapter will be implemented during the decommissioning phase to reduce the potential for such impacts to an insignificant level.

3.2.3 Ornithology Mitigation Measures

3.2.3.1 Mitigation by Design

In order to eliminate the potential for significant negative effects to bird species the Development has been designed to minimise the footprint of the proposed wind farm layout. This has been achieved by using existing infrastructure such as the existing access tracks on site as well as minimising the footprint of the proposed access track and hardstand areas.

3.2.3.2 Ecological Clerk of Works

An Ecological Clerk of Works (ECoW) will be appointed for the duration of construction works to advise the contractor and will visit as necessary (minimum once per week) when works are in progress to ensure that the mitigation measures are adhered to. The ECoW will be responsible for completing pre-construction transect/walkover surveys over the Site to ensure that disturbance to breeding birds is avoided.

The ECoW will be responsible for undertaking ongoing ornithological monitoring during periods of the construction phase that overlap with the breeding bird season. The ornithological monitoring will focus on identifying the presence of primary and/or secondary target species (as listed in Section **6.3.5.3** of **Chapter 7: Ornithology**) within the vicinity of the construction footprint. Where evidence of breeding pairs of primary and/or secondary species are identified a buffer distance of 500m will be established around the nest site in which no construction activity will be permitted until it is confirmed that breeding has terminated.

3.2.3.3 Pre-Construction Confirmatory Surveys

Pre-construction surveys, completed by suitably experienced ornithologists, will be completed in order to help inform the approach to the construction works associated with the proposed wind farm so that the presence/absence of any breeding key ornithological receptors identified in this assessment (or any other sensitive bird species as per **Table 7.1** in **Chapter 7: Ornithology** is confirmed.

In the spring / summer prior to any construction works being undertaken (including enabling works and ground investigations) surveys would be undertaken to identify any breeding activity associated with key ornithological receptors identified in this assessment (or any other sensitive bird species as per **Table 7.2** above). Where breeding activity by such species is identified the breeding sites will be identified and will be demarcated so as to

avoid disturbance to their breeding sites. The Applicant would appoint a suitably experienced ECoW to oversee the works and help ensure that suitable protection zones are established and adhered to during the works. Species and site-specific buffer zones, following current best practice, would be established, appropriate to the specific circumstances, under the advice of a suitably experienced ornithologist.

In addition to the pre-construction surveys, all works areas would be checked by a suitably experienced ecologist/ornithologist or the ECoW for the presence of any nesting birds in advance of works commencing during the main bird breeding season. Should any active nest sites be found in areas where construction works are proposed, the location of the nest would be protected from damage and disturbance.

All works would be monitored by a suitably experienced ecologist / ornithologist or the ECoW to help ensure that protection measures are properly implemented and maintained and that works proceed in accordance with best practice and the requirements of the legislation protecting breeding birds. The ECoW would provide a toolbox talk before any personnel start on site which will cover the issue of breeding birds, their legal protections, what to look for and what to do should breeding bird behaviour or a potential nest site be found.

3.2.3.4 Habitat Management Plan

A Habitat Management Plan (HMP) (**Appendix 5.4**) has been created in order to implement positive land management to mitigate any adverse impacts the proposed wind farm may have on habitats. The HMP proposes measures that will encourage the rapid recovery of suitable habitat for upland waders such as snipe post construction, provide improved habitat conditions for meadow pipit, skylark and other passerine species that have been identified as key ornithological receptors, as well as providing improved foraging habitat for raptor species such as hen harrier. The details of management measures are set out in the HMP (**Appendix 5.4**)

3.2.3.5 Mitigation by Reduction

Of the raptor species recorded during baseline surveys, kestrel was the most frequently recorded species, with 27 flights recorded. Whilst kestrel activity in the flight survey area represented a very low percentage of the overall vantage point monitoring surveys completed for the proposed wind farm, this species is still likely to use the flight survey area and habitats surrounding the proposed turbines for foraging. In order to reduce the potential

for casualties at turbines, proactive measures will be taken to discourage birds from hunting in the area surrounding the four turbine locations.

This will involve eliminating any high sward or rank vegetation from around the relevant turbine(s) to make it less suitable for supporting prey items such as small mammals (mice, shrews, voles) and birds (meadow pipit, skylark etc). Vegetation clearing can be achieved by mowing and/or strimming. With mitigation in place, the risk of collision risk to Kestrel as a result of the project will be further reduced, in keeping with the very low level of significance posed to this species.

3.2.3.6 Monitoring

A detailed breeding bird monitoring will be implemented at least 12 months prior to the start of construction works. The monitoring plan would detail survey methods, and the reporting mechanism, for each focal species. The surveys would be completed by suitably experienced ornithologists. The surveys will commence (as a minimum) in the breeding season prior to works commencing and for at least the first fifteen years of wind farm operation (i.e., annually for the first three years, then fifth, seventh, tenth and fifteen years). At which point the need for further monitoring would be reviewed. The surveys would include the flight survey area which comprises the four proposed turbines and a 500m surrounding buffer area.

The monitoring will comprise:

Vantage point surveys as per SNH (2017) from the two vantage points used for the baseline surveys.

Breeding bird survey following methods used in the baseline survey to be repeated yearly between early April to early July during each operation phase monitoring year.

Collision fatality searches which will involve the search of a standard polygon area around each of the 4 no. turbines. At the start of each survey, data recorded will include meteorological and ground cover information. The locations of any carcasses found will be recorded by GPS and will be photographed in-situ. The state of each carcass will be recorded on a corpse record card, using the following categories (after Johnson 2003):

- Intact - a carcass that is completely intact, is not badly decomposed, and shows no sign of being fed upon by a predator or scavenger.
- Scavenged - an entire carcass which shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one location such as wings, legs, skeletal remains or pieces of skin.

- Feather Spot - ten or more feathers at one location indicating predation or scavenging. If only feathers are found, 10 or more total feathers or two or more primaries must be discovered to consider the observation a casualty.

Searcher efficiency and predation tests will be carried out at the commencement of the programme in order to calibrate the results to account for the search dog's ability to find bird corpses and to also account for scavenging of corpses by animals. The collision searches will be carried out on a monthly basis in years 1, 2, 3, 5, 7, 10, 15 of the operational wind farm.

A full Schedule of Mitigation Measures relating to Biodiversity can be seen in **Appendix 17.1.**

3.3 SOILS AND GEOLOGY

The following section details the environmental control measures which must be incorporated into the Contractors' Construction Method Statement (CMS) to ensure the protection of soils and geology. In addition, a Peat and Spoil Management Plan and a Waste Management Plan (see **Management Plans 4 and 5** respectively) have been prepared which provide further details of control measures and monitoring procedures.

3.3.1 Design Phase

3.3.1.1 Mitigation by Avoidance

The opportunity to mitigate any effect is greatest at the design period. In this respect, a detailed Site selection process was carried out by the Developer. This process identified deep peat and potentially deep bedrock as specific geotechnical constraints. Furthermore, infrastructure design sought to avoid those areas as much as possible.

In order to mitigate against the risk of landslide associated with the construction and operation of floating roads, areas of deep peat have been avoided wherever possible. Floated roads will only be constructed in areas of deeper peat (>1.5m depth with a crossfall of less than 1 in 10). The floated roads will be laid directly on the existing peat using geogrid and crushed stone. Pipes will be installed at intervals to allow the existing runoff regime on the site to continue.

3.3.1.2 Pre-Construction Phase Ground Investigation Works

Prior to the Construction Phase it will be necessary to undertake pre-construction phase ground investigation works to confirm the design.

The works required for this ground investigation will contain both intrusive and non-invasive elements. The intrusive investigative works will consist of the following main elements:

- Excavation and sampling of trial holes within soils to depths of up to 5m below existing ground level.
- Drilling and sampling of boreholes within soils and bedrock to depths of up to 30m below existing ground level.
- Carrying out of in-situ testing (including geophysics) using mechanical and man-portable equipment to depths of up to 20m below existing ground level.

These works, although of lesser significance are similar to the type of activities undertaken during the Construction Phase. As such mitigation as detailed in **Section 8.6.2** of **Chapter 8: Soils and Geology** will be applied to reduce the effect from these activities to slight impact.

The non-invasive investigative works will consist of the following main elements: -

- Geophysical Surveys
- Topographic Surveys
- Laboratory Testing

These non-invasive activities will have a much lesser effect on soils and geology, based on the lack of requirement for heavy plant and machinery. Where possible the pre-construction Ground Investigation will prioritise the use of non-invasive methods over intrusive methods.

The pre-construction Ground Investigation programme will be designed so as to collect sufficient information on soils and geology across the entire development area in order to mitigate against adverse impact at Construction Phase, as follows:

- Determine ground water table at the location of significant excavations. This will allow appropriate design of excavations and groundwater control ahead of construction.
- Assess soil thickness, type and competence to inform excavation stability, suitable methods for protecting soil structure and permeability and minimise excavation for foundations.
- Test soils and subsoils to determine reusability of soils on site for “cut” and “fill” purposes.

- Assess the suitability of existing roads, footpaths and hardstanding areas for re-use and / or inclusion in the proposed design, without the need for removal and new construction.

3.3.2 Construction Phase

3.3.2.1 Earthworks Activities

The removal of soils will be unavoidable in places, but every effort should be made to ensure that the amount of sub-soils to be removed is kept to a minimum in order to limit the impact on the geotechnical and hydrological balance of the site.

It is noted that the "natural hydrology" of parts of the site may have been significantly altered by land drainage, however measures will be emplaced to minimise any additional changes to the existing site hydrology resulting from the construction of the wind farm.

During the construction works, the excavation, storage and re-use of excavated materials have the potential to, directly or indirectly, negatively impact on water quality. Appropriate engineering controls, such as the installation of a drainage system with settlement / stilling ponds, silt traps, check dams and interceptor drains, will be carried out in tandem with, and where possible, prior to, any excavation work to mitigate potential impacts. In relation to construction works, the most important aspects of these recommendations involve:

1. Deep excavations at turbine base locations in order to construct turbine foundations and hard-standings to support crane loadings.
2. Construction of new site roads, the upgrade of existing site roads and construction on new road surface at locations along the turbine delivery haul route where widening is required.
3. Construction of new sections of "floated road" (where recommended to fulfil a geotechnical requirement) where excess peat depth is present.
4. Removal / transport of "waste" peat and glacial spoil and disposal within designated zones.
5. Construction of a new grid connection between the Letter Wind Farm Substation and Corderry 110kV Substation, approximately 6.4km.

In addition to standard ground investigation works carried out prior to construction additional, supplementary investigations may be undertaken during the construction phase to assess the integrity of the rock formation beneath critical infrastructure.

3.3.2.2 Soils and Bedrock Removal

The following mitigation measures will be implemented to minimise potential impacts on soils and geology during the construction phase:

- Prior to commencement of construction works all-natural organic topsoil will be stripped from the footprint of the proposed development and stored temporary in a series of stockpiles.
- Surface water runoff will be intercepted and diverted away from open excavations towards the nearest gulley (on roadways) or to a temporary holding pond/tank (near river/stream) crossings.
- For off- sections, granular material will be placed over exposed clayey subsoil or made ground, to prevent erosion of fines and/or rutting.
- Minimal bedrock excavations are expected and where these are undertaken will be shallow in penetration. During construction any exposure of bedrock surfaces will be minimised. Following uncovering of the bedrock surface and excavation to the required level, the exposed formation will be quickly covered by a non-permeable barrier material until construction work can be completed in a timely manner and then reinstated.

3.3.2.3 Degradation of Soil and / or Subsoil

The following mitigation measures will be implemented to minimise potential impacts on soils and geology during the construction phase:

- Surface water runoff will be intercepted and diverted away from open excavations towards the nearest gulley (on roadways) or to a temporary holding pond/tank (near river/stream) crossings.
- Within the fields or other off-road areas, granular material will be placed over exposed clayey subsoil or made ground, to prevent erosion of fines and/or rutting and to provide a temporary trafficable surface.
- There will be limited stockpiling of material on-site. Excavated soil / material will be removed directly onto an awaiting truck for removal off site for recovery or re-use at an appropriate destination within the Site. Any stockpiles will be small in size and covered with appropriate waterproofed material where fine content exceeds 5%.
- Open excavations, where practical, will be covered and sidewalls supported, if these are to remain open for periods in excess of one day.
- Regular site audits will be undertaken to ensure compliance with this mitigation and to provide active management of surface groundwater runoff.

3.3.2.4 Karst

GSI does not record the presence of any karst features within the proposed development site, neither is it located within an area known to be directly underlain by soluble bedrock.

Pre-construction ground investigation undertaken to inform design, will be reviewed to ensure the findings confirm this opinion.
Impact to any unrecorded "karst" landforms that may exist below the footprint of the Development will be limited by the shallowness of the proposed excavations and minimisation of bedrock exposure.

Where bedrock exposure occurs, the mitigation provided in **Chapter 8: Soils and Geology Section 8.6.2.2** can be expected to ensure the magnitude of this effect will be SLIGHT.

3.3.2.5 Geological Heritage

The site is not located within an area of geological heritage. Should sensitive aspects of the local geology be exposed within the infrastructure footprint during the construction phase these will be documented and recorded by a suitably qualified geologist and a combined factual and interpretative report produced.

3.3.2.6 Contamination of Overburden and Groundwater

Where contaminated material is encountered, it will be left in-situ while testing to determine its characteristics is carried out. This material will be covered to minimise rainfall ingress. The material will be excavated and either retained on site or transported by a permitted waste contractor to an appropriate facility for treatment or disposal.

All contaminated materials encountered within the Site will be excavated, stored, moved, disposed of or recovered in accordance with the requirements of the Waste Management Act 1996 as amended and the Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.

To reduce the risk of soil, subsoil, made ground and/or groundwater contamination arising as a result of spills or leakages, a number of measures will be implemented during the construction phase of the Development to control the storage and handling of fuels, lubricants and waste.

These measures include, but are not limited to, the following:

- Storing fuels, chemicals, liquid and solid wastes in appropriately bunded areas within the temporary compound(s)
- Removal of all potentially contaminating materials as well as plant and machinery away from rivers/stream crossings to the temporary compound(s) at the end of each working day
- Undertaking refuelling of plant, equipment and vehicles within the temporary compound(s)
- Provision of spill kits at high-risk sites.

3.3.2.7 Potential for Bog Failure

Site investigations and assessment of the proposed Letter Wind Farm site indicate that the site is a low risk for slope failure or mass movements.

Applying the precautionary principle however, the following procedures are recommended as best-practise mitigation measures to avoid / improve slope instability at wind farm sites. For Letter Wind Farm, these procedures are both management driven and through risk reduction enabling works.

3.3.2.7.1 Construction Mitigation of Risk

General Constraints and Anecdotal Evidence

Analysis of the historic conditions following peat slides indicates that the following main factors generally trigger slope failures:

1. Excessive quantities of spoil loaded onto sensitive peat covered sloping ground. (In such cases the gradient of the slope should be no more than an average of 5 degrees to the horizontal). Where peat is not of a sensitive nature, it will be possible to load spoil onto slopes up to a maximum of 10 degrees to the horizontal.
2. The angle of repose of the cut face of excavations is all too often found to be too high, sometimes 70 – 80 degrees to the horizontal. Battering back the sides of an excavation to approx. 45 degrees helps to reduce the potential for slippage, which will significantly reduce the potential for peat movement.
3. The consequences of peat slide can be identified as Damage to Machinery, Damage or Loss of Access Track, Damage to Site Drainage, Site Works Damaged, Death or Injury to Personnel or Degradation to the Environment.
4. A contingency plan is to be compiled and will be enacted should peat movement occur.

3.3.2.7.2 Prevention of Peat Slide and Bog Burst

Application of the following procedures will have the effect of reducing the Hazard Ranking associated with Peat Instability:

1. Excavated spoil will not be deposited on the down slope or up slope edges of the adjacent peat. This spoil will instead be deposited on the two flanks either side of the excavation (where gradient is least) and spread in such a way as to limit the surcharge pressure on sensitive peat.
2. Bog Burst is recognised to be a difficult condition to mitigate against. Bog Burst tends to occur within deep peat (> 3.00m) after very heavy or prolonged precipitation. To ward against this possibility the design of turbine bases should be engineered to ensure that excavations do not cut into deep peat (>2.50m). It is however considered acceptable, where slopes are less than 5 degrees, that floating roads may be placed within peat cover exceeding 2.50m depth.
3. The hardstanding areas surrounding the turbine bases will be designed in a manner such that crane loadings can be transferred directly onto the competent strata underlying the peat. In order to facilitate these works it will be necessary to undertake limited excavations. To ensure effective sidewall support during these operations the contractor will adopt an approved engineering solution (such as sheet piling) to maintain sidewall stability at all times.
4. Movement can often occur during or following severe rainstorm events, particularly when following a prolonged dry spell. Extra vigilance will be maintained at such times, during construction.
5. All slopes are to be regularly checked for development of tension cracks (caused by desiccation), indicative of slope movement.
6. Extra care will be taken where the peat has previously been tilled. Attention should be paid to any historic turbary nature of a site.
7. Method statements will be followed at all times. Where modification is required, this will be agreed by the supervising engineer.
8. Slopes will not be undercut, or excavations left unsupported for periods in excess of 24 hours. Excavations are to be backfilled as soon as practicable. Excavation and filling operations shall be coordinated to minimise the time an excavation remains opened.
9. Pore water pressure within excavations should be kept low at all times by draining deliberate or intentional sumps at regular intervals. This is to prevent ponding of water

within excavations which can in turn increase hydraulic heads locally and potentially lead to instability.

10. The potential for Peat Slide will be monitored regularly during the construction works, by means of regular site visits and assessments, by a suitably qualified and experienced professional.
11. Only experienced and competent contractors will be appointed to carry out the construction works. Low ground bearing pressure machinery shall be used for transport of construction materials in sensitive areas. It is also recommended that the less sensitive areas are completed first to allow suitable construction practices to be established before works commence in the more difficult areas.
12. Site staff will also undergo induction training to learn about the risks associated with working on "upland environments" and procedures aimed at reducing Peat Slide risk.
13. Sufficient time should be allowed to carry out the works in a safe and timely manner.

3.3.2.7.3 Spoil Disposal

Spoil will invariably be generated during excavations for foundations at turbines and along new access roads.

Minimisation of the production of this spoil will be treated as a high priority, but it is nevertheless expected that there will be in the region of 54,236 m^3 of peat soils and subsoils excavated during site works.

Analysis of peat depths recorded along proposed site tracks and turbine locations indicates a range of 0.10m to 5.50m across the development area with an average peat depth of 1.98m within the construction zone. The volume of peat (or organic soils) to be extracted as part of the Development is estimated to be approximately 54,236 m^3.

Spoil types will be treated separately. Glacial soils and peat will be separated during excavation and these two types of spoil will be disposed of generally as follows:

A *Glacial soils will be deposited directly on top of other glacial soils. This will require the removal of peat where present to facilitate the process.*

B *Peat can be disposed of either on top of glacial soils, on top of inactive peat or on top of the "Acrotelm" where the "Top Mat" has been removed.*

1. Glacial spoil disposal will take place within a 100m radius of each structure.

2. It is intended that spoil movements will be minimised by disposing of the material

within or immediately adjacent to the construction footprint of the structure from whence it was excavated.

3. Preparation of the Spoil Disposal site will involve the removal of the "Top Mat" which will be transplanted to an area of inactive bog and maintained for re-use during restoration operations.

4. Spoil will be deposited, in layers of 0.50m and will not exceed a total thickness of 1.50m.

5. Spoil will only be deposited on slopes of < 10 degrees to the horizontal and greater than 10m from the top of a cutting. The exact location of such areas will be determined on consultation with the geotechnical specialist.

6. A Peat Stability Register will record the location of each Spoil Disposal Site used and regular weekly assessment will be made by the construction manager or other suitably qualified individual.

7. Once disposal is complete the disposal sites will be re-vegetated with the "Top Mat" removed at the commencement of disposal operations. Upon commencement of the restoration phase guidance from a suitably qualified ecologist will be sought to provide a suitable methodology and programme of maintenance for the restored areas.

3.3.2.8 Management Driven Procedures and Protocols

The contractor's methodology statement should be reviewed and approved by a suitably qualified geotechnical engineer with experience in peat environments prior to site operations.

- Any excavations that may tend to undermine the up-slope component of a peat and / or unstable sub-soils slope should be sufficiently supported by buttress, frame or rampart to resist lateral slippage.
- In areas where peat soils are to be excavated, machinery of a sufficient size to complete the works will be employed. Excessively heavy plant machinery will not be used in these areas. This measure is intended to avoid large vibrations disturbing the peat substrate.
- Drainage management measures will be installed to effectively drain grounds in tandem with access track construction. Such drains should be positioned at an oblique angle to slope contours to ensure ground stability. Drains on areas of the site with

minimal risk of bog failure as identified by site investigations can be positioned at a more acute angle to the slope contour in order to reduce the velocity of surface water drainage.

- Due to peat's fluid-like properties, all peat excavated should be immediately removed from sloping sites. If peat is required for reinstatement, then acrotelm peat (<0.3m shallow, living layer) should be moved to a lower elevation part of the site that is characterised by near-horizontal slopes, is >100m away from any significant break of slope and is >50m away from drains and streams.
- If additional materials are required for the construction process, after exhausting excavated materials during road and infrastructure construction, additional materials may be acquired from external sources. Wherever possible any imported aggregates should consist of a similar geo-chemistry to the local geology of the site. It should be noted that this is dependent on the quality and variety of aggregate supplied by available quarries.
- From evidence (landslides in Mayo and Galway), excessively wet periods should be avoided in terms of scheduling significant excavations in peat substrates.

These recommendations will be included in the Contractor's contract of works, who should be experienced in construction within peat environments. In addition, a construction and environmental management plan will be in operation to check equipment, materials storage and transfer areas, drainage structures and their attenuation ability on a regular basis. The purpose of this management control is to ensure that the measures in place are operating effectively, prevent accidental leakages, and identify potential breaches in the protective retention and attenuation network during earthworks operations.

3.3.2.9 Additional Risk Reduction Enabling Works

The zone of historic peat landslide movement to the western side of access track and infrastructure at turbine T4, will be stabilised so as to prevent the continued natural loss of peat and / or mineral soils into the adjacent watercourse.

Such naturally induced migration of organic or mineral soils into watercourses has the effect of diminishing water quality and negatively impacting the associated flora and fauna.
To achieve this the watercourse will be culverted along the entire length of the recorded landslide zone. This will have the effect of stopping any subsequent soil movements from entering the water course and therefore negate further impact on the downstream watercourse.

3.3.2.10 Water Quality

During the construction phase, surface water drainage is generally found to be more at risk to water quality change than groundwater, where the majority of documented pollution events tend to involve suspended solids from sediment flows. The following mitigation measures are recommended to protect surface water and, to a lesser degree, groundwater quality.

3.3.2.11 Groundwater Dewatering

Any water ingress that may be encountered in the upper weathered zone of the bedrock during the construction phase should be intercepted by a toe drain and diverted to an existing artificial drainage channel and attenuation before release.

The design of the drainage takes into account factors of slope stability and where possible should be sealed at the base.

3.3.3 Operational Phase

3.3.3.1 Change to Hydrological Regime

Stilling ponds and interceptors will be kept for attenuation and runoff. Consideration should be given to the engineered design of roadside drains, the hardstanding areas and improved access roads to take the capacity of additional surface run-off arising from the proposed development.

The design must prevent both ***(a) hydraulic loading*** of the existing surface water network and ***(b) provide sufficient attenuation of suspended solids*** prior to outfall to the natural drainage network to maintain the existing environments baseline chemistry. Surface water flows in all existing waterways and drainage should not be impeded in any way by the proposed development.

Access tracks that intercept existing waterways should have suitably designed culverts installed to maintain baseline flows, large enough to accommodate peak flow of a one in 100-year return period.

3.3.3.2 Water Quality

The following measures are recommended to mitigate pollution to surface waters and groundwaters during the lifetime of the Development.

A regular programme of environmental site maintenance for the drainage network and drainage culverts to ensure their performance to standards at the site. Some changes in the drainage network may be required as a result of unanticipated changes in the hydrological regime at the site during the operation phase of the Development.

If fuelling has occurred on site, the fuel tanks and oil interceptor used at the fuel transfer area should be removed by a suitably qualified contractor. An audit of ground and water conditions immediately under and around the transfer area is recommended to investigate whether any leakage has occurred to the hydrological system and whether some clean-up measures are required. Aside from the use of lubricant oils at the substation (low volume), fuels should not be stored on site for the operation phase of the Development.

The substation compound is likely to require substation transformer cooling oil or gas. This should be stored in containers within a safe part of the substation compound, minimising accidental leakage and / or fire hazards. Consideration should also be given to a "bunded" area for the oil. Similarly, any other potentially harmful substances used to service the substation should be stored in an environmentally safe manner to mitigate impact to the soils and water.

3.3.3.3 Monitoring

In order to ensure there are no impacts on soils and geology during the operational phase a schedule of regular maintenance is proposed, as follows:

- Regular inspections and maintenance of surface water drainage to ensure correct functioning and to prevent build-up of blockages.
- Regular inspection and maintenance of bunded storage of chemicals and fuels to prevent escape of contaminants and allow early indications of any potential defects in storage facilities.
- Regular inspection and maintenance of roads, footpaths and parking areas to monitor settlement and investigation further where recorded.
- Regular monitoring of adjacent watercourses for contamination and comparison to baseline readings.

3.3.4 Decommissioning Phase

There will be a change in ground conditions at the site with the replacement of natural materials such as peat, sub-soils and possibly bedrock by concrete, sub-grade and

surfacing materials. This is a direct permanent change to the materials composition at the site.

No new mitigation is anticipated during the decommissioning phase. However, prior to initiating the decommissioning phase a review will be undertaken of the relevant legislation and guidance in force at that time to determine if additional mitigation is required.
Limited temporary decrease in water quality on a local level is likely to arise from the release of suspended solids and sediments during the excavation and construction process, particularly following rainfall events after a sustained dry period. This local deterioration in water quality will subsequently be reduced naturally by dilution and by managed mitigation prior to exiting from the site boundary to main catchments.

3.4 HYDROLOGY AND DRAINAGE

The following section details environmental control measures which will be implemented on site in relation to hydrology and drainage and provide the framework within which the targeted CMS must be prepared. In addition, a Surface Water Management Plan and a Water Quality Management Plan have been prepared (see **Management Plans 2** and **3** respectively) which provide further details of control measures and monitoring procedures.

3.4.1 Design Phase

3.4.1.1 Mitigation by Avoidance

The fundamental mitigation measure to be implemented during each stage of the Project will be avoidance of sensitive hydrological or hydrogeological receptors wherever possible, this key principle is referred to as “mitigation by avoidance”. This principle has been adopted during the design of the turbine and associated infrastructure layout across multiple design iterations. Hydrological constraints maps have been developed which identified areas of the Site where surface water and drainage constraints resulted in areas of the Site being deemed less suitable for development. The constraints map is presented in **Figure 9.13a, 9.13b.**

The final Site layout plan has been identified as the optimal layout design available for protecting the existing hydrological regime of the Site, while at the same time incorporating and overlaying engineering and other environmental constraints.

3.4.1.2 Mitigation by Design

- The descriptive mitigation measures outlined in the CEMP and **Chapter 9: Hydrology and Hydrogeology** will be applied to the development design and construction methodologies with a view to avoiding and/or minimising any potential adverse effects to water quality in the receiving surface water network.
- Details on how such measures will be applied (objectives, design considerations, layout) will be contained in a Surface Water Management Plan (SWMP) (see Management Plan 3 appended to the CEMP, EIAR **Appendix 2.1**). The aims and examples of important considerations in relation to mitigation measures described in the EIAR are further clarified here.

3.4.1.3 Nature Based Solutions

Nature Based Solutions (NBS) will be adopted at the Wind Farm site where possible. NBS include Sustainable Drainage Systems (SuDS), which will be employed to attenuate runoff and reduce the hydrological response to rainfall at the Site. Extending or maximising this approach sufficiently has the potential to attain net beneficial effects i.e., a net reduction in runoff rates at the Site, beneficial effects to water quality and reducing flood risk to downstream flood risk areas. Coupling SuDS with ecology and biodiversity mitigation can also provide opportunities to attain net biodiversity gain.

One of the main objectives of Nature Based Solutions and SuDS is to create an array of runoff stilling areas / standing water and promote diffuse discharge and recharge of runoff at the proposed Site. The objective of nature-based solutions will be to reverse the impact of the Development where there is the opportunity and where it is appropriate through surveying and risk assessment.

3.4.1.4 Constructed Drainage

The drainage design for the proposed site (**Surface Water Management Plan, Appendix 2.1**) will be such that drains are positioned adjacent to the footprint of the development, therefore the proposed drainage infrastructure can be considered part of the Development footprint. The scale of the impact a shallow drain poses on the surrounding peatland area is minor particularly in areas impacted as baseline. Therefore, the potential magnitude or scale of impact to waters posed by the introduction of the proposed drainage extends to a

minor extent beyond the footprint of the development. However, it is important to consider the gradual degradation over time.

The design of the proposed drainage network will facilitate:

- The collection of surface water runoff from upgradient of the development footprint (clean runoff interceptor drains) and the buffered redistribution of clean runoff downgradient of the development footprint by means of culverts and buffered outfalls to vegetated areas with a view to maintaining or improving the hydrological regime at the site.
- The collection of surface water runoff from the footprint of the development i.e., the construction area (construction runoff interceptor drains) and management of potentially contaminated runoff in the constructed treatment train. Where possible the buffered outfalls from the treatment train / stilling ponds will be redistributed with a view to maintaining or improving the hydrological regime at the site.
- To achieve separation, clean water infiltration collector drains or silt fences are positioned on the upslope and dirty water v-drains positioned along the verge, with site surfaces sloped towards dirty water v-drains.
- Where extensive drainage networks exist, collected / diverted runoff will likely be diverted back into the existing network. In such instances it is important to include the existing drainage network in designing and specifying the treatment train and attenuation features, including improving, modifying, and constructing attenuation features in drainage channels. Similar to considerations for newly constructed drainage channels, the modification and/or improvements of existing drainage will be designed with a view to maintaining or improving the hydrological regime at the site.

Maintaining or improving the hydrological regime at the site implies achieving the objectives of the development Surface Water Management Plan (SWMP) (**Appendix 2.1**) i.e., mitigating against potential adverse effects to the hydrological response to rainfall at the site (related to flood risk), and water quality in the receiving surface water network.

3.4.1.5 Attenuation Features

Mitigation measures to address surface water runoff and drainage include in line attenuation features such as check dams and stilling ponds and buffered outfalls). Both check dams and stilling ponds provide mitigation against potential effects to water quality, erosion, and discharge velocity, however they also facilitate buffered and diffuse percolation of surface

water runoff into the receiving environment along the permitter of the development footprint. Attenuation features have been designed to take account of a 1 in 100 year rainfall event and additional 20% for Climate Change.

3.4.1.6 Check Dams

Check dams will be constructed along the length of constructed drainage at regular intervals in line with relevant guidance (**Chapter 9: Hydrology and Hydrogeology, Section 9.2.2**). Check dams (**Appendix 9.5.– Tiles 3-6**), will be permanent (for the life of the project / drainage network), made of suitable locally sourced coarse aggregate (similar geology), and are intended to attenuate (impede) surface water runoff in the drainage channel, therefore slowing the velocity of the runoff in turn reducing the potential for erosion in the channel and allowing suspended solids to settle out if present. At low velocity, the runoff has increased opportunity to percolate through the coarse aggregate and into the surrounding peat area, effectively contributing to bog water levels at that location.

3.4.1.7 Stilling Ponds

Stilling ponds with buffered outfalls will be constructed at drainage outfalls associated with the construction runoff drainage network (**Figure 9.6a**). Buffered outfalls (**Appendix 9.5– Tiles 3-6, 15),** will be established at intervals along the clean runoff drainage network. Multiple outfalls along the drainage routes facilitates the strategic management of runoff with a view to maintaining the baseline hydrological regime in so far as possible. Similar to check dams; stilling ponds will be permanent (for the life of the projects / drainage network), made of suitable coarse aggregate, and are intended to attenuate surface water runoff in the drainage channel, slowing the velocity of the runoff before discharging to vegetated areas (buffered outfall). Slowing the water velocity allows suspended solids to settle out if present. At low velocity the runoff has increased opportunity to percolate through the coarse aggregate and into the surrounding landscape.

3.4.1.8 Watercourse Crossings

The bottomless bridge design will ensure the protection of the riparian bank structure, minimisation of sedimentation to the watercourse by use of silt fencing, sandbags or other sediment reducing measures, and minimisation of instream activity.

All mitigation measures are in line with IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters, Section 6 – River and Stream

Permanent Crossing Structures. More details on this Watercourse crossing can be found in **Chapter 9: Hydrology and Hydrogeology**, **Section 9.5.2.10.**

3.4.1.9 Constraints

As part of mitigation by avoidance during the design phase of the Development, groundwater, surface water, and drainage buffer zones were established where applicable. Buffer zones are intended to drive the design process by minimising or avoiding the risk to surface water features by restricting construction disturbance to outside these zones, in turn protecting riparian vegetation and providing potential for filtering of runoff from the Site and maintaining the baseline hydrological and drainage regime at the Site. The prescription of surface water and groundwater buffer zones (sometimes referred to as setback distances), is in line with relevant guidance relating to forestry, agriculture, water resources, direct discharges and wind farm development guidance documents **(Chapter: Hydrology and Hydrogeology Section 9.2.2)**.

The available guidance stipulates varying surface water buffer widths depending on type of activity, receptor type and sensitivity, and riparian zone characteristics including topography (steepness). Recommended surface water buffer widths range from 5m to 50m depending on Site specific and activity specific characteristics. For the purposes of this assessment the following conservative approach has been applied:

- 50m Surface Water Buffer Zone - Mapped surface water features i.e., mapped streams, rivers, lakes. Source for mapped surface water features; EPA.
- 15m Drainage Buffer Zone - Non-mapped drainage features i.e., non-mapped streams, natural and artificial drainage features. Source for non-mapped surface water features desk study and aerial photography assessment, Lidar topographic data and field observations.

Wind Farm Surface Water Buffers are presented in **Figure 9.13a**. Grid Connection Route Surface Water Buffers are presented in **Figure 9.13b.**

Significant drainage features have been identified and mapped in so far as practical. Such drainage features, while not mapped or prescribed buffer zones, will be treated with the same consideration as mapped drainage during the design and construction phase of the development i.e., mitigating for the potential for drainage connection to receiving surface water network.

Groundwater buffer zones are dependent on the characteristics of the receptor e.g., private well, or public supply source protection zone, and the characteristics of the underlying geology and associated aquifer e.g., poor unproductive aquifer, or regionally important karstified aquifer. Recommended groundwater buffer zones range from e.g., 15m (exclusion zone karst swallow holes) to entire catchments, depending on site specific characteristics. For the purpose of this assessment the following conservative approach has been applied:

- 250m Groundwater Buffer Zone – Groundwater abstraction points in relation to foundations, proposed access tracks and cable trenches. Source for mapped abstraction points: GSI. Not applicable, none within 250m of the Site.
- Source Protection Areas – The entire area mapped as a public or group groundwater supply protection area. Source: EPA. This is applicable.
- Entire Catchment (poor aquifer) – The entire catchment associated with a public or groundwater supply protection area which is underlain with a poor aquifer. This will be assessed in detail as applicable. Not applicable.
- Karst Features – Not applicable. No karst features were identified on Site.

Some of the proposed Turbine Hardstands, and Site Access Tracks fall within buffer zones associated with existing natural and constructed drainage features at numerous locations (**Figure 9.13a**). These features pose an elevated risk in terms of connectivity to surface water receptors; streams and rivers, and also means that some of these features will require diversion.

Following site surveys, significant natural and artificial drainage features observed which are relatively well connected to the mapped surface water network have been included in considering constraints. Given the extensive drainage network existing at the Site the construction activities associated with the development will invariably be in close proximity to surface water / drainage features, including within the buffer zones such that there will be a requirement for further mitigation measures.

No groundwater buffer zones are required for the proposed Letter Development, refer to the baseline **Section 9.3** of this report. **NOTE:** With reference to **Chapter 8 Soils and Geology** areas have been identified as Geo-Hazards and an effective drainage buffer zone will be however in terms of drainage constraints, mapped High Landslide Susceptibility (GSI) (**EIAR Figure 8.6**) is used to indicate constraints in relation to hydrogeology and stability (**Appendix 8.1**). For example, areas which are particularly sensitive include:

- One mapped extent for a landslide is recorded within the landholding of Letter Wind Farm. The location of this mapped landslide is highlighted on the drawings contained in the appendix. The following details are recorded by GSI for this feature:
- The south portion of the site (T3 and T4). This area possesses high landslide susceptibility (GSI), extensive existing drainage channels.
- The Northern portion of the site has evidence of deeply eroded drainage channels in till with evidence of iron pan **(Appendix 9.2 – Tile 7).**

In the scenarios above, the Turbine Hardstands and associated drainage will divert runoff away from these higher risk areas and design the drainage network to place buffered outfalls in more favourable areas adjacent to the Development footprint.

Some of the Development footprint will fall within buffer zones due to the unique and limiting circumstances associated with the Site and the Development, including the proposed infrastructure itself whereby the Grid Connection Route is limited to local road networks.

Portions of the Grid Connection Route pass through numerous surface water and 1 no. groundwater buffers **(Figure 9.13b).** Of note are the several watercourse crossings, which by their nature will be within surface water buffer zones. Given the extensive drainage network existing at the Site the construction activities associated with the development will invariably be in close proximity to surface water / drainage features, including within the buffer zones.

Careful consideration and special attention to planning is required for the identified locations within the surface water buffer zones. The Surface Water Management Plan **(Appendix 2.1)** details multiple mitigation measures for works proposed within buffer zones. Each proposed construction location will possess unique characteristics and will require assessment on a case-by-case basis to ensure adequate measures are implemented. Method statements and the proposed design of any road crossings will also require agreement from Inland Fisheries Ireland (IFI) in advance of construction which invariably must be constructed within the buffer zones. The mitigation measures described in the following sections will also be applied.

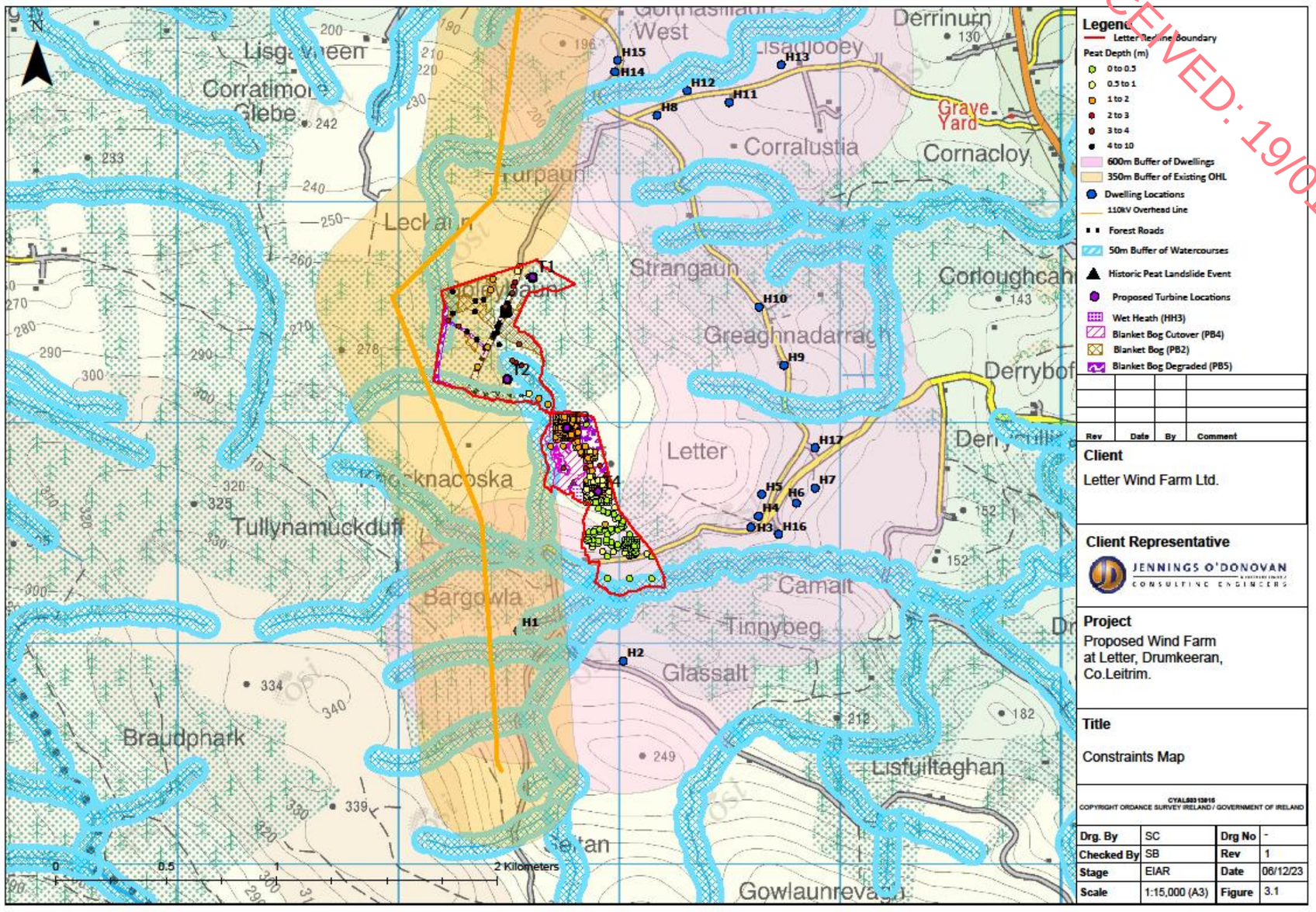

Figure 3.1 – Constraints Map

3.4.2 Construction Phase

3.4.2.1 Ground Disturbance and Diffuse sediment laden run-off Proposed Mitigation Measures- Wind Farm

- Management and mitigation for earthworks is covered in further detail in **Chapter 8: Soils and Geology**. Mitigation measures to reduce the potential for adverse effects arising from earth works and management of excavated material – A Spoil Management Plan has been prepared and forms **Management Plan 4** of the CEMP (**Appendix 2.1**) which adopts the mitigation measures outlined below.
- No permanent stockpile will remain on the site during the construction or operational phase of the Development. Excavated materials will be stored temporarily at designated spoil areas.
- Temporary stockpile locations have been identified and will be used to avoid the temporary placement of any excavation arisings outside of the footprint of the development. Temporary stockpile areas will be managed to facilitate the orderly segregation of material types, be isolated from the receiving surface water network by the use of silt screens etc., and are limited in height (1m).
- Earthworks will be limited to seasonally dry periods and will not occur during sustained or intense rainfall events. Similar to measures outlined in relation to ground stability during excavation works (**Chapter 8: Soils and Geology**), an emergency response system has been developed for the construction phase of the project (see **Management Plan 1 – Emergency Response Plan** and **Section 5.10 of Management Plan 3, Appendix 2.1)**, particularly during the early excavation phase. This involves 24-hour advance meteorological forecasting (downloadable from Met Éireann) linked to a trigger-response system. When a pre-determined rainfall trigger levels is exceeded (e.g., sustained rainfall (any foreseen rainfall event longer than 4-hour duration) and/or any yellow or greater rainfall warning (>25mm in 24 hour) issued by Met Éireann), planned responses will be undertaken. These responses will include;
- Cessation of construction until the storm event including storm runoff has passed over,
- Following heavy rainfall events, and before construction works recommence, the Site construction areas and infrastructure will be inspected by and Environmental Clerk of Works to confirm no additional escalation of response is required; and
- Corrective measures implemented to ensure safe working conditions, for example, dewatering of standing water in open excavations, repair works to drainage features if necessary.

- Exposed soils (exposed temporary stockpiles) will be covered with plastic sheeting during all heavy rainfall / storm events and during periods where works have temporarily ceased before completion at a particular area (e.g., weekends, overnight, etc).
- Sediment fencing will be erected along proximal and paralleling areas of watercourses, channels and drains spanned by the works to reduce the potential for sediment laden run-off to reach sensitive receptors.
- No direct flow paths between stockpiles and watercourses will be permitted at the Site.
- All drainage infrastructure required for the management of surface water runoff will be established before excavation works commence. Similarly, mitigation measures related to surface water quality will be implemented before excavation works commence.
- Conceptual and information graphics presented in **Appendix 9.5 – Tile no. 8 - 9** present indicative layout and specification for both passive treatment trains (clean water interceptor drains), active management treatment trains (management and treatment of construction water) and emergency response and intervention.

3.4.2.2 Ground Disturbance and Diffuse sediment laden run-off Mitigation Measures – Grid Connection Route

Mitigation measures to reduce the potential for adverse effects arising from earth works and management of spoil include the following:

- In sensitive areas, excavation of material will be conducted in a controlled manner whereby any temporary deposit of the material in buffer zones can be minimised. For example, vacuum excavation techniques or similar will be used for excavations within Surface Water Buffer zones and other sensitive areas (constraints) (**Figure 9.12b and 9.13b)**. Excavated soil will be removed to temporary storage areas.
- Management of excavated material will adhere to the measures related to the management of temporary stockpiles outlined in **Chapter 8: Soils and Geology**, a Peat and Spoil Management Plan has been established and forms part of the Construction & Environmental Management Plan (CEMP, **Appendix 2.1, Management Plan 4**) with a view to establishing material balance during the proposed construction phase, thus minimising the potential for, or the length of time excavated materials are exposed and vulnerable to entrainment by surface water runoff. No permanent, or semi-permanent stockpile will remain on the site during the construction or operational phase of the Development.
- All spoil from trenches in public roadways will be removed form Site as it is excavated and transported to a licenced facility for soil and stones.

- Temporary stockpile locations will be situated outside of Surface Water Buffer Zones (as seen in **Figure 9.13b)**. Temporary Soil stockpiles shall have side slopes battered back to a safe angle of repose, e.g., 1:1. Silt fencing is to be erected around the base of the temporary mound. Soil will be reinstated on completion of drilling and jointing operations. Temporary storage areas will require bunding and management of runoff likely contaminated with suspended solids (**Appendix 9.5 – Tile 8**).
- All unused spoil from trenches in public roadways will be removed from Site as it is excavated and transported to a licenced facility for soil and stones.
- Earthworks will be limited to meteorologically dry periods and will not occur during sustained or intense rainfall events. Similar to measures outlined in relation ground stability during excavation works (**Chapter 8: Soils and Geology**). An emergency response system has been developed for the construction phase of the project (see **Management Plan 1** appended to the CEMP, **Appendix 2.1**), particularly during the early excavation phase. This, at a minimum, will involve 24 hour advance meteorological forecasting (Met Éireann download) linked to a trigger-response system. When a pre-determined rainfall trigger level is exceeded (e.g., 1 in 100 year storm event or very heavy rainfall at >25mm in 24 hours), planned responses will be undertaken. These responses will include cessation of construction until the storm event including storm runoff surge has passed over. Following heavy rainfall events, and before construction works recommence, the site will be inspected and corrective measures implemented to ensure safe working conditions, for example dewatering of standing water in open excavations and transfer to treatment train.

3.4.2.3 Release and Transport of Suspended Solids Proposed Mitigation Measures

Conceptual and information graphics associated with mitigating runoff quality are presented in **Appendix 9.5 – Tiles 8 - 9.**

In order to mitigate the impact posed by release of suspended solids to the surface water environment, the following mitigation measures will be implemented. The drainage, attenuation and other surface water runoff management systems will be installed concurrent with the main construction activities to control increased runoff and associated suspended solids loads in runoff during intensive construction activities e.g., excavation of turbine base. Vehicular movements will be restricted to the footprint of the Development and advancing ahead of any constructed hardstand will be minimised in so far as practical. For example, excavation ahead of established hardstands will be in line with expected phases of Turbine Hardstand and Site Access Road construction in terms of both delivery of and installation

of material and site activity periods whereby excavations will not be opened ahead of site shut down periods. This will be done with a view to minimising soils / subsoils exposure to rain and runoff. Drainage infrastructure will be installed during meteorologically dry ground conditions.

Diffuse surface water runoff will be managed as follows:

- Collector drains and/or soil berms **Appendix 9.5 – Tile 7,** will be established to direct/divert surface water runoff from development areas, including temporary stockpiles, and direct same into established treatment trains including stilling ponds **Appendix 9.5 – Tiles 8 - 9**, buffered discharge points **Appendix 9.5 – Tiles 8 – 9,** or other surface water runoff control infrastructure as appropriate. This is particularly important for effective surface water management associated with proposed infrastructure within the 50m surface water buffer zones.
- Silt fences will be established along the perimeter of source areas e.g., stockpiles, within the drainage network, and in existing natural drains which are likely to receive surface water runoff, **Appendix 9.5 – Tiles 12 & 13.** This will reduce the potential for surface water runoff loaded with suspended solids to rapidly infiltrate towards and be intercepted by drainage or significant surface water features. Where possible multiple silt fences will be installed at multiple locations in drains / treatment trains discharging to the surface water network. multiple silt fences / screens will be deployed at drains/outfalls discharging to surface waters. Silt fences will be temporary features but will remain in place for a period following the completion of the Construction Phase until such time that site conditions are stable.

Waters arising as a product of excavation activities will be managed as follows:

- Waters arising from dewatering practices during excavation works will be significantly loaded with suspended solids. As such, constructed stilling ponds **Appendix 9.5 – Tiles 8 – 9,** followed by buffered outfalls, **Appendix 9.5 – Tiles 8 – 9,** may be insufficient in controlling the release of suspended solids to the surface water network. Routine monitoring will prevent the possibility of clogging from significant volumes of settled or attenuated solids. Therefore, any water pumped from excavations, or any waters clearly heavily laden with suspended solids will be contained and managed and pumped through the preestablished Active Management treatment train (**Appendix 9.5 – Tile 8 and 9).** This will include continuous active monitoring of water quality by turbidity measurement on an hourly basis.

Waters (likely loaded with suspended solids) intercepted by the established drainage network will be managed as follows:

- In line Stilling Ponds **Appendix 9.5 – Tiles 8 – 9, Tile - 16,** will buffer the run-off discharging from the drainage system during construction, by retaining water, thus reducing the hydraulic loading to watercourses. Stilling ponds are designed to reduce flow velocity to 0.3m/s at which velocity, silt particle settlement occurs. Stilling ponds will be permanent (life of development at minimum). The locations of stilling pond have not been chosen as a part of the drainage design at this time**.** Flow control devices such as weirs and baffles will facilitate achieving better attenuation, particularly when considering fluctuating runoff rates.
- In line Check Dams will be constructed across drains (**Appendix 9.5 - Tiles 3 – 6)**. Check dams will reduce the velocity of run-off in turn facilitating the settlement of solids upstream of the dam. Check dams will also reduce the potential for erosion of drains. Rock filter bunds may be used for check dams however, wood or straw/hay bales (**Appendix 9.5 – Tile 14**) can also be used if properly anchored, that is; supported with rock or fitted timber to reduce potential for material to be swept away by incoming water. Multiple check dams will be installed, particularly in areas immediately downgradient of construction areas. Check dams will only be constructed in drainage infrastructure and not in significant surface water features i.e., streams or rivers. Check dams (comprised of rock) established will be permanent. The following will be implemented in the design of check dams and their deployment (CIRA, 2004):
- Permanent rock filter bunds (coarse aggregate) will be used for check dams however, temporary wood or straw/hay bales can also be used if properly anchored and if the need arises. Permanent rock filter bunds are preferred as this will ensure that rapid surface water runoff is mitigated against for the life of the Development.
- Check dams will be installed at c. 20m intervals within the length of drainage channels. This is dependent on the slope angle and height of check dams constructed, refer to **Appendix 9.5 – Tile no. 3**.
- Check dams will include a small orifice / pipe at the base to allow the flow of water during low flow conditions i.e., maintain hydrological regime during low flow conditions. Note: the use of coarse aggregate will facilitate some infiltration.
- Erosion protection will be established on the downstream side of the check dam i.e., cobbles or boulder (100-150 mm diameter) extending at least 1.2m (**Appendix 9.5 – Tile no. 3 and 4)**.
- Check dams will be constructed as part of the drain i.e., reduce the potential for bypassing between the drain wall and check dam.

- Further details and design considerations are presented in **Appendix 9.5 – Tile no. 3 to 6.**
- Surface water runoff will be discharged to land via buffered drainage outfalls (refer to **Appendix 9.5 - Tiles 7 -8 and 15**. Buffered drainage outfalls will contain hard core material of similar or identical geology to the bedrock at the site to entrap suspended sediment. In addition, these outfalls promote sediment percolation through vegetation in the buffer zone, removing sediment loading to acceptable levels any adjacent watercourses and avoiding direct discharge to the watercourse. A relatively high number of discharge points / buffered outfalls will be established as part of the design, thus decreasing the loading on any particular outfall. Discharging at regular intervals mimics the natural hydrology by encouraging percolation and by decreasing individual hydraulic loadings from discharge points.
- Buffered drainage outfalls will be located outside of surface water buffer zones **(Appendix 9.5 – Tile 15)**. Similarly, outfalls will not be positioned in areas with extensive existing erosion and exposed soils. Buffered outfalls will be fanned and be comprised of coarse aggregate (cobbles / boulders) (**Appendix 9.5 – Tile 11**). These structures will be akin to rip raps (coastal erosion defences/ outfall erosion defences). Silt fences **Appendix 9.5 – Tiles 12 – 13,** will be established downstream of buffered outfalls with a view to ensuring the effectiveness of the attenuation train, particularly during elevated flow events. Buffered outfalls established will be permanent.
- Very fine solids, or colloidal particles, are very slow to settle out of waters and the finest of particles require near still water and relatively long periods of time to settle, therefore, such particles are unlikely to settle despite the aforementioned measures. To address this, as required, flocculant will be used to promote the settlement of finer solids prior to redistributing to the treatment train and discharging to surface water networks. Flocculant 'gel blocks' are available and can be placed in drainage channels upstream of stilling ponds. Gel blocks are passive systems, self-dosing and self-limiting, however they still require management (by the Contractor's Environmental Manager and supervised by the Developer appointed Ecological Clerk of Works (ECoW)), as per the manufacturer's instructions. Flocculants are made from ionic polymers. Cationic polymers (positive charge) are effective flocculants; however, their positive charge make them toxic to aquatic organisms. Anionic polymers (adverse charge) are also effective flocculants, and are not toxic i.e., environmentally friendly[2]. Therefore, when

[2] USEPA (2013) Stormwater Best Management Practice – Polymer Flocculation (Available at: http://www.siltstop.com/pictures/US_EPA_Polymer_Flocculant_Handout__3-14.pdf)

flocculants are required, the material used must be made from anionic polymer. Gel blocks will be a temporary measure during the construction phase.

- Straw bales (similar to stone check dams) (**Appendix 9.5 - Tile 14**) and silt fences (discussed under diffuse runoff) can also be used within drainage channels for the purposes of attenuating runoff and entrained suspended solids, however these measures should be considered temporary and will be used mainly in managing potential acute contamination incidents (e.g. additional features to control runoff during excavation works) or to facilitate temporary works. Note; the installation of straw bales or silt fences will require checking on a daily basis by the Contractor's Environmental Manager and supervised by the Ecological Clerk of Works (ECoW) to ensure the bypassing does not occur. Coarse stone / boulders could be used in conjunction with these measures to address such issues.

The above measures, buffer zones, constructed drainage, check dams, two-stage stilling ponds design for attenuation, buffered outfalls are referred to as *The Treatment Train*, whereby the runoff will continuously be treated from source (construction area) to receptor (site exit, outfall of attenuation lagoon). Where necessary (>25mg/l suspended solids) the treatment train will be augmented through the use of anionic polymer gel blocks. These measures reduce the suspended sediment and associated nutrient loading to surface water courses and mitigates potential effects to water quality and on plant and animal ecologies downstream of the site.

The precautionary and mitigation measures listed here will avoid, reduce or remedy all potential effects on water quality and will ensure that the sensitive receptors in the catchment of the development do not suffer any deterioration in water quality, either during construction, operation, or decommissioning.

3.4.2.4 Reduction in Site Stability Proposed Mitigation Measures

Mitigation measures for Vehicular Movements are mitigation measures by avoidance and good practices.

3.4.2.5 Release of Hydrocarbons Proposed Mitigation Measures

The following mitigation measures to reduce potential effects from the environmental release of hydrocarbons and other harmful chemicals to the surface waters will be implemented:

- Refuelling of vehicles will be carried out off Site to the greatest practical extent. This refuelling policy will mitigate the potential for effects by avoidance. Due to the remote location nature of the Site, it is unlikely that implementation of this refuelling policy will be practical in all circumstances (e.g., bulldozers, cranes, etc.). In instances where refuelling of vehicles on Site is unavoidable, a designated and controlled refuelling area will be established at the Site. The designated refuelling area will enable low risk refuelling and storage practices to be carried out during the works. The designated refuelling area will contain the following attributes and mitigation measures as a minimum requirement:
- The designated refuelling area will be located a minimum distance of 50m from any surface waters or Site drainage features.
- The designated refuelling area will be bunded to 110% volume capacity of fuels stored at the Site.
- The bunded area will be drained by an oil interceptor that will be controlled by a pent stock valve that will be opened to discharge storm water from the bund.
- Management and maintenance of the oil interceptor and associated drainage will be carried out by a suitably licensed contractor on a regular basis, including Decommissioning following construction.
- Any oil contaminated water will be disposed of at an appropriate Licensed wate disposal site.
- Any minor spillage during this process will be cleaned up immediately.
- Vehicles will not be left unattended whilst refuelling.
- All machinery will be checked regularly for any leaks or signs of wear and tear.
- Containers will be properly secured to prevent unauthorised access and misuse. An effective spillage procedure will be put in place with all staff properly briefed. Any waste will be collected, stored in appropriate containers and disposed of offsite in an appropriate manner.

Notwithstanding the management of refuelling and fuel storage at the designated refuelling area, the potential risk of hydrocarbon spills from plant and equipment or other general chemical spills at other areas of the Site remains. As a precautionary measure, to mitigate against potential spills at other areas of the Site, the following mitigation measures will be implemented:

- Oil absorbent booms and spill kits will be available adjacent to all surface water features associated with the Development. The controls will be positioned downstream of each construction area and at principal surface water drainage features. Oil booms deployed will have sufficient absorbency relative to the potential hazard.
- Spill kits will also be available at construction areas such as at turbine erection locations, the Temporary Construction Compound, On site Substation, spoils storage areas and Mast location etc.
- Spill kits will contain a minimum of oil absorbent pads, oil absorbent booms, oil absorbent granules, and heavy-duty refuse bags for collection and appropriate disposal of contaminated matter.
- Should an accidental spill occur during the construction or operational phase of the Development, such incidents will be addressed immediately, this will include the cessation of works in the area of the spillage until the issue has been resolved.
- Spill kits will be kept in each vehicle at the Site and will be readily available to all operators.
- No materials contaminated or otherwise will be left on the Site.
- Suitable receptacles for hydrocarbon contaminated materials will also be available at the Site.
- A detailed spill response plan (**Management Plan 1 Emergency Response Plan**) has been for the Project.

Implementation of the above mitigation measures will significantly reduce the risk of hydrocarbon contamination being released to the surface water network. Nevertheless, the potential risk cannot be entirely eradicated.

3.4.2.6 General Overview of Works Mitigation Measures

- The timing of grid connection cable laying will be carried out during metrologically dry seasons/periods.
- An Ecological Clerk of Works (ECoW) will be onsite in order to lessen environmental disruption and ensure site integrity is maintained. The Ecological Clerk of Works (ECoW) will also be responsible for routine environmental monitoring and report writing.
- Methodology Statements of works, prepared by the Contractor, will be submitted to the local and relevant authorities associated with the Development.
- Any temporary access structures, put in place to allow machinery access to the area will be arranged in discussion with the Ecological Clerk of Works (ECoW) and the site will be fully restored post grid route connection (GRC) works.

3.4.2.7 Good Practice of Plant Machinery

- Fuels, lubricants and hydraulic fluids for equipment use on Site will be carefully handled to avoid spillage, properly secured and provided with spill containment kits in case of incident to ensure best practice.
- Spill kits, hydrocarbon mats, oil booms etc., will be maintained at areas of works for emergency use and replaced when necessary.

3.4.2.8 Contingency Plan

- The method statements produced by the Contractors(s) will be reviewed by the Ecological Clerk of Works (ECoW) and will be agreed with the appropriate parties, including Leitrim County Council. The developer will employ a project manager to monitor the construction phase of the project and ensure works are being carried out in accordance with the agreed method statements, safety procedures and pollution control measures.
- Emergency contact numbers for the Local Authority Environmental Section, Inland Fisheries Ireland, the Environmental Protection Agency and the National Parks and Wildlife Service will be displayed in a prominent position within the site compound. These agencies will be notified immediately in the event of a pollution incident.

3.4.2.9 Release of Wastewater Sanitation Contaminants

A temporary compound area will be constructed on-site to contain temporary facilities for the construction phase including welfare facilities **Chapter 2, Section 2.6.6**. This will be stabilised with the laying of hardcore material on top.

During the construction phase, foul effluent will be periodically removed by tanker (licenced contractor) for offsite disposal at a licenced wastewater treatment plant.

Wastewater/sewerage from the staff welfare facilities located in the Temporary Construction Compound will be collected and held in a sealed storage holding tank, fitted with a high-level alarm. The high-level alarm is a device installed in the storage tank that is capable of sounding an alarm during a filling operation when the liquid level nears the top of the tank. Chemicals are likely to be used to reduce odours.

All wastewater will be emptied periodically, tankered off-site by a licensed waste collector to the local wastewater sanitation plant in Drumkeeran for treatment. There will be no onsite

treatment of wastewater. A wastewater or sewerage leakage is not anticipated in a properly managed Site.

3.4.2.10 Release of Construction and Cementitious Materials Proposed Mitigation Measures

In order to mitigate the potential impact posed by the use of concrete and the associated effects on surface water in the receiving environment, the following precautions and mitigation measures are recommended:

- A dedicated, bunded area will be created to cater for concrete wash-out and this will be within the temporary construction compound located to the south of T4. This will be for the wash-out of the chutes only after the pour. Concrete trucks will then exit the Site and return to the supply plant to wash out the mixer itself.
- The procurement, transport and use of any cement or concrete will be planned fully in advance of commencing works by the Contractor's Environmental Manager and supervised at all times by the Developer appointed Ecological Clerk of Works (ECoW). This entails minimising quantities on Site, planning delivery routes and washout stations.
- Precast concrete will be used wherever possible i.e., formed offsite. Elements of the Development where the use of precast concrete will be used include structural elements of watercourse crossings (closed culverts) as well as Cable Joint Bays. Elements of the Development where the use of precast concrete is not possible includes turbine foundations and joint bay pit excavations. Where the use of precast concrete is not possible the following mitigation measures will apply.
- Lean mix concrete, often used to provide protection to main foundations of infrastructure from soil biome, can alter the pH of water if introduced, which would then require the treatment of acid before being discharged to the surrounding environment. The use of lean mix concrete will be minimized, limited to the requirement of turbine foundations. The risk of runoff will be minimal, as concrete will be contained in an enclosed, excavated area.
- Vehicles transporting cement or concrete to the Site will pass through a designated wash out station **Appendix 9.5 - Tile 11** and be visually inspected for signs of excess cementitious material prior to being granted access to the Site. The wheel wash facility will be provided near the Site entrance so that the wheels of vehicles entering or exiting the Site can be cleaned prior to entering or exiting the Site. This will prevent the likelihood of cementitious material being accidentally deposited on the site access tracks or elsewhere at the Site or on the public road network.

- Drivers of such vehicles will be instructed to ensure that all vehicles are washed down in a controlled environment prior to the departure of the source site, such as at concrete batching plants.
- Concrete will be poured during metrological dry periods/seasons in so far as practical and reasonably foreseeable. This will reduce the potential for surface water run off being significantly affected by freshly poured concrete. This will require limiting these works to dry meteorological conditions i.e., avoid foreseen sustained rainfall (any foreseen rainfall event longer than 4-hour duration) and/or any foreseen intense rainfall event (25mm in a 24-hour period, yellow on Met Éireann rain forecast maps), and do not proceed during any yellow (or worse) rainfall warning issued by Met Éireann. This also will avoid such conditions while concrete is curing, in so far as practical.
- Pouring of concrete into standing water within excavations will not be undertaken. Excavations will be prepared before pouring of concrete by pumping standing water out of excavations to the treatment train and buffered surface water discharge systems in place.
- Any shuttering installed to contain the concrete during pouring will be installed to a high standard with minimal potential for leaks. Additional measures will be taken to ensure this, for example the use of plastic sheeting or other sealing products at joints.
- No surplus concrete will be stored or deposited anywhere on site. Such material will be returned to the source location or disposed of off-site appropriately. Concrete washing will be contained and managed similarly.
- Raw or uncured waste concrete will be disposed of by removal from the Site and returned to the source location or disposed of appropriately at a suitably licensed facility.
- Designated washout of concrete trucks shall be strictly confined to the batching facility and will not be located within the vicinity of watercourses or drainage channels. Only the chutes will be cleaned prior to departure from Site and this will take place at a designated area at the Temporary Construction Compound. The contents will be allowed to settle and the supernatant will be removed off site by licenced generator to a licenced waste water treatment plant.
- Temporary storage of cement bound sand (if required for construction of the substation building) will be on hardstand areas only where there is no direct drainage to surface waters and where the area has been bunded e.g. using sand-bags and geotextile sheeting or silt fencing to contain any solids in run-off.
- Ground crew will have a spill kit readily available, and any spillages or deposits will be cleaned/removed as soon as possible and disposed of appropriately.

3.4.2.11 Excavation Dewatering Proposed Mitigation Measures - Active Construction Water Management

In all instances where construction water, or runoff has the potential to entrain solids during excavation and other construction activities, runoff will be contained by means of temporary berms (lined geotextile of similar), bunds (lined) and sumps. This will be referred to as Dewatering. Construction water (contaminated) will be pumped to the Treatment Train (**Appendix 9.5 Tiles 7-9).**

Contaminated water arising from construction works, namely, excavations, and temporary stockpiling, will be contained and treated prior to release or discharge. The schematic presented here is a conceptual model of measures implemented to manage arisings and runoff (Letter headings align with **Appendix 9.5 – Tile 8):**

A. Arisings. Arisings from the launch / reception pit, or any other significant excavation (e.g., cable joint bays), will be directed the treatment train.
B. Temporary Bund. Arising control area i.e., a temporary bund. Gross solids will be temporarily deposited here. Water arising with the material will be allowed to drain to sump.
C. Sump / Pump. Sump will discharge by gravity / pumped to stilling pond.
D. Temporary Stilling Pond. This can be constructed using soils for bunding in combination with an impermeable liner.
E. Outfall. The outfall from the stilling pond will be buffered (coarse aggregate) to dissipate energy and diffuse discharging water.
F. Silt Screen. A silt screen will be in place down gradient of the Stilling Pond outfall. This is a precautionary measure to mitigate peak loads or surcharges in the system.
G. Monitoring Location/s. Discharge quality will be monitored in real time using telemetry systems. Monitoring of discharge quality will be carried out at the outfall of the stilling pond i.e., before being actually discharged to surface vegetation or surface water (licenced).
H. Sump / Pump. Discharge By-Pass. If water discharging from the stilling pond exceeds quality reference limits water will be diverted (pumped) from the stilling pond to the settlement / treatment tank.
I. Stilling Pond By-Pass. Similar to Discharge By-Pass, if conditions dictate water can be diverted directly to Settlement / Treatment Tank.
J. Settlement / Treatment Tank. A settlement tank will in line and ready to use if required i.e., water quality at stilling pond outfall fails to meet quality reference limits. The tank

will be equipped with treatment systems which will be activated as the need arises, for example, very fine particles which are very slow to settle can be treated with a flocculant agent to promote settlement of particles.

K. GAC Vessel/s. As a precautionary measure, GAC (Granulated Activated Carbon) vessel/s will be in line and ready to use if required. GAC vessels are used to filter out low concentrations of hydrocarbons. Significant hydrocarbon contamination is only envisaged under accidental circumstances. If a hydrocarbon spill does occur, normal operations will pause, and the treatment train will be utilised to remediate captured contaminated runoff.

L. GAC Vessel By-Pass. If the quality of the water is acceptable in terms of hydrocarbon contamination.

M. Treated water will be discharge by gravity / pump to the stilling pond for additional clarification, monitoring and buffered discharge to vegetated area.

N. Silt Bag. A silt bag can be used as alternative to stilling ponds. However, silt bags must only be used as primary method in lower risk areas i.e., outside of buffer zones, etc. Stilling ponds will be the primary method (D, N) is circumstances where risk is elevated, however a gate vale and silt bag can be included in the treatment train and used as an emergency discharge route in the event that the stilling pond needs remediation or maintenance.

In all instances, stilling ponds (D), Silt Bags (N) and outfalls (E) will be situated outside of surface water buffer zones. At many locations, works will be within buffer zones. In these instances, waters can be pumped to the treatment train which can be positioned upgradient along the road (Grid Connection route) where discharge to vegetated areas / roadside drains can be managed.

Discharge of non-contaminated storm runoff to vegetated land within the Redline Boundary is not a licenced activity however this methodology is possible only under relatively low flow conditions (e.g., <2 litres per second (l/sec) typical of runoff over a relatively small site area. In the event that the expected incoming flow rate or dewatering rate is relatively high (>2 l/sec) a discharge licence will be acquired.

The discharge points will be identified during the licence application process. As discussed previously, the main components of the treatment will be positioned outside of the 50m surface water buffer zone where possible (**Figure 9.13a Figure 9.13b**). The Developer will identify suitable locations for the establishment of temporary infrastructure considering other variable such as traffic and access management. Similarly, the location of discharge points

will be outside of buffer zones and into minor or non-mapped surface water / drainage features where possible. The subject drain will be inspected to ensure connection to the mapped network (not blocked).

The quality of the water being discharged will be monitored. If discharge water quality is poor (e.g., >25mg/l) additional measures will be implemented, for example, pausing works as required and treating construction water by dosing with coagulant to enhance the settlement of finer solids – this can be done in a controlled manner by means of a suitably equipped settlement tank, **Appendix 9.5 Tiles 8-9**). Collected and treated construction water will be discharged by gravity / pump to a vegetated area of ground within the Site, **Appendix 9.5 Tiles 8-9**). Silt fences will be established at the discharge area to ensure potential residual suspended solids are attenuated and the potential for erosion is reduced, **Appendix 9.5 Tiles 8-9**). The discharge area will be outside of 50m surface water buffer areas (similar to dewatering of excavations. The quality of water discharged will be in line with licence discharge limits assigned by the Council and will be monitored in real time (telemetry with 15 min sampling rate), as well as laboratory samples taken, analysed and reported and the frequency indicated in the licence. Daily sampling is recommended given the short duration and temporary nature of the works.

Discharging of construction water (trade effluent) directly to surface waters or groundwater is a licenced activity. (This is in accordance with Local Government (Water Pollution) Act, 1977 as amended).

3.4.2.12 Excavation Dewatering Proposed Mitigation Measures - Passive Construction Water Management

Passive management systems (**Appendix 9.5 – Tile 8**) include some of the features described in active management treatment trains. These include;

- Spoil bunds and/or temporary berms. Spoil bunds and/or berms will be constructed using either crushed rock or clean soils and overlain or lined with an impermeable layer e.g., geotextile or plastic membrane. These features are intended to control the movement of construction water / runoff with a view to;
    - Containing contaminated water (e.g., excavation spoil and runoff laden with solids). Temporary bunds will be used to manage spoil arising from drilling operations or saturated spoil arising from excavations in sensitive areas e.g., within SW buffer zones.

- To divert runoff i.e., divert clean/storm runoff during construction works or contaminated construction water away from sensitive receptors such as drains/surface waters directly adjacent to construction areas.

- Silt screens, (**Appendix 9.5 -Tile 12 & 13**). These will be utilised in a similar sense to berms whereby, silt screens will be installed between construction areas and sensitive receptors, including:
  - At the outfall of the treatment train where discharging to vegetated ground or within non-mapped drains (within the Site boundary).
  - Along the perimeter of construction areas which are directly adjacent to watercourses or within surface water buffer zones. This includes all watercourse crossings and sections of Grid Connection Route alongside adjacent watercourses.

Passive systems are intended to function with minimal supervision, however in the management of construction water on this Site, in many cases the diverted water will likely require active management to ensure sensitive receptors are protected. For example, diverted storm-water, if clean can discharge to the receiving vegetated areas or existing drains, but any construction waters impacted by contaminants on the Site must be managed, and potentially active management / treatment is required.

3.4.2.13 Watercourse Crossings Proposed Mitigation Measures

The following mitigation is proposed and is in line with IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters, in particular Section 6 – River and Stream Permanent Crossing Structures.

During the construction phase the appointed Contractor(s) shall ensure that:

- No works will take place within the 50m buffer zone of watercourses except for the bottomless bridge culvert, road development and drainage measures as detailed.
- Site compounds and temporary excavation areas will be located at a minimum distance of 50m from any watercourse. All drainage from these facilities will be directed through a settlement pond with appropriate capacity and measures to provide spill containment.
- All site drainage, as described in the **Management Plan 3: Surface Water Management Plan** and shown on associated drawings, will be directed through either sediment traps, settlement ponds and / or buffered drainage outfalls to ensure that total suspended solid levels in all waters discharging to any watercourse will not exceed 25mg/l (IFI, 2016). All construction site run-off will be channelled through a stilling

process to allow suspended solids to settle out and through a spill-containment facility prior to discharge.

- In areas of the site where works will take place (example hardstands) the area will be required to be isolated from intercepting drains and drains diverted alternative route while maintaining the same hydrological flow/levels (example ensuring no pinch points).
- Daily monitoring of all sediment traps and settlement ponds will be undertaken by the Environmental Clerk of Works to ensure satisfactory operation and/or maintenance requirements.
- The design minimises the potential for localised bank and bed erosion, refer to drainage **Planning Drawings 5969-PL-301 to 5969-PL-304**.

In regard to the Grid Connection Route:

There are watercourse crossings proposed for the Grid Connection Route.

(*** Note:** Likely to be additional minor culverts).

- Flood Risk Identification some portions of the Grid Connection Route are within a mapped probable flood zone. To mitigate against any potential for onsite flood risk and consequences, it will be a strict requirement to carry out works at this location during seasonally dry conditions. Exposed soils and fill materials will be reinstated and/or will have erosion control installed as part of the design and sufficient time as to be in place prior to the next seasonally wet period. This will minimise the potential for flood events to impact on the construction works, plant machinery or operators etc, and will minimise the potential for entrainment of soils or other materials in high water flow during potential flood events.

There remains the potential for the actual construction of such crossings to have significant adverse effects on the receiving watercourse/s through general construction activities the release of suspended solids and hydrocarbons for example. Relevant guidance documents have been consulted and applicable mitigation measures have been incorporated into the design of the proposed bridges and construction methodology of same. These will be adhered to with a view to mitigating and reducing any potential impact on the receiving watercourse.

3.4.2.14 Instream Works Proposed Mitigation Measures

Infrastructure such as culverts over natural or artificial drainage channels and non-mapped rivers may require instream works. Where culverts are required and the subsequent in-stream works are necessary, the following will be implemented:

- Contracted operators will draft method statements and risk assessments in line with mitigation outlined in this report and in consultation with relevant guidance prior to commencing works (as part of the watercourse crossing consent application).
- The construction area will be isolated, this means; the water feature (streams / drains) will be temporarily dammed upstream of the watercourse crossing and flow will be diverted by means of a flume / pipe by gravity or pumped (this is referred to as over pumping, **Appendix 9.5 – Tile 1**) downstream of the watercourse crossing and construction area. Following the successful upstream damming, a downstream dam or barrier will also be established. The downstream barrier will ensure contaminated runoff in the isolated work area can be contained and managed and will block surface water back flow in lower lying or flatter areas. **Appendix 9.5 – Tile 1** presents a conceptual plan view of an isolated construction area within a surface water feature. Over pumping of a surface water feature is considered diversion of water runoff only and therefore considered similar to discharge of storm water runoff only to sewer (exempt from licensing), however it is imperative that controls are in place to ensure environmental effects are minimised, particularly in relation to ecological sensitivities.
- In order to ensure isolation and over pumping is carried out effectively, the methodology must ensure that dams are secure / sufficiently supported, and that pumping of water can continue uninterrupted and that pumps are capable of keeping up with the discharge rate of the surface water feature. Pumping systems will require backup and fail-safe protocols e.g., backup pumps and generator. At significant surface water features e.g., non-mapped streams, isolation and diversion of drainage will be implemented.
- Provided the construction water within the isolation area is managed effectively, over pumping of the surface water feature does not pose a significant risk to surface water quality downstream of the watercourse crossing.
- Water ingress into the construction area will be managed and collected by established sumps immediately downstream of the works (upstream of the downstream barrier) (**Appendix 9.5 – Tile no. 1**). Runoff within the construction area will likely be heavily laden with suspended solids. Where required, dewatering (pumping out or extracting) of such waters will be discharged to an inline settlement tank **Appendix 9.5 – Tile no. 1**, or preestablished stilling pond **Appendix 9.5 – Tile no. 1** to remove suspended

solids before being discharged (**Appendix 9.5 Tiles 8 and 9**). The quality of the water being discharged will be monitored. If discharge water quality is poor (e.g. >25mg/l) additional measures will be implemented, for example treating construction water by dosing with coagulant to enhance the settlement of finer solids – this can be done in a controlled manner by means of a suitably equipped settlement tank. Collected and treated construction water will be discharged by gravity / pump to a vegetated area of ground within the Site (an example is provided in **Appendix 9.5 – Tile 11**). Silt fences (**Appendix 9.5 – Tile 12 & 13**), will be established at the discharge area to ensure potential residual suspended solids are attenuated and the potential for erosion is reduced. The discharge area will be outside of the surface water buffer areas (similar to dewatering of excavations).

- Discharging of construction water (trade effluent) directly to surface waters is a licenced activity. No extracted or pumped or treated construction water from the isolated construction area will be discharged directly to the surface water network associated with the Site (This is in accordance with Local Government (Water Pollution) Act, 1977 as amended). It is noted that all runoff on the site will eventually discharge to the receiving surface water network, however with appropriate management the quality of runoff discharging to the surface water network will be acceptable e.g. <25 mg/l Suspended Solids.
- Works in relation to in stream works will be carried out during periods of sustained dry meteorological conditions and will not commence if sustained wet conditions or if wet conditions are forecast.
- Works in relation to watercourse crossings will be planned and carried out as efficiently as possible. This means work plans are agreed fully and all equipment and materials are prepared fully before in stream works commence. Works will be completed as quickly as possible and will not pause for the duration of the in stream works e.g., Installation of culverts (24 hour as necessary), with the exception of circumstances related to meteorological and/or health and safety conditions.
- Only precast concrete will be used for in stream works.
- Precautions will be made to mitigate the potential risk of a hydrocarbon spill. Further to measures outlined in, settlement tanks (will be adequately equipped with hydrocarbon removal functionality on standby, for example hydrocarbon absorbent booms, oil skimmers, and GAC (granulated activated carbon) filters, should they become necessary **(Appendix 9.5 – Tile 10 &11).**

3.4.2.15 Groundwater Contamination Proposed Mitigation Measures

In order to mitigate against potential groundwater contamination by hydrocarbons, implementation of the following mitigation measures is recommended:

- In the first instance, no fuel storage should occur at the Site whenever feasible and refuelling of plant and equipment should occur off Site at a controlled fuelling station.
- In instances where on Site refuelling is unavoidable, then the bunded on Site designated refuelling area must be used. The designated refuelling area must be bunded to 110% volume capacity of fuels stored at the Site.
- The bunded area will be drained by an oil interceptor that will be controlled by a pent stock valve that will be opened to discharge storm water from the bund.
- Management and maintenance of the oil interceptor and associated drainage will be carried out by a suitably licensed contractor on a regular basis.
- Any oil contaminated water will be disposed of at an appropriate oil recovery plant.
- Any minor spillage during this process will be cleaned up immediately.
- Vehicles will not be left unattended whilst refuelling.
- For large machinery such as cranes, a drip tray will be used and spill kits will be on hand.

The following mitigation measures are recommended in relation to non-hydrocarbon potential contamination of groundwater:

- All other liquid-based chemicals such as paints, thinners, primers and cleaning products etc. will be stored in locked and labelled bunded chemical storage units.
- Sanitation facilities used during the construction phase will be self-contained and supplied with water by tank trucks. These facilities will not interact with the existing hydrological environment in any way and they will be maintained and serviced throughout the construction phase.
- The controlled attenuation of suspended solids in settlement ponds and check dams etc. will result in inorganic nutrients (if present in elevated concentrations) such as phosphorus and nitrogen being absorbed and retained by the solids in the water column. This will allow for a reduction of peak inorganic discharges in a controlled and stable run off rate. It is noted that the presence of elevated contaminants were detected during the four surface water quality monitoring rounds.
- It is considered that there is a low risk of mobilising trace metals that may naturally be present in low concentrations in the baseline environment. The potential for mobilising trace metals is most likely to result from enhanced water percolation associated with excavated bedrock substrate. To mitigate against this potential impact, water quality

should be monitored for trace metal concentrations prior to, during and after the construction phase.

- The potential for livestock such as cattle and sheep which have been observed grazing in the vicinity of the Site to cause bacteriological contamination of groundwater will be controlled through the implementation of strict grazing control zones, Site perimeter fencing and exclusion zones around all open excavations.

3.4.2.16 Monitoring

3.4.2.16.1 Monitoring - Wind Farm Site

To ensure effective implementation of mitigation measures, environmental auditing, and monitoring of environmental obligations of the Developer, an Ecological Clerk of Works (ECoW) will be assigned by the Developer to carry out monitoring at the Site during the construction and operational phases of the Development. The role of the Ecological Clerk of Works (ECoW) will be to actively and continuously monitor site conditions and advise on environmental issues and monitoring compliance, and will not be responsible for implementing measures, the due duty of implementing measures will be held by the Developer / contracted construction operator.

The Ecological Clerk of Works (ECoW) will have the authority to temporarily stop works in a particular area of the site to ensure corrective measures are implemented and adverse environmental effects are minimised if not avoided. The following wind farm Site monitoring recommendations will be undertaken by the ECoW assigned by the Developer to mitigate against potential effects on the surface water and groundwater receiving environment:

- Monitoring site pollution prevention plan.
- Water quality monitoring.
- Advising on required pollution prevention measures (as described in this EIAR) and monitoring their effectiveness.
- Liaison with local authorities in relation to pollution instances if applicable.
- Considering the Ecological Clerk of Works (ECoW) will be responsible for monitoring a broad range of environmental factors at the Site, technical monitoring and advice will be sought such as from specialist consultants as the need arises e.g., installation and website for telemetry.

The following measures will be implemented for Site monitoring in relation to the hydrological and hydrogeological effects:

- The baseline monitoring undertaken at the Site as part of this study will be repeated periodically before, during and after the construction phase of the Development to monitor any deviations from baseline water quality that occur at the Site. This monitoring along with the detailed monitoring outlined below will ensure that the mitigation measures that are in place to protect water quality are working. Specifically, a construction period and post construction monitoring programme for the Site will include the following:
- During the construction phase, daily inspection of silt traps, buffered outfalls and drainage channels and daily measurement of total suspended solids, electrical conductivity, and pH at selected water monitoring locations on the Site (**Figure 9.6**) (locations close to active working zones). Monitoring of same during times when excavations are being dewatered (likely high in solids) will be done in real time. In this regard, physiochemical properties will be monitored in real time by means of alarmed telemetry e.g., telemetric monitoring at baseline sampling locations and alarm thresholds established in line with water quality reference concentrations/limits which will be set using relevant instruments for example, Surface Water Quality Regulations, <25mg/l Total Suspended Solids (TSS).
- Continuous Monitoring will be carried out as part of Active Management of construction water management and treatment. These monitoring systems will travel with the active construction areas / remain with the Active Management infrastructure. The purpose of this is to recycle water if quality is unfavourable and adjust the dewatering and treatment train accordingly until discharge quality is observed to be acceptable. A small degree of tolerance above reference concentrations is acceptable at this location but only if the discharge from the Active Management train discharges to another Passive Management system or to a non-sensitive vegetated area. If discharging within sensitive areas or buffer zones, the quality of discharge from the Active Management train will be in line with prescribed reference limits (e.g., 25mg/l TSS)
- Continuous Monitoring at downstream Baseline SW Monitoring Locations (**Figure 9.6)** will be carried out using telemetry during the construction phase. Triggering of the threshold at these locations will trigger emergency response and escalation of measures including immediate full site inspection to ascertain to the potential unknown source (bearing in mind that the quality of managed runoff at the site will be known by means of live telemetry and handheld meters). Continuous monitoring at Baseline SW Monitoring Locations will continue into the operational phase until stable conditions are observed e.g., stable conditions in line with baseline conditions for 6 months.

- Post construction: inspection of silt traps, buffered outfalls and drainage channels, measurement of total suspended solids, electrical conductivity and pH at selected water monitoring locations at the Site will be carried out at a reasonable frequency (weekly initially gradually reduced based on observed stability of conditions), and will also be scheduled following extreme metrological events. During the operational phase of the project the stilling ponds and buffered outfalls will be periodically inspected e.g., weekly during maintenance visits to the Site initially and gradually reduced based on observed stability of conditions.
- During the construction phase of the project, the Development areas will be monitored daily for evidence of groundwater seepage, water ponding and wetting of previously dry spots, and visual monitoring of the effectiveness of the constructed drainage and attenuation system so that it does not become blocked, eroded or damaged during the construction process. This monitoring will continue at a reasonable frequency (weekly initially gradually reduced based on observed stability of conditions) during the operational phase of the Development, however it is envisaged that any potential issues in this regard will be identified and rectified during the construction phase.
- A programme of water quality monitoring outlining the selected parameters and monitoring frequency should be agreed with Inland Fisheries Ireland and Leitrim County Council prior to the commencement of construction. During the construction phase of the project, the Development areas and adjacent receiving drainage systems will be monitored daily for evidence of erosion and other adverse effects to natural drainage channels and existing degraded areas whereby soils/subsoils are exposed and prone to enhanced degradation. This monitoring will continue at a reasonable frequency during the operational phase of the Development, however it is envisaged that any potential issues in this regard will be identified and rectified during the construction phase.
- During both the construction and operational phases of the Project, the watercourse crossing within the Site will be monitored frequently (daily during construction and intermittently during operational phase i.e., weekly / monthly inspections initially and reduced gradually in line with observed stability and confidence in longer term data obtained. The water course crossings will be monitored in terms of structural integrity and in terms of their impact on respective watercourses.
- A detailed inspection and monitoring regime includes an environmental risk register e.g. constraints linked to the development construction schedule, routine reporting on the performance and effectiveness of drainage and attenuation infrastructure, and any actions taken to rectify or enhance the system.

- Site water runoff quality at all surface water monitoring locations will be monitored on a continuous basis during the construction phase of the Development. Monitoring will continue into the operational phase until such time that the Site and water quality have stabilised (stable conditions in line with baseline conditions for e.g. 8 consecutive quarterly monitoring events). This monitoring will be carried out at the downstream surface water baseline sampling locations (**Figure 9.6a**)
- A handheld turbidity meter will be available and used to accurately measure the quality of water discharging from the site at any particular location. The meter will be maintained and calibrated frequently (per the particular unit's calibration requirements / user manual), and will also be used to check and calibrate remote sensors if they are employed. Quality thresholds have been established for the purposes of escalating water quality issues as they arise.
- Rainfall will be monitored (1 no. rainfall gauge required). This unit will be connected with and displayed with other site water quality telemetry data via the telemetry website.
- Surface water runoff control infrastructure will be checked and maintained on an ongoing basis, and stilling ponds and check dams will be maintained (de-sludge / settle solids removed) on an ongoing basis, particularly during the construction phase of the Development. It is important to minimise the agitation of solids during these works, otherwise it will likely lead to an acute significant loading of suspended solids in the drainage network. This can be achieved by temporarily reducing or blocking inkling flow and vacuum extracting settled solids or *sludge*. Where the drainage feature posses relatively significant flow rates, isolating and over pumping is the best course of action.
- As part of the CEMP, regular checking and maintenance of pollution control measures are required (in line with frequencies outlined above), with an immediate plan for repair or backup if any breaches of design occur. In the event that established infrastructure and measures are failing to reduce suspended solids to an acceptable level, construction works will cease until remediation or upgrading works are completed.
- All details in relation to monitoring will be included in the Surface Water Management Plan (SWMP) (**Management Plan 3, Appendix 2.1**).

Routine Surface Water Monitoring

Similar to Wind Farm Site baseline monitoring, baseline surface water samples will be obtained at upstream and downstream sampling locations at each significant construction location over mapped rivers. Baseline surface water samples will be obtained at accessible locations such as existing bridges on public roads. Where upstream access is poor, the

upstream baseline sampling location will be directly/immediately upstream of the construction location (e.g., existing bridge / culvert). Sample locations, monitoring frequency and precise hydrochemistry parameters will be agreed in writing with Leitrim County Council, prior to commencement of construction, and following consultation with Inland Fisheries Ireland **(Water Quality Management Plan 3).**

Continuous Monitoring of Active Construction Water Management and Discharge

As a minimum, the monitoring programme will include:

- At least one baseline monitoring visit.
- Daily visual observation in areas of high construction activity or during high rainfall periods to identify any evidence of siltation, oil or silt. Visual inspections will include details of the colour of the water at the time of inspection.
- Weekly visual inspections and monthly field hydrochemistry monitoring.
- One round of post construction monitoring, to be agreed with Leitrim County Council. Post construction will be defined as when the reinstatement phase is completed.
- Monthly analysis of water parameters will be carried out. Construction-stage analytical determinants (including limits of detection and frequency of analysis) will be specified and agreed with the Local Authority and third parties for each sample location. The agreed suite of grab sample determinants will include the following:

Parameters for hydrochemistry analysis

- pH
- Temperature
- Total Suspended Solids (TSS)
- Dissolved Organic Carbon (DOC)
- Conductivity
- Dissolved Oxygen (DO)
- Total Oxidized Nitrogen (TON)
- Ammoniacal Nitrogen
- Ammonia
- Potassium
- Phosphate
- Biological Oxygen Demand (BOD)
- Chemical Oxygen Demand (COD)

- Total Petroleum Hydrocarbons (TPH)*

In line with monitoring objectives in relation to surface water quality, parameter value thresholds or limits when exceeded, the relevant assigned persons of trend anomalies which require investigation, escalation, and corrective mitigation, for example;

- A threshold of 25mg/l Total Suspended Solids (TSS) will be applied at treatment train outfalls/discharge points, in line with legislative reference limits for surface water quality. Exceedance of such threshold will trigger further investigation and escalation of responses on site with a view to identifying potential uncontrolled sources of contaminants. Parameter trend analysis will also inform investigations and response, for example, intermittent spikes in concentrations in line with baseline conditions versus continuously elevated concentrations caused by an ongoing environmental incident.

Active Monitoring on Site

Handheld meters (Turbidity / Total Suspended Solids (TSS)) will used by the ECoW / competent operators during construction works. This will be done with a view to managing water treatment and anticipating potential surcharges in water or TSS loading within the treatment train. Handheld meters will also be used to monitor outfall/discharge quality in the event telemetry systems fail or during system maintenance. Handheld probes will be checked and calibrated regularly.

Monitoring Under Licence

Where a discharge licence is required, the conditions of the licence will stipulate monitoring requirements in line with licence parameters with associated emission limit values. The frequency of sampling will likely be daily or weekly. Sampling will include obtaining physical samples at an agreed discharge sampling point and will be sent an accredited laboratory for analysis. Where discharge licence is required, monitoring in line with the licence will be done in addition to the other monitoring regimes undertaken as described in sections above. Monitoring under licence conditions will not negate the requirement for the other regimes described.

3.4.2.16.2 Tailoring of Monitoring Requirements

Monitoring will be tailored at each location in terms of requirements set out in trade effluent discharge licence/s where relevant.

* Only during construction phase

- The baseline monitoring undertaken at the Site as part of this study will be repeated periodically before, during and after the construction phase of the Development to monitor any deviations from baseline hydrochemistry that occur at the Site. This monitoring along with the detailed monitoring outlined below will help to ensure that the mitigation measures that are in place to protect water quality are working. Specifically, a construction period and post construction monitoring programme for the Development site should include the following.
- During the construction phase; daily inspection of silt traps, buffered outfalls and drainage channels and daily measurement of total suspended solids, electrical conductivity, and pH at selected water monitoring locations on the site. Monitoring of same during times when excavations are being dewatered (likely high in solids) should be done in real time.
- Post construction: at a reasonable frequency inspection of silt traps, buffered outfalls and drainage channels, measurement of total suspended solids, electrical conductivity, and pH at selected water monitoring locations at the site. During the operational phase of the project the stilling ponds and buffered outfalls will be periodically inspected during maintenance visits to the site.
- During the construction phase of the project, the development areas should be monitored daily for evidence of groundwater seepage, water ponding and wetting of previously dry spots, and visual monitoring of the effectiveness of the constructed drainage and attenuation system so that it does not become blocked, eroded or damaged during the construction process.
- During both the construction and operational phases of the project, watercourse crossings should be monitored frequently (daily during construction and intermittently during operational phase). The water course crossings should be monitored in terms of structural integrity and in terms of their impact on respective watercourses.

3.4.2.17 Clear Fell of Forestry

No new impacts or remediation measures are associated with forestry activities. More details on clear felling at the Site is outlined in the **Forestry Report (Appendix 2.4).** However, good practices working in specific environments such as forested areas will be adhered to including working outside of surface water or other buffer zones, and risk assessing on a case-by-case basis in terms of drainage intercepting run off, ecological sensitivities, etc.

Further mitigation measures in regard to the management of forestry operations include;

- Phased felling approach,

- Minimising erosion by use existing tracks and use of brash for off track areas,
- Follow all relevant forestry guidance and policies, including;
    - Forest Protection Guidelines (2002)
    - Forestry and Water Quality Guidelines (2000)
    - Forest Harvesting and Environmental Guidelines (2000)
    - Forestry and Freshwater Pearl Mussel Requirements - Site Assessment and Mitigation Measures (2018)
    - Forest Biodiversity Guidelines (2000)
    - Forestry and The Landscape Guidelines (2000)
    - Forestry and Archaeology Guidelines (2000)
- The permanent felling of 2ha of forestry is subject to replacement obligations. All felling in State requires a licence.
- Harvest site plans including extraction routes, fuelling areas, stacking areas, turning areas and drain crossings etc. and Hazard Identification and Risk Assessment will be designed and implemented during all harvesting operations.
- All drains, either mound drains, culverts, water crossings crossed during extraction, if necessary, will be cleared of any debris to ensure no drainage issues will occur for the remaining trees, which can be a major attributor to windblow.
- Felling and extraction of timber will, are to be undertaken in dry weather conditions.
- Harvesting operations are scheduled according to the nature of the soil with sites being categorised into winter and summer sites depending on ground conditions. Also, best practice is to suspend mechanised harvesting operations during and immediately after periods of particularly heavy rainfall.
- Waterways are particularly vulnerable to the effects of harvesting as silt from the movement of machinery can enter streams and rivers causing blockage of gravels which affects insect and fish life. Also, nutrients released from decaying branches, particularly from large clear felled sites, can cause enrichment of the waters which in turn causes pollution. To counteract these effects careful planning is required in carrying out harvesting operations. Some of the measures taken to avoid impacts include:
    - Limiting the size of the areas to be felled which reduces the amount of nutrients and silt released.
    - Minimising the crossing of drains and streams, but where necessary installing temporary structures (log bridges, pipes etc) to avoid machines entering the water;

- Establishing buffer zones around waterways from which machines are excluded.

3.4.2.18 Emergency Response

Emergency response procedures to potential contamination incidents have been prepared as part of the Emergency Response Plan (**Management Plan 1** of **Appendix 2.1**) will be implemented at the Site prior to the commencement of the construction phase. The following is a non-exhaustive list of potential emergency scenarios where corrective action may be required, and proposed corrective mitigation measures are included:

- Potential issue; Elevated concentrations of suspended solids in runoff during excavation activities during an unforeseen or low probability storm event, for example a 1 in 100-year event. Proposed measure; Cover exposed stockpiles in plastic sheeting and placement of straw bales and silt fences in associated drainage channels.
- Potential issue; Failure or degradation of stone check dam during a storm event with associated elevated runoff volumes. Proposed measure; Introduction of straw bales and silt fences in order to regain attenuation capacity of the drainage channel until the maintenance can be completed.
- Potential issue; Localised peat stability issue leading to deposit of peat within an active drainage channel. Proposed measure; Introduction of straw bales and silt fences directly downstream, of the area in order to attenuate gross solids isolate the area and over pump until remedial works and maintenance can be completed, divert all runoff from the area to Active Management area of the treatment train (**Appendix 9.5 – Tile no. 8 to 9**).
- Potential issue; Management of unexpected runoff patterns leading to excessive drying or wetting in a particular area, potentially leading to enhanced erosion. Proposed measure; This type of issue will require assessment on a case by case basis. Solutions might include; decommission, modification, introduction or relocation of buffered outfall, or diversion of runoff volumes to or away from the area. In regard to the potential for erosion and similar physical processes, any such issues will become apparent through monitoring relatively rapidly, whereas effects to ecological sensitivities will become apparent relatively slowly in comparison. It is noted that much of the Site is impacted as part of baseline in this regard e.g. existing artificial drainage networks.

Prior to commencement of construction, the ECoW will prepare a register of corrective action and emergency response sub-contractors that can be called upon in the event of an environmental incident, and/or to give training on escalating incident where useful, including

e.g. specialist hydrocarbon spill response, specialist hydrological and/or water quality response.

Mitigations measures as outlined in the previous sections will reduce the potential for contamination of waters during the construction phase of the proposed development, however, there remains the risk of accidental spillages and or leaks of contaminants, and excessive loading of surface water mitigation infrastructure.

Emergency responses to potential contamination incidents will be established and form part of the CEMP (**Management Plan 1, Appendix 2.1**). Potential emergencies and respective emergency responses include:

- Hydrocarbon spill or leak – Hydrocarbon contamination incidents will be dealt with immediately as they arise. Hydrocarbon spill kits will be prepared and kept in vehicles associated with the construction phase of the Development. Spill kits will also be established at proposed construction areas, for example, a spill kit will be established and mobilised as part of the turbine erection materials and equipment. Suitable receptacles for hydrocarbon contaminated materials will also be at hand.
- Significant hydrocarbon spill or leak – In the event of a significant hydrocarbon spillage, emergency responses will be escalated accordingly. Escalation can include measures such as installation of temporary sumps, drains or dykes to control the flow or migration of hydrocarbons and contaminated runoff will be contained, managed and pumped to a controlled area in line with Active management including treatment through a suitably equipped treatment tank and Granular Activate Carbon (GAC) vessels. This process will be managed by the ECoW in conjunction with a preidentified consultant (ECoW) specialist register) in regard to effective remediation, treatment and removal of hydrocarbon contaminated water and soils. Excavation and appropriate disposal of contaminated soils will be required in this instance.
- If a significant hydrocarbon spillage does occur, the contractor on behalf of the developer will have an approved and certified clean-up consultancy available on 24-hour notice to contain and clean-up the spill. The faster the containment or clean-up starts, the greater the success rate, the lower the damage caused and the lower the cost for the clean-up.
- Cementitious material – Cement / concrete contamination incidents will be dealt with immediately as they arise. Spill kits will also be established at proposed construction areas, for example a spill kit will be established and mobilised as part of the turbine

erection materials and equipment. Suitable receptacles for cementitious materials will also be at hand.

In the event of a significant contamination or polluting incident the relevant authorities will be informed immediately.

3.4.2.19 Managing & Reporting Environmental Incidents

Environmental incidents including accidental spillages on soils (e.g. fuel), breeches of licence limits if applicable (discharge of trade effluent), and significant environmental incidents will be reported to the Local Authority as part of emergency responses to such incidents. Incident notification will be escalated to relevant third parties where relevant e.g. Inland Fisheries Ireland (IFI) if surface water receptors are intercepted.

3.4.3 Operational Phase

3.4.3.1 Increase in Hydraulic Loading Proposed Mitigation Measures

The principles of the above mitigation measures (check dams, stilling ponds, attenuation lagoons etc.) are based on the control and management of runoff discharge rates, which ensure the regulating the speed of runoff within the drainage network, buffering the discharge from the drainage network where possible, and maintaining the natural hydrological regime. As such, the measures described with a view to controlling the release of suspended solids also mitigate against the potential for rapid runoff and rapid hydrological responses to rainfall potentially leading to flooding and erosion of the drainage network or downstream of the development.

The same measures will be implemented with a view to mitigating against net increase surface water runoff arising from the Development. For example, the following conceptual model will be applied at a proposed turbine hardstand location:

- Collector drains; allowing for 0.5m depth, 1.0m width, presume semi-circular, sectional area; c. 0.4m^2. Presume 100m length of collector drain; up to 40m^3 capacity per 100m, by 50% allowing for gradient equates to 20m^3. Collector drains are not intended to store runoff, however the in-line attenuation features, such as check dams and flow regulators will serve to reduce discharge rates dramatically, effectively backing up water and regulating the rate of discharge. The actual attenuation capacity of the drainage network and treatment trains will be calculated during the detailed design phase of the development. The actual attenuation capacity of the drainage network and

treatment trains will be calculated during the detailed design phase of the development **(Appendix 9.5 – Tile 7).**

- Check dams at regular intervals throughout the drainage network (existing, new clean collector and new dirty collector drains) will attenuate runoff intercepted by respective drainage channels.
- Dirty water collector drains (associated with construction areas) will direct runoff to established stilling ponds. Stilling ponds will reduce the velocity of runoff, further reducing the hydrological response to rainfall.
- Buffered outfalls to vegetated areas will utilise the infiltration capacity of the ground prior to the rejected rainfall eventually being intercepted by the receiving surface water system.
- Clean water collector drains will intercept clean runoff (upgradient of construction areas) and will direct runoff around construction areas. The runoff will be attenuated by means of check dams and intermittent buffered outfalls.

The potential combined attenuation capacity of the proposed drainage infrastructure, checked dams, stilling ponds, etc. (**Management Plan 1, Appendix 2.1**) has been designed to attenuate net increase in water runoff during extreme storm events i.e., 1 in 100-year storm event plus a 20% allowance for global warming, as set out in **Appendix 9.1 – Letter Flood Risk Assessment.**

3.4.4 Development Decommissioning & Restoration

3.4.4.1 Decommissioning of Infrastructure Phase/s

The mitigation measures outlined in this CEMP will be implemented during the Decommissioning phase, as well as those outlined in the Decommissioning Plan, to reduce the potential for such effects.

3.4.4.2 Reinstatement of Redundant Access Track and Hardstand Areas

In order to reduce the potential impact of excavating and removing the entirety of the crane hardstand areas, it is proposed that the majority of the stone structure of the individual crane hardstands will be left in place, with topsoil spread on top of the hardstand to form a vegetated surface layer. The top layer of the crane hardstand areas will have the rock/stone dug out and be left to revegetate naturally. Any reinstatement of topsoil and the restoration of vegetation will be kept consistent and compatible with surrounding vegetation and shall be agreed with the Environmental Engineer in advance of commencement. Reinstatement

of redundant site access tracks and Turbine Hardstand areas during the Decommissioning phase has the potential to result in soil creep, associated erosion and potential entrainment of elevated suspended solids in surface water run-off. This in turn has the potential to impact on the receiving surface water environment.

- A site-specific Decommissioning Plan has been developed prior to the commencement of any Decommissioning activities (**Management Plan 6, Appendix 2.1**).
- Mitigation measures described in this CEMP to reduce the potential for run-off of elevated suspended solids will be implemented.
- It is recommended that silt/sediment fences should be implemented along the perimeter of all access tracks and hardstand areas prior to decommissioning works and for the during the reinstatement works.
- Additional precautions such as the implementation of check dams, secured straw bales, sandbags, or settlement ponds should be implemented at areas where surface water runoff is likely to be intercepted by both natural and artificial drainage features.
- The mitigation measures for the preparation of the hardstand area surfaces prior to material being deposited discussed in the previous sections will be implemented.
- It is recommended that monitoring and maintenance of the reinstated areas should be conducted regularly following the initial stages of establishment to ensure that the potential for excessive surface water runoff eroding deposited material along preferential pathways is minimised.

The Site Access Roads and associated drainage systems will serve ongoing forestry and agriculture activity in the area. All other hard surfaced areas will be allowed to revegetate naturally. Based on the experience of the project team monitoring operational wind farm sites throughout the country, the approach of allowing these areas to revegetate naturally has proven to be very successful.

A full Schedule of Mitigation Measures relating to Site Drainage can be seen in **Appendix 17.1.**

3.5 AIR AND CLIMATE

Contractors Good practice site control measures include the following:

- Site Access Roads will be upgraded and built prior to the commencement of other construction activities. These roads will be finished with graded aggregate which compacts, preventing dust.
- Approach roads and construction areas will be cleaned daily to prevent build-up of mud and prevent it from migrating around the Site and onto the public road network.
- Wheel wash facilities will be provided near the Site entrances to prevent mud/dirt being transferred from the site to the public road network.
- Public roads along the construction haul route will be inspected and cleaned daily. In the unlikely event that dirt/mud is identified on public roads, the roads will be cleaned. The wheel wash facility will be investigated, and the problem fixed to prevent this from happening again
- During periods of dry and windy weather, there is potential for dust to become friable and cause nuisance to nearby residences and users of the local road network. This requires wetting material and ensuring water is supplied at the correct levels for the duration of the work activity. The weather will be monitored so that the need for damping down activities can be predicted. Water bowsers will be available to spray work areas (wind turbine area and grid connection route) and haul roads to suppress dust migration from the Site.
- Vehicles delivering materials to the site will be covered appropriately when transporting materials that could result in dust, e.g., crushed rock or sand.
- Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the Contractors by ensuring that emissions from vehicles are minimised through regular servicing of machinery.
- Ready-mix concrete will be delivered to the Site and no batching of concrete will take place on the Site. Minor works will involve the use of a small mixer. This would only be likely at the site compound or substation, which are over 170m from watercourses.
- Only washing out of chutes will take place on site and this will be undertaken at a designated concrete washout facility at the Contractors compound.
- Speed restrictions of 15km/h on access roads will be implemented to reduce the likelihood of dust becoming airborne. Consideration should be given to how on-site speed limits are policed by the Contractor and referred to in the toolbox talks.

- Stockpiling of materials will be carried out in such a way as to minimise their exposure to wind. Stockpiles will be covered with geotextiles layering and damping down will be carried out when weather conditions require it.
- Earthworks and exposed areas/soil stockpiles will be re-vegetated to stabilise surfaces as soon as practicable.
- An independent, qualified Geotechnical Engineer will be contracted for the detailed design stage of the project and geotechnical services and will be retained throughout the construction phase, including monitoring and supervision of construction activities on a regular basis. The methodology statement will be signed off by a suitably qualified Geotechnical Engineer.
- A complaints procedure will be implemented on site where complaints will be reported, logged and appropriate action taken.
- All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise.

3.6 ARCHAEOLOGY AND CULTURAL HERITAGE

The following section details the environmental control measures which will be incorporated into the Contractors' Construction Method Statement in respect of archaeology and cultural heritage. An assessment of the impacts from works on Archaeology and Cultural Heritage can be found in the EIAR, **Chapter 14: Cultural Heritage**.

3.6.1 Mitigation

Construction Phase

- All ground disturbance associated with the construction of the proposed development will be monitored by a suitably qualified archaeologist working under licence as issued by the minister (DCHG) under section 26 of the National Monuments Acts (1994-2014).
- In the event of archaeological features, finds and/or deposits been encountered during the monitoring, all relevant authorities should be notified immediately. Preservation in-situ or preservation by record (excavation) may be required.

3.7 NOISE & VIBRATION

No significant construction noise effects have been identified. However, where the grid route is within 20m to a receptor, then mitigation measures will be put in place. Mitigation could include the erection of an acoustic barrier between source and receptor giving maximum attenuation. Maximum levels from grid connection will pertain for no more than one day at

any location. General guidance for controlling construction noise through the use of good practice is given in BS 5228-1[3] will be followed (see **Section 11.6.1** of EIAR). During construction of the Development, activity shall be limited to working times incorporated in any planning permission, however there may be occasion where delivery of large transport loads such as turbines necessitates delivery outside of daytime hours. In such cases permission will be sought from the relevant authorities. The transport of large transport loads generates low levels of noise and vibration as trucks performing such tasks move at very low speeds. Construction activity is temporary and unlikely to generate noise issues at any receptor. Construction noise including ground vibration, and air overpressure impacts are predicted as insignificant.

3.8 TRAFFIC

The following mitigation measures are recommended:

- A Traffic Management Plan (TMP) has been developed (see Management Plan 7 attached to the CEMP). Prior to construction and once the Contractors have confirmed their suppliers, the TMP will be updated in consultation with Leitrim County Council and An Garda Síochána as necessary. All drivers will be made aware of the location and presence of schools and other sensitive receptors at an induction session prior to construction activities taking place and will be made aware of the speed limits of the various roads on the route which are contained in the TMP. This is to ensure compliance with speed limits and school drop off and pick-up zones.
- All significant traffic likely to be generated by the Wind Farm will be during the construction of the Development and will be temporary in nature. It is envisaged that the construction period for the Wind Farm will span a 15-month period with the underground cable being installed over a concurrent 5-month period. The construction-phase Traffic Management Plan will mitigate these impacts.
- Use special transporter vehicles with rear wheel steering in delivery of wind turbine components to ensure safe transportation and manoeuvrability on the roads. Extendable transporter vehicles will be retracted on return journeys.
- Prior to delivery of abnormal loads i.e. turbine components, the Developer or their representatives, will consult with An Garda Síochána and Leitrim County Council Roads Departments to discuss the requirement for a Garda escort.
- The Developer will confirm the intended timescale for deliveries and every effort will be made to avoid peak times such as school drop off times, church services, sporting

[3] British Standard 5228_:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites-Noise

events, peak traffic times where it is considered this may lead to unnecessary disruption.

- Abnormal loads are likely to travel at night and outside the normal construction times as may be required by An Garda Síochána. Due to the distance between Killybegs Harbour and the Site of c.156.2 km, the journey is achievable within a 4–5-hour timeframe. Accordingly, locations for resting will not be required. Local residents along the affected route will be notified of the timescale for abnormal load deliveries.
- The Developer will lodge a bond with Leitrim County Council prior to commencement of construction in the amount to be agreed with the Council for the possible repair/upkeep of the roads. During the construction period, these roads will be inspected weekly by the Developer's Resident Engineer and the Contractor will be instructed to repair any defects within the following two weeks. At the end of the construction period, any further defects will be remedied to the satisfaction of Leitrim County Council.
- Wheel cleaning equipment will be used at the exit to the Site to prevent any mud and/or stones being transferred from site to the public road network. All drivers will be required to see that their vehicle is free from dirt and stones prior to departure from the construction sites.
- The sites' entry points will also be appropriately signed. Access to the Wind Farm Site will be controlled by on site personnel and all visitors will be asked to sign in and out of the site by security / site personnel on entering and exiting the site. All site visitors will undergo a site induction covering Health and Safety issues at the Site Temporary Construction Compound will be required to wear appropriate Personal Protective Equipment (PPE) while on-site.
- In addition, any dust generating activities will be minimised where practical during windy conditions, and drivers will adopt driving practices to minimise the creation of dust. Where conditions exist for dust to become friable, techniques such as damping down of the potentially affected areas will be employed.
- To reduce dust emissions, vehicles transporting crushed stone will be covered during both entrance and egress to the site.
- A survey of the Killybegs Turbine Delivery Route will be undertaken prior to commencement to identify if any new overhead lines or broadband lines will need to be lifted along the route to allow abnormal loads such as tower sections and nacelles to be delivered.
- During the construction phase, clear construction warning signs will be placed on the L-4282, L-8280, R200 and R280 as necessary, which will advise road users of the

presence of a construction site and of the likelihood of vehicles entering and exiting the site or road construction areas. This will help improve road safety.

- Works on public roads on the Turbine Delivery Route and Grid Connection will be strictly in accordance with "Guidance for the Control and Management of Traffic at Road Works – 2nd Edition 2010" as well as "Traffic Signs Manual 2010-Chapter 8- Temporary Traffic Measures and Signs at Roadworks".
- Road Closures will be obtained for Grid Connection works on narrow public roads with passing bays available. A number of options are available in some areas for diverting traffic that will allow flexibility during construction. For the Grid Connection works within the L-4282 and L-8280, passing bays can be utilised. While traffic diversions are in place, local access will be maintained at all times. All access points (domestic, business, farm) will be considered when finalising the proposed road closures and diversions. Additional measures such as local road widening, traffic shuttle systems and 'Stop-Go' systems will also be considered subject to agreement with Leitrim County Council and Mayo County Council. Road closures will be scheduled in consultation with local residents and the Contractor shall endeavour to avoid times of high agricultural activity e.g. silage cutting.
- The widening/straightening of haul route L-4282 is proposed to be completed in advance of road closures.
- Road Opening Licences will be obtained for the Grid Connection trench and chambers within public roads as well as for the widening of public roads.
- All vehicles using or while in operation at the Site shall either have roof mounted flashing beacons or will use their hazard lights.
- A speed limit of 25 km/h shall apply to all vehicles within the Site.
- Provide a footpath adjacent to the upgraded carriageway where works are being undertaken. This footpath should provide a safe method of permitting pedestrians to access the pre-existing carriageway at the terminations of the works.
- Ensure all visibility envelopes are kept clear of high vegetation.
- Provide visibility splays set back a suitable distance from the yield line.

3.8.1 Diversion Routes

The Site is generally served by the N56, N15, N4, R285, R280, and L4282. Receptors considered as having 'high' sensitivity are primarily premises which are directly on the R263, N15, and R280 which already have significant potential to generate traffic.

3.8.2 Delivery Volume for Construction Materials

Table 3.1: HGV and Abnormal Load Deliveries – Associated with Civil/Electrical Construction Works

Materials	Quantity	No. of Deliveries
Site Establishment and Removal	15	15
Concrete	3,722 m^3	620
Reinforcing Steel	420t	21
Substation Building and electrical equipment	-	30
Other – Geotextile Mats, Tools, Fencing etc.	-	25
Wind Farm Internal Cabling Materials incl. bedding	-	200
Imported Crushed Stone (engineering fill) as Upfill to Foundations	2,043 m^3	171
Imported Crushed Stone for Substation	3,717 m^3	310
Imported Crushed Stone for Site Access Roads and Turbine Hardstands	12,302 m^3	1025
Waste – 1 container/month		15
Total		**2,432**

Table 3.2: HGV and Abnormal Load Deliveries – Associated with Wind Turbine Components

Materials	Quantity	No. of Deliveries
Site Establishment and Removal	12	12
Miscellaneous Deliveries for Temporary Bridge (fencing, silt fencing, siltbusters, drainage, sumps etc.) incl. Removal	30	30
Anchor Cages & Foundation Templates	5	5
Tower Sections	-	16
Nacelles	4	4
Rotor Blades	12	12
Transformers, Panels and Cabling	-	8
Tools etc.	-	1
Crane Deliveries to Site, including ballast, booms, etc. and removal of same	2 Cranes	50
Total		**138**

Table 3.3: HGV Load Deliveries – Associated with Grid Connection Works

Materials	Quantity	No. of Deliveries
Site Establishment and Removal	30	30
Concrete Blinding for Joint Bays, Comms Chambers and Link Boxes	18.78 m^3	3
Concrete for Floors of Joint Bays	60.59 m^3	10
Pre-cast Concrete Joint Bays and Communication Chambers	39 No.	39

Materials	Quantity	No. of Deliveries
Other – Steel mesh, Geotextiles, Silt Fencing, Fencing, Danger Tape, etc.	7	7
Grid Connection Cables	170t	10
Grid Connection Ducting	32,000 m	11
Disposal of Excavated Materials from trenches in Public Roads	5,725 m^3	1445
Lean Mix Concrete for Trenches	2,506 m^3	418
Crushed Stone for Trenches in Public Roads	2,217 m^3	185
Road Surfacing	1,178 m^3	99
Total		**2,257**

3.8.3 Site Entrance

There is one Site entrance to the wind farm site.

A wheel wash facility will be provided near the Site entrance so that the wheels of vehicles exiting the Site can be cleaned prior to exiting onto the public road. This will be carried out under the supervision of the Site Health & Safety manager and in accordance with the agreed **Traffic Management Plan (Management Plan 7)** to ensure that it is undertaken in a safe manner.

3.8.4 Construction Material Haul Route

The haul route of materials i.e., will be established after the appointment of the Contractors, but it is envisaged that material will be sourced from quarries local to the Site to minimise disruption on the public road network as per **Figure 15.5.**

For the quarries in the area, trucks will approach the R280 and will then follow the L4282 in a westerly direction to the Site.

3.9 WASTE

The following section details the environmental control measures which will be incorporated into the Development in respect of Waste Management.

3.9.1 Mitigation

- The Contractors will avoid or minimise the volume of waste generated.
- Waste will be stored a minimum of 50m from nearby watercourses or drains at the proposed Letter Wind Farm.

- Waste storage and disposal will be carried out in a way which prevents pollution in compliance with legislation.
- Rainwater, which has collected within bunded areas used for the storage of oils, chemicals and waste, will be collected and disposed offsite by suitably qualified waste Contractors.
- Waste derived from the port-a-cabins (office and canteen facility) onsite will be placed in an appropriately designed waste storage area prior to collection a licensed Contractors under the Waste Management Act, 1996.
- Port-a-loos will be regularly maintained by a suitably qualified waste Contractors engaged by the supplier.
- The wheel cleaning facility is proposed at the Site entrance; in addition, a track sweeper may be used.
- All waste to be transported off-site to a licensed facility will be documented in accordance with the European Union (Waste Directive) Regulations 2020. An adequate description of the waste and where it came from will be given and an appropriate European Waste Catalogue Code and Standard Industrial Classification Code will be provided. The quantity and nature of the waste will be described and how it is contained. Personal details of the waste transferor and transferee at Letter Wind Farm will be documented. Waste will only be transferred by registered/licensed and competent person(s).
- Only trained operatives will handle hazardous substances. All stored hazardous waste will be clearly labelled.
- All oil storage facilities of over 200 litres need secondary containment facilities of 110% storage capacity (e.g., bund, enclosure, drip tray). All of these will be regularly inspected for visual signs of leaks or something that would impact on their capacity – e.g., a drip tray full of rainwater.
- Waste storage areas will be clearly located and signed. If space allows, key waste streams will be separated.
- All waste will be transported from the Site at appropriate frequency by a registered waste Contractors to prevent over-filling of waste containers.
- Frequency of Checks. The Contractors will ensure that all storage facilities are checked on a weekly basis. The checklist for completion is attached in **Management Plan 5: Waste Management Plan**.

3.10 CONSTRUCTION

The following sections detail an outline construction sequence to provide an overview of the construction process; The construction-stage details of the sequence and methodologies, to be undertaken within the framework of this CEMP, will be determined by the Contractors.

3.10.1 Phasing of Works

It is envisaged that the following will be the sequence of construction for the Development:

1. Site Preparation including felling and drainage
2. Site Access Roads
3. Contractors Compound and Welfare Facilities
4. Crane hardstandings
5. Turbine Foundations
6. Internal cable ducting
7. Installation of the Grid Connection
8. Erection of wind turbines
9. Commissioning and Energisation

3.10.2 Working Hours

The Development will have approximately 50 construction workers during the peak of the construction phase. Working hours for construction will be from 07:00 to 19:00 on weekdays, with reduced working hours at weekends, from 08:00 to 13:00 on a Saturday. It should be noted that during the turbine erection phase, operations will need to take place outside those hours with concrete pours commencing at 05:00 and continuing till 16:00, to facilitate turbine foundation construction and so that lifting operations are completed safely. Hours of working for turbine foundation construction will be agreed with Leitrim County Council prior to the commencement of turbine foundation construction. **Chapter 15: Traffic and Transportation** refers to this in further detail. A detailed Traffic Management Plan will be implemented for the construction phase. This shall be agreed during the planning compliance stage with the Planning Authority so that strict controls described therein are in place with all suppliers coming to the Site.

3.10.3 Site Management Procedures and Construction Methodologies

Prior to commencement of construction, the appointed Contractors(s) will prepare detailed method statements and work programmes for the construction stage. These method statements will be prepared in the context of measures set out in this CEMP and will take account of mitigation measures as outlined in the planning application and accompanying

environment reports, and site investigations to be carried out prior to construction. Any specific requirements will be fully incorporated into the appointed Contractors scopes of work and appropriate supervision and management will be carried out to ensure full compliance.

The method statements produced by the Contractors(s) will be reviewed by the Ecological Clerk of Works (ECoW) and will be agreed with the appropriate parties, including Leitrim County Council. The developer will employ a project manager to monitor the construction phase of the project and ensure works are being carried out in accordance with the agreed method statements, safety procedures and pollution control measures.

3.10.3.1 Mobilisation of Contractors Plant

Prior to commencement of construction works, the selected Contractors shall submit to the Developer a full list of plant, equipment and accommodation (site offices etc.) proposed for use during the works.

Dates for mobilisation will be agreed with the developer and/or his representative/Owners Engineer.

3.10.3.2 Site Infrastructure

Site Access Roads / Turbines

Machinery and vehicles used in access track construction are operated from the track only as it is constructed.

The location of all infrastructure required for this Development shall be set out by GPS (Real-Time Kinematicenabled[4]) equipment to the permitted detail as noted on the approved drawings. The Site will be set out using wooden posts to mark the boundary and extent of construction activities, in accordance with the Site layout and environmental constraints drawings, and with contributions from the appointed ecologist. The boundaries of the buffer zones will be taped/fenced off to prevent construction plant from entering the buffer zones and impacting on water quality. Site personnel will be informed of the buffer zones through toolbox talks onsite, both before and during construction. New personnel will be informed of the construction buffer zones with induction training before commencing work.

[4] Real-time kinematic (RTK)-processing on a drone records GPS information and geotags images as they're captured during flight.

Borrow Pit

Most of the crushed stone fill material for site track and hardstand areas will be sourced from the permitted borrow pit outlined above.

The rock will be extracted from the proposed borrow pit using rock breaking. Rock sourced from the proposed borrow pit will be used for the roads and hardstanding areas. The borrow pits will operate for the duration of the construction period of the site infrastructure.

3.10.3.3 Establish Pre- Commencement Mitigation Measures

Prior to construction works advancing on site, the Contractors shall confirm to the Employer of their intention to advance the works in a sound practical manner with no undue impact on the receiving environment. The Contractors shall identify all sensitive environmental areas within the Employer's site and confirm their intended method of construction works regarding these areas in line with the methods outlined in this CEMP. All environmentally sensitive areas shall be identified prior to the detailed design/construction phase.

Where the estimated working area is reduced by any sensitive environmental areas i.e., buffer zones, post and tape marking shall be used to set out these locations and thus prevent the entry of Contractors plant within these areas during construction works.

To protect any known ecological features that occur close to the planned infrastructure, a delineated working corridor will be employed throughout the construction. Posts and tape will be used to establish these areas and thus prevent the entry of Contractors plant outside the working corridor during construction works. Locations of ecological significance or where invasive species are identified will also be fenced off.

A 50m buffer to natural watercourses will be employed during construction to protect water quality and to see that there is no significant direct effect on existing watercourses. The proposed locations for spoil storage are highlighted in the attached Spoil Management Plan. Where spoil storage areas are located in proximity to watercourse buffer zones, silt fencing will be installed along the area facing the buffer zone and maintained in line with the instructions of the manufacturer. Works within the buffer zone will be subject to specific method statements.

3.10.3.4 Site Preparation

Entrance Formation

From Killybegs Harbour, County Donegal, turbine nacelles, tower hubs, and rotor blades will be transported to the Site via the N56, N15, N4, R285, R280, before turning left onto the L4282 towards the Site entrance.

Turbine components and construction materials will use the same route and site entrance.

Please refer to **Figures 3.2** for an illustration of the Site entrances location.

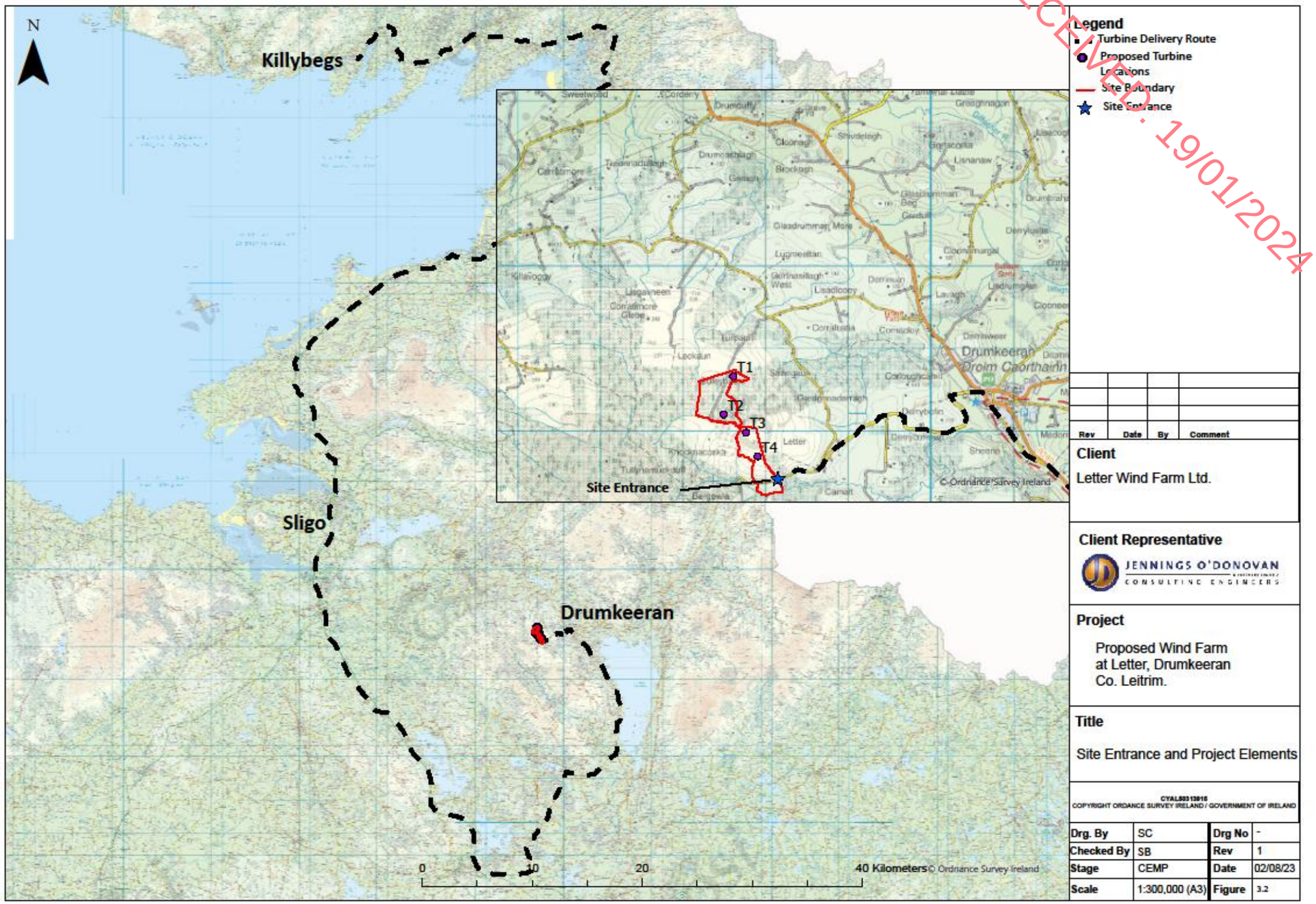

Figure 3.2 Map showing the proposed location of the site entrance at Letter Wind Farm.

Contractors Compound and Welfare Facilities

The temporary site compound will be in place for the duration of the construction works only. The compound will be used as a secure storage area for construction materials and to contain temporary site accommodation units for sealed type staff welfare facilities. The compound will contain cabins for offices space, meeting rooms, canteen area, a drying room, parking facilities, and similar personnel type facilities.

An area within the compound will be used for the storage of fuel and oils and this will be suitably bunded to 110% of the storage volume. The bund will be lined with an impermeable membrane in order to prevent any contamination of the surrounding soils, vegetation and water table. Double protection containers / equipment will be used along with drip trays and details.

During the construction phase, water will be supplied by water bowser. The maximum wastewater production is estimated to be the same as the maximum water consumption (2,000 litres per day). The project will include an enclosed wastewater management system at the temporary compound capable of handling the demand during the construction phase with 50 construction workers on site at peak. A holding tank is proposed for wastewater management. Wastewater which will be removed off-site and disposed at an appropriate licenced facility.

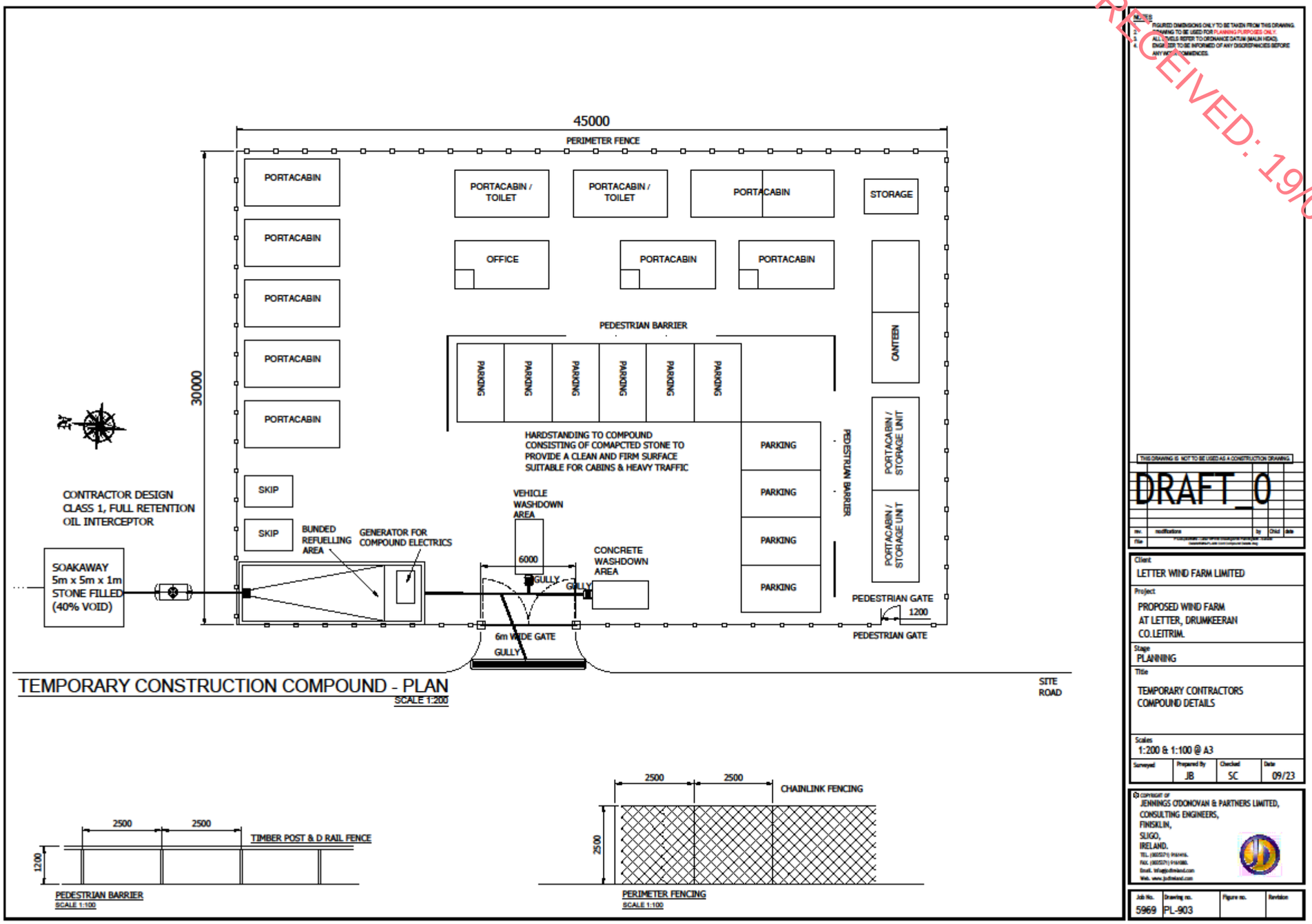

Figure 3.3 Contractors Temporary Compound Plan (Excerpt from Drawing No. 5969-PL-903)

The proposed construction method statement for the construction compound / storage area is detailed in **Table 3.5**.

Table 3.5: Contractors' Compound and Welfare Facilities CMS

Activity	Notes
Set out the perimeter of the site compound using GPS equipment following a site walkover by the Ecological Clerk of Works	Setting out must be undertaken to Irish Grid co-ordinates and to sub-centimetre accuracy in the X, Y and Z plane.
Archaeology	The Site will be accessible to the appointed archaeologist at all times during working hours. The nominated archaeologist will monitor all invasive works.
Install drainage treatment and flow attenuation features as per the detailed design	Required to minimise the transportation of suspended solids generated during the construction stage.
The top layer of vegetated material will be stripped and stored for re-use onsite.	The top layer of vegetated material is set aside for re-use as a sealing layer to prevent sediment runoff and reduce visual impact. The location for storage of these vegetated turves will be around the perimeter of the site compound away from any sensitive habitats.
Stone will be placed in layers to form the hardstanding area for the site compound.	Hardcore area with Clause 804 stone on geotextile layer (Netlon SS30 or similar) for temporary site offices and for vehicle movements / parking.
The accommodation, eating and sanitary cabins will be installed in accordance with the construction drawings. The site office will be located in the temporary storage area.	Foul drainage from site welfare accommodation will discharge to a holding tank. The holding tank will be fully enclosed with no discharge outlet. The toilets will be the 'portaloo' chemical toilet type. The holding tank will be emptied as required by a licenced waste disposal operator. Temporary power supply and telecommunications will be connected to the relevant cabins.
Construct covered bunded area for oil tanks Construct Plant refuelling Area	Bund to absorb 110% of potential spill volume. Non-permeable concrete refuelling area with petrol interceptor.

Activity	Notes
Storage units for hazardous products and covered waste skips will be installed as per best industry practice. Complete temporary service provisions – electrical, telecommunications, etc.	All storage units for hazardous products will be fully lockable and bunded in proprietary steel containers.
Provide measures for waste management.	Waste segregation skips will be deployed for optimum recycling and re-use of materials. Skips will be covered with a lid.
Construct an impervious bunded area for plant refuelling and plant maintenance and cleaning operations.	An oil interceptor will be installed on the drainage outlet from the bunded area to separate any oils from the surface run off. Generators and associated diesel tanks are to be installed on such an area.
Parking	Parking areas shall be identified by signage with a handrail system or barrier separating pedestrian areas and vehicle routes.
Reinstatement	Compound areas to be restored to pre-construction condition at completion and demobilisation stage.

Site Security

From an operational point of view, for control of site access and for proper site management, all access to the Site will require passage through a controlled safety barrier/gate or hut. The exact location(s) shall be decided by the Contractors with primary responsibility for safety on the Site. It is proposed that the barrier(s) be located at the entrance to the south of the Site (L4282) and so that no unauthorised traffic can enter the Site and to check that all personnel are permitted / inducted on the Site. The barrier will be set back sufficiently so that HGVs can enter the Site without stopping.

The Contractors shall be responsible for securing each area of work, so as to ensure the safety and health of all affected persons (Contractor's personnel, site supervision staff,

members of the general public, traffic, etc.). The Contractors will provide details to the Developer of security arrangements for the following:

- Fencing specification;
- Provision of personnel to man site access point(s);
- Signage; and
- Signing in/out procedures.

3.11 SITE CLEARANCE AND CONSTRUCTION METHODS

The management of earthworks will be of paramount importance throughout the construction of the project. The general principles that will apply to earthworks include:

- Excavations to only take place following implementation of setting out the working corridor, drainage treatment and flow attenuation provisions.
- Archaeological supervision works will be undertaken.
- Vegetation within the construction corridor shall be cleared as part of the excavation works.
- Suitable plant to be used, particularly when working off road i.e., use of geotextile mats.
- Machinery and vehicles used in access track construction are operated from the track only as it is constructed.
- Vegetated top-mat layer to be removed separately and set aside from other spoil and place around the excavations for use in reinstatement. Spoil storage areas will be around turbine bases and within the borrow pit as per the attached Peat and Spoil Management Plan.
- Topsoil stockpiles shall be no more than 1m in height, smoothed to prevent erosion, and watered to prevent them drying out.
- Apply the vegetated capping layer to permanently exposed excavations or storage areas to mitigate against movement and to avoid sediment run-off. Input from the appointed ecologist will be used to apply the appropriate species of the immediate environment in the capping layer.
- No permanent stockpiles will remain on site after completion of the construction phase.
- The borrow pit will be utilised on site to reduce the requirement for imported fill.
- Monitor all rock breaking activities and survey areas for indicators of peat/soil movement/slide. The appropriate remedial action will be taken.

The construction method statement for excavation and spoil management is shown in **Table 3.6**.

Table 3.6: Excavation and Spoil Management Method Statement

Activity	Notes
Archaeology	The Site will be accessible to the appointed archaeologist at all times during working hours. The nominated archaeologist will monitor all invasive works.
Install drainage treatment and flow attenuation features as per the detailed design, which includes recommendations of an expert ecologist	Required to minimise the transportation of suspended solids generated during the construction stage. Temporary and permanent ponds and outflow buffers will be constructed as per the attached Surface Water Management Plan.
Spoil locations to be identified to machine drivers	Spoil storage areas/borrow pits to be mapped and pegged out prior to excavation commencing.
A Risk Assessment shall be developed for each and every excavation location to be carried out on site.	Control measures to mitigate safety, stability and environmental risks specific to the local conditions.
The vegetated layer will always be removed and set aside separately from any spoil material.	Required to enhance revegetation.
Excavated material will only be stored to a maximum height of 1.0m along access tracks.	Prevent movement of stored material and protect watercourses.
Excavated material will not be stored in areas which have been identified as unsuitable for spoil storage.	Prevent movement of stored material and protect watercourses against harmful run offs.
Excavated material will be separated and stored so that it is not left exposed to the elements. This will be provided for through the immediate application of a vegetated capping layer.	No spoil is permitted to be stored on areas identified as sensitive or high value habitats. Other material will be used for landscaping or to rehabilitate the borrow pit.

Activity	Notes
Interim (temporary) material storage during the construction stage will be kept to a minimum by the implementation of a continuous construction cycle: 1) Excavate material; 2) Handle material; 3) Permanently store material	Return and re-vegetate the Site to its original state as soon as possible.
Permanent excavated or spoil surfaces shall be re-vegetated without undue delay using seed collected pre-construction, final details of which will be approved by the ecologist. Reseeding will occur within the growing season.	To encourage growth of locally-common habitats
Material from excavations in rock, suitable sands and gravels will be carefully managed and re-used as structural fill in the locality of the excavation where possible.	To minimise the volume of imported material required and ensure no impact on the local pH level. No spoil will be permitted to be stored on areas identified as sensitive or high value habitats.

3.11.1 New Site Access Roads

Carrying capacity will be based on the weight restriction for the installation crane, which typically has a maximum 20 tonne axle weight with a minimum of 12 tonnes.

Prior to advancing any construction works, final road design shall take into account the following:

- Existing Ground Profile
- Existing Ground Soil Type
- Bearing Capacity
- Natural Drainage
- Proposed Turbine Delivery Specification
- Existing Environmental Buffers

As this project will most likely be advanced as Design & Build, the Contractors will be obliged to form the design and construction works with reference to the above and seek final approval from the Engineer for their design prior to advancing any work on site. In any event, it is proposed that the roads are built as follows:

- The alignment of the new site roads will be established, and the centrelines will be marked out with ranging rods or timber posts.
- Any trees/hedgerow within the construction corridor shall be cleared prior to any construction works. All works will be undertaken outside of the breeding season.
- The first phase of drainage will then be installed in accordance with the detailed drainage design. Road construction will likely require the crossings of a number of cut drains and minor drainage paths.
- The angle of repose of the cut face of excavations shall be battered back approximately 45 degrees. However, where peat is encountered, it will be increased to 26.5 degrees.
- Slopes will not be undercut, or excavations left unsupported for periods in excess of 24 hours.
- The access road will be excavated to a suitable formation level. Roadside berms will be developed as 0.6m in height and 1m in width.

Plate 3.1: Roadside Berm

- Where necessary, stone will be delivered to site by tipper trucks from approved local quarries (please see **EIAR Figure 15.5**) and will be placed, spread and compacted in layers to form the running surface. The compaction will be carried out using a dead weight roller.

- Imported stone will be used throughout for the final surfacing layer.

- Well-graded granular fill (quarry sourced clean stone) will be spread and compacted in layers to provide a homogeneous running surface. The thickness of layers and amount of compaction required will be decided by the Site Manager based on the characteristics of the material and the compaction plant to be used.

As is typical with windfarm roads, the construction method will be Cut and Fill.

3.11.2 Floated Roads

The line of the floated roads will be marked out and drainage installed ahead of construction works. The intended floated road area will be cleared of any major protrusions down to ground level. The first layer of geogrid will then be placed on top and overlapped with adjacent geogrids in a simple overlapping arrangement. The overlaps will be protected and maintained during the during the construction of the road. This will be achieved by careful spreading of the fill on to the geogrid to avoid damage to the geogrid. The fist layer of stone aggregate will be placed on top of the geogrid. This should be a suitably sized “well graded material” that will be able to achieve a sound interlock with the geogrid. The stone will be carefully cascaded on to the geogrid to achieve the maximum possible interlock effect. Under no circumstances should aggregate be dozed directly over the geogrid in thin layers. This may tear or damage the geogrid and render it useless. The placed layers will then be compacted. Vibratory compaction should not be used. The degree of compaction applied to the lowest layer of fill may have to be reduced when dealing with exceptionally soft areas. It is common practice in such cases to compact the aggregate by trafficking it in by the wheels and tracks of the construction plant alone. Similarly on very low CBR (California Bearing Ratio) sites compaction of the lower layers by deadweight roller may not be possible. In this case the aggregate should be trafficked in by the wheels/tracks of the construction plant alone. A second layer of geogrid will then be placed on top of the compacted aggregate. This second layer should not be placed on top of the initial layer too quickly to allow for time for the underlying peat to gain in strength. After this, a capping layer will be placed on top of the geogrid and subsequently compacted.

3.11.3 Road Drainage

A vegetative filter strip and under-road drainage will allow discharge in a controlled manner downslope of the works.

Any crossing of field drains, man-made drains and vegetated drains will be piped directly under the road through appropriately sized drainage pipes. Where appropriate, a lateral drainage ditch (interceptor drain) will be cut along the uphill side of the road to intercept the natural runoff. This lateral drain will be drained under the road at regular intervals through correctly sized cross drains. In cases where the roads must run significantly downhill, transverse drains ('grips') will be constructed where appropriate in the surface of the roads to divert any runoff down the road into the drainage ditch. Where the crossing of ditches, field drains, man-made drains and vegetated drains cannot be avoided, the design of the crossing, (in this case culverts) shall be prepared in line with the drainage design philosophy. This is further detailed in the Surface Water Management Plan and Water Quality Management Plan.

Under road drainage will be provided under the excavated roads at all locations where existing land drainage passes under the proposed roads. Conventional cross drains will be 150mm diameter and increased to 300mm diameter (minimum) at points for land drainage or natural drainage paths. The spacing of the cross drains will be dependent upon whether the roads run parallel or tangential with the general contours of the Site.

The detailed design of all under-road drains in areas near flushes will have the input from the Ecological Clerk of Works and Ecological Clerk of Works to see that there is sufficient flow connecting the upstream and downstream habitats. These will be inspected by the Ecological Clerk of Works and Ecological Clerk of Works during construction.

All existing site drainage channels and culverts shall be maintained, and any additional drainage design required on-site shall be carried out as per the detailed design. Any such additional requirements will be reviewed by the Engineer, Ecological Clerk of Works and Ecological Clerk of Works prior to site clearance activities taking place on-site.

There is one proposed water crossing on site. This crossing will be a bottomless bridge culvert and will be located at approximately the centre of the Site (ITM 587642E, 824,049N). Further details on this crossing are discussed in **Management Plan 2: Water Quality Management Plan.**

3.11.3.1 Borrow Pit

One borrow pit is proposed on site which will curtail the impact on the existing local authority road network by reducing the volumes of traffic importing materials to site. The 1 No. borrow pit will be used to extract stone for construction of the Site Access Roads. The location of all infrastructure required for the borrow pit shall be set out by GPS equipment to the permitted detail as noted on the drawings.

Further details on borrow pit including extraction methodology can be found in **Management Plan 4: Peat and Spoil Management Plan**.

3.11.3.2 Turbine Bases/Foundations

Foundation requirements will be provided by the wind turbine supplier, and appropriate factors of safety will be applied to these in accordance with Draft Revised Wind Energy Development Guidelines, 2019[5]. The turbine towers will be anchored to the concrete foundation using a bolt assembly which shall be cast into the concrete.

Each turbine will be constructed on a cast in-situ concrete foundation requiring approximately 590m^{3}of concrete which, for the most part, is buried in the ground. The turbine foundations will be constructed so that the top of the foundation is at the existing ground level, with an acceptable tolerance of +/- 1m. assuming an average peat depth to competent bearing stratum of 0.30m below probed peat thickness for hard-standings and a total of 3.50m for turbine foundations, the volume of subsoils to be extracted is estimated to be approximately 8,953m^2.

[5] Draft Revised Wind Energy Development Guidelines, December 2019. Available at https://www.gov.ie/en/publication/9d0f66-draft-revised-wind-energy-development-guidelines-december-2019/ . Accessed on 21/03/23

Plate 3.2: Turbine Foundation under Construction with Adjoining Crane Pad[6]

There are two options for design and construction of Turbine foundations as follows:

- **Option 1 – Turbine Foundation constructed directly on in-situ ground:**
  The Contractors shall demonstrate that the soil/rock properties at the formation level are in compliance with the turbine Foundation Design limiting criteria for a ground bearing base.

- **Option 2 –Turbine Foundation constructed on engineering fill:**
  If it cannot be demonstrated that Option 1 is achievable, the Contractors shall establish and demonstrate a suitable bearing stratum at a lower level, design and construct engineering fill to the formation level of the foundation and demonstrate that the fill properties at the formation level are in compliance with the Turbine Foundation Design limiting criteria for a ground bearing base.

[6] SSE Renewables. *Concrete poured for first of 103 wind turbine bases at Viking Wind Farm*. Available at https://www.sserenewables.com/news-and-views/2021/09/concrete-poured-for-first-of-103-wind-turbine-bases-at-viking-wind-farm/. Accessed on 01/08/23

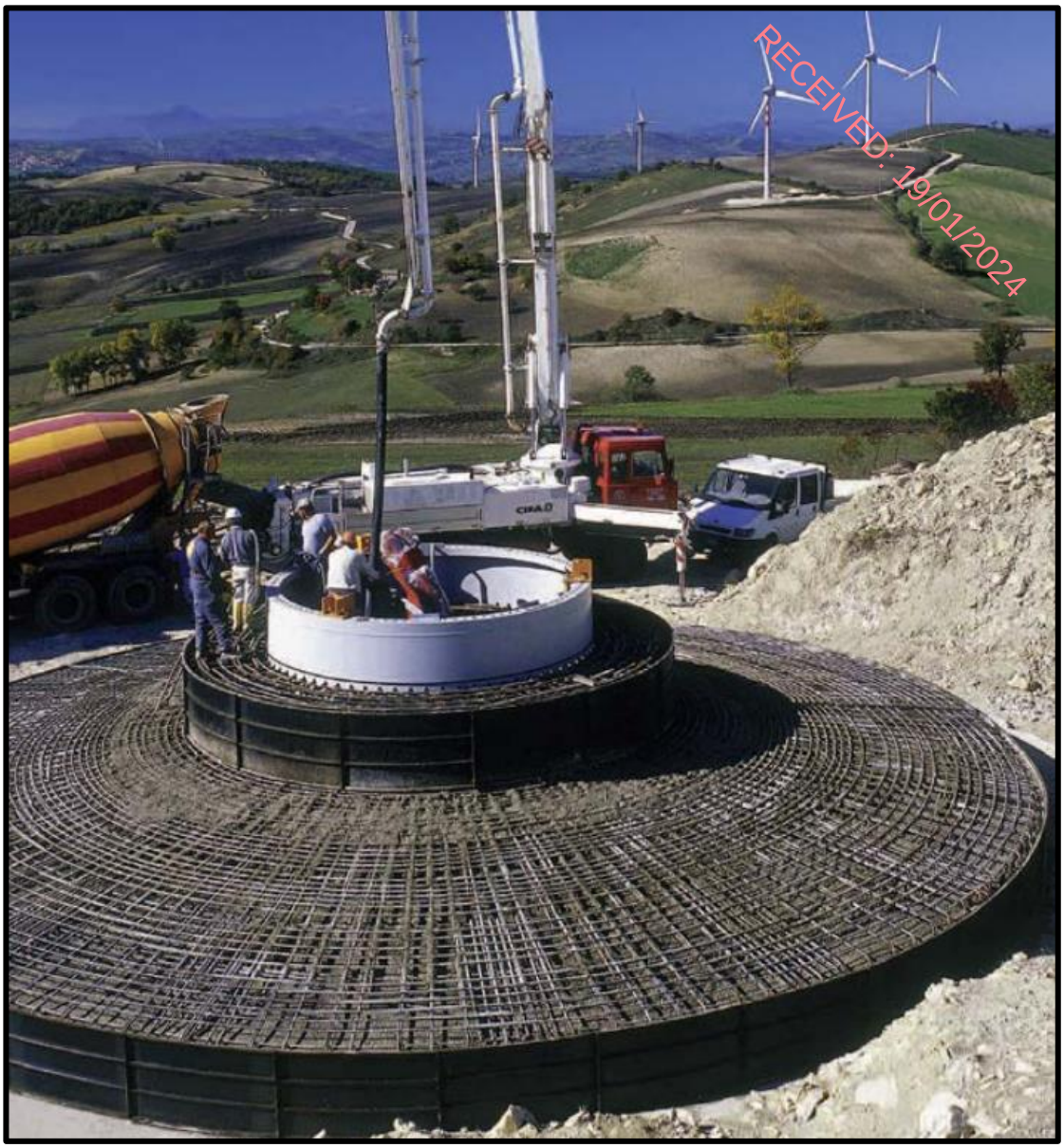

Plate 3.7: Wind turbine foundation[7]

The construction method statement for the turbine bases will generally follow the sequence as defined in **Table 3.7**.

[7] Available at https://www.grousemountwindfarm.ie/documents/downloads/EIS%20Vol%201%20-%20Section%203%20-%20Text%20-%20Project%20Implementation.pdf [Accessed on 21/03/2023]

Table 3.7: Turbine Base Construction Method Statement

Activity	Notes
Set out the turbine location with the use of GPS (RTK) equipment.	The Contractors shall tape off buffer zones with assistance from the Environmental Manager and Ecological Clerk of Works, and toolbox talks will be used to inform site staff of the importance of the buffer zones.
Archaeology	The Site will be accessible to the appointed archaeologist at all times during working hours. The nominated archaeologist will monitor all invasive works.
Set out and install drainage treatment and flow attenuation features.	Required to minimise the transportation of suspended solids generated during the construction stage.
Remove and locally store the top layer of vegetated material over the excavation area.	This material will be stored for re-use to cover and promote natural re-vegetation of the inorganic spoils that will be deposited at the nearest suitable location to the excavation, monitored by the Ecological Clerk of Works.
Excavate remaining material to 1m depth and segregate organic material from mineral material.	Selected excavated organic material will be considered for re-use as backfilling material.
Excavate to formation level. Complete plate bearing tests.	Any excavated inorganic material will be re-used as structural ballast to minimise the required volumes of spoil and imported stone.
A reinforcement steel cage for the foundation will be assembled after insertion of the turbine foundation insert arrangement (required for fixing steel tower) and formwork will be fixed to surround the cage.	Place layer of lean mix concrete on formation.
Reinforcement steel for the top section of the foundation is fixed along with the required number of cable ducts.	Reinforcing steel shall be checked for design compliance and signed off upon acceptance.

Activity	Notes
Erect the formwork to contain the concrete pour.	Formwork will be re-used and removed offsite when foundation construction is complete.
The foundation anchorage system will be checked both for level and line prior to the concrete being installed in the base. These checks will be passed to the appointed Turbine Contractors for their approval.	
The foundation will be backfilled with a cohesive material.	Concrete will be placed and cured. Remove formation. Place earth wires around foundation. Using the material arising during the excavation and landscaped using the vegetated soil set-aside during the excavation.

Plate 3.4: Wind Turbine Erection[8]

[8] Available at https://www.craneandhoistcanada.com/libherr-debuts-700-tonne-crawler-crane-at-wind-farm-job/. [Accessed on 21/03/23]

Plate 3.5: Assembly of wind turbine blades [6]

3.11.3.3 Turbine Hardstands/Crane Pads

A crane pad hardstand area will be required at each turbine. The hardstands must allow for two cranes (including outriggers) to operate in the vicinity of the turbine to allow for turbine erection. The hardstand must also provide storage and set down areas for turbine components. The hardstand requirements are specified by the turbine supplier and require strict compliance so that there are no stability issues during erection of the turbine sections.

All Turbine Hardstands will be designed to take account of the loadings which will be provided by the appointed turbine and installation Contractors and will consist of a compacted stone structure which is to be installed in accordance with the Transport Infrastructure Ireland (TII) Specification 800 2013.

Two types of hardstands are facilitated:

- Locations that will require a turning head.
- Standard Hardstand arrangement where delivery vehicles do not require a turning area.

Hardstand formation will consist of either 1 or 2 layers of stone depending on the properties of the underlying load bearing layer. Where the underlying layer is clay, 2 layers of stone formation are used, the stone capping layer and the running layer. In areas where the load bearing layer is rock, the capping layer is omitted, and the running layer is installed directly onto the rock surface (in this case siltstone). The proposed Turbine Hardstand design is shown on **Figure 3.4**.

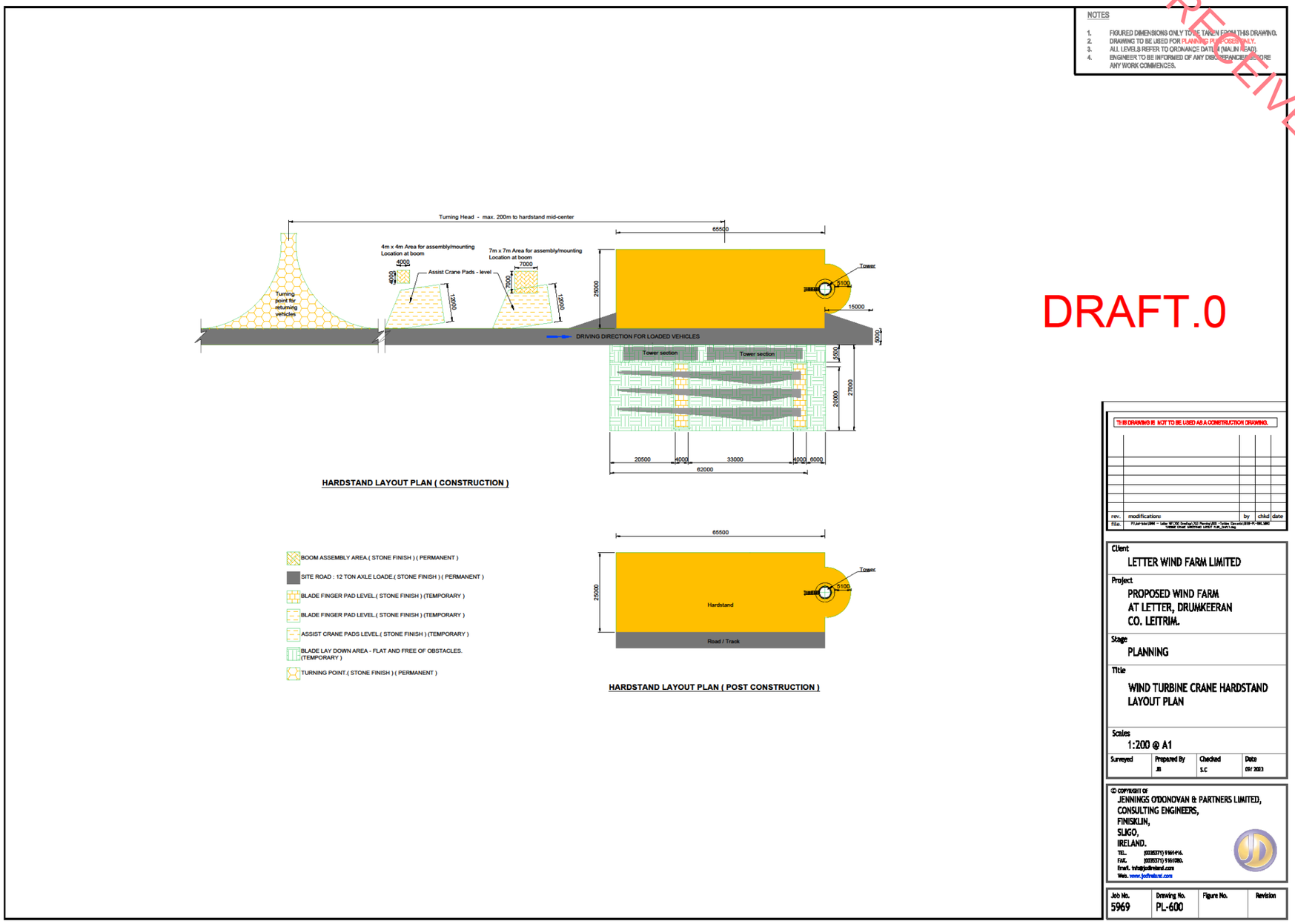

Figure 3.4 Crane Pad Hardstand Design (Excerpt from Drawing No. 5969-PL-600)

The hardstand area will be excavated to a formation level of weathered rock where possible or on stiff bearing strata on overlaying material.

Following completion of the hardstands, a series of plate load tests will be undertaken to demonstrate compliance with the turbine supplier requirements of 260kN/m^2.

Excavated material will be used for side slope formation local to the hardstands. Material from the excavation of the hardstands will be used to dress exposed areas around the hardstand with the remainder being used for landscaping around the turbine base or for the rehabilitation of the proposed borrow pits in accordance with the attached Spoil Management Plan. A Hardstand construction method statement is set out in **Table 3.8**.

Table 3.8: Typical Hardstands Construction Method Statement

Activity	Notes
Set out the crane hardstands with the use of GPS (RTK) equipment.	The Contractors shall see that buffer zones and areas of restricted working width are taped off with assistance from the ECoW and toolbox talks used to inform site staff of the importance of the buffer zones with identification of areas on drawings and maps.
Archaeology	The site will be accessible to the appointed archaeologist at all times during working hours.
Set out and install drainage treatment and flow attenuation features around the crane hardstand and turbine area.	In areas of peat only 'bog master' low ground pressure excavators will be used to minimise the impact on the vegetation layer. Temporary and permanent ponds and outflow buffers will not be constructed in sensitive habitats or buffer zones. Liaison with the ECoW at the detailed design stage will assist in the identification of suitable locations.
Remove and locally store the top layer of vegetated material over the area of the crane hardstand excavation.	This material will be stored for re-use to cover and promote natural re-vegetation of the amorphous peat and /or inorganic spoils that will have to be deposited at the nearest suitable location to the excavation.

Activity	Notes
Excavate remaining material to 1m depth and segregate organic material from mineral material.	Selected excavated organic material will be considered for re-use as backfilling material.
Excavate material to the required formation level.	The formation level for the crane hardstands will be on weathered rock or stiff overlaying material. Where suitable, the excavated material will be re-used as structural backfill material to minimise the required volumes of spoil and stone.
Place rock fill in accordance with the design to form the crane hardstand structure. Where appropriate, geotextile and/or geogrid should be used to help reduce the volume of stone. Fence off steep edges.	Special consideration will be given towards the stone placement and compaction so that the structural integrity meets the loading requirements.
Plate bearing tests will be undertaken following completion of the hardstand structure.	The number and location of the plate bearing tests shall be specified by the Contractor's designer.

Plate 3.6: Crane for wind turbine erection [6]

3.11.3.4 Handling/Disposal of Excavated Material

Details of spoil management methodology are outlined in the attached Spoil Management Plan. Excavated soil will be used for landscaping and to reinstate the borrow pit.

3.12 PLANNING CONDITIONS AND OUTLINE METHOD STATEMENTS

This CEMP and its future versions/revisions will form part of the Contract for Letter Wind Farm. It will therefore be updated and revised during the different stages of the Development. Where the project is granted planning permission all the planning conditions associated with the Planning Application, applicant Letter Wind Farm Ltd will be listed in **Table 3.9**.

Table 3.9: Relevant Planning Conditions and Related Documentation

Condition No.	Planning Condition	Reason
Planning Ref: INSERT NUMBER		

Condition No.	Planning Condition	Reason

The Contractors will address all of the mitigation measures and best practice construction methods detailed within the above consent in his design and in any detailed environmental plans as required by this CEMP or the Contract.

3.13 SCHEME AMENDMENTS

Scheme Amendments will be recorded in **Table 3.10**. These amendments do not include changes to the scheme design which are completed in accordance with the existing planning consent. Instead, this refers to changes in the design of the wind farm for which additional approvals and / or consents may be required from Leitrim County Council. For example, amendments to layouts or in accordance with the current grant of planning permission.

Table 3.10: Scheme Amendments

Reference	Date	Scheme Amendment Description	Environmental Sensitivities potentially

3.14 REGISTER OF VARIATIONS

Where any variations to the Management Plans and CEMP are required (either as a result of Scheme Amendments or through corrective actions or improvements noted and undertaken on site) these will be recorded in **Table 3.11**, Register of Variations. Furthermore, all changes to construction methods, design, mitigation and the implications of these changes and authorising personnel will be recorded in **Table 3.11**.

Table 3.11: Register of Variations

No.	Variation Description	Authorising Personnel	Completion Date

4 COMMUNICATION PLAN

4.1 INTRODUCTION

Both the Contractors and the Client will appoint Project Managers to the project. These Project Managers will be the main points of contact between the two parties. This includes the Contractors Construction Project Manager and the Client.

It is envisaged that main project communications will take the form of structured reporting arrangements and meetings.

All issues in relation to environmental management/monitoring will be reported to the Ecological Clerk of Works. The Contractors Environmental Manager will report to the Contractors and Client/Owner's Engineer on a regular basis.

4.2 CONTACT SHEETS

Table 4.1 provides a list of Letter Wind Farm Ltd., Contractors and relevant third party contact details. This table will be updated and maintained by the Contractors for the duration of the Contract.

Table 4.1: Contact Sheets

Company	Position	Name	Telephone
Letter Wind Farm Ltd	Client Project Manager		
Contractors	Site Manager / EM		
Contractors	Contracts Manager		
Contractors	General Manager		
Contractors	Foreman		
Letter Wind Farm Ltd	Construction Project Manager		

4.3 MEETINGS REPORTS AND CONSULTATIONS

Table 4.2 lists all meetings and consultations as required by the Contract. The table also provides details on the schedule/frequency, scope & objectives and attendees / responsibility for each meeting.

4.4 ROLES & RESPONSIBILITIES

Roles and responsibilities for environmental management, monitoring and reporting are detailed in **Table 4.3**. The Ecological Clerk of Works Contractors will be responsible for the delivery of all elements of the Environmental Management Plan. The Ecological Clerk of Works Contractors will retain all responsibility for issuing, changing and monitoring the Environmental Management Plan.

4.5 REPORTING PROCEDURES

Figure 4.1 provides a diagrammatic outline of the general tasks and communication lines, based on the roles described in **Tables 4.2** and **4.3** and tasks detailed in the Management Plans. The Contractors will update this information as part of the construction stage CEMP.

Management Plan 1- Emergency Response Plan includes the communications plan for reporting procedures for all potential environmental risks, hazards or incidents which may relate to ecology, water quality, dust, noise or archaeology. Environmental reporting to statutory bodies, such as Leitrim County Council will be managed by the relevant Contractors in accordance with an agreed reporting schedule.

Table 4.2: Meetings, Reports and Consultations

Meeting/ Report	Schedule/ Frequency	Scope & Objective	Attendees/Responsibilities
A Record of all meetings, checks, permissions and licenses will be retained within Section 4 of this CEMP			
Site Inductions	All new site personnel and visitors		Contractors to organize and maintain records
Weekly environmental meetings	Weekly	To provide updates on environmental mitigation measures and performance and identify actions for improvement. The Ecological Clerk of Works Contractors is required to maintain a Pollution Prevention Measures Register in which mitigation measures put into place will be listed and checked weekly to assess the requirement for maintenance. The results of these checks will be discussed at the meeting and corrective actions agreed as required.	Attendance required: Ecological Clerk of Works Contractors Site Manager, Contractor's Environmental Manager, and any other relevant personnel or statutory consultees where necessary.
Monthly Environmental Report & Monthly Environmental Management Group Meeting	Monthly	To provide a compiled record of weekly meeting minutes and environmental performance and monitoring results (e.g. air, noise or water quality monitoring as appropriate). To identify any areas / action for improvement.	To be prepared by Ecological Clerk of Works. Report to be issued to the Contractors and Construction Project Manager before the end of each calendar month. Report to be discussed at the monthly meeting with recommendations for improvement passed to the Contractors in written format

Meeting/ Report	Schedule/ Frequency	Scope & Objective	Attendees/Responsibilities
Final Environmental Report	Upon completion of construction works	The final report will document the environmental and ecological effects of the construction period. The evidence for effects will be based on findings included in the minutes of weekly meetings and monthly meetings, together with other recording information maintained by the Ecological Clerk of Works. The report will relate results to residual effects predicted in the EIS.	The Final Report will be prepared by the Ecological Clerk of Works. The report will be made available to the Contractors, Construction Project Manager and Planning Authority, if required.
Environmental Checks and Monitoring of Mitigation Works	As required in advance of construction works regular checks will also be made at least every 14 days.	Environmental Checks are to be carried out in advance of construction works. This will comprise an on-site meeting / inspection to confirm the appropriate use of identified mitigation measures and highlight any further issues / measures which may be relevant prior to commencement of works in any area. As a minimum, Environmental Checks will be completed at each main piece of site	Environmental checks will be undertaken by the Contractors Environmental Manager. The Ecological Clerk of Works may also undertake regular checks, either independently or in conjunction with the Contractors checks as required. The Contractors Environmental Manager and the Ecological Clerk of Works will retain a record of all inspections / findings of Environmental Checks within Section 4 of this CEMP. All records will be made available for audit / review. All records will also be made available for discussion

Meeting/ Report	Schedule/ Frequency	Scope & Objective	Attendees/Responsibilities
		infrastructure (turbine bases, construction compounds, sub-station, control room) prior to works commencing in that area. Environmental Checks will include: • Checks for visual evidence of contamination / sediment alongside watercourses, nearby working areas and in areas of surface water discharge. • Regular checks of all plant and equipment to identify any oil or fuel leaks to confirm the condition of the plant. • Inspection of drainage and erosion and sediment control measures. Additional checks will be made before, during (where safe to do so) and immediately following anticipated storm events or periods of continuous or heavy intermittent rainfall	during regular meetings as scheduled herein.

Meeting/ Report	Schedule/ Frequency	Scope & Objective	Attendees/Responsibilities
		over one or more days. • Environmental checks will also encompass a review of: - Waste management procedures - General site tidiness - Temporary materials storage (extracted materials stockpiles) and restoration works and - Soil stability - Signs of any mammal activity on site - Buffer zones (if any) are being maintained	
Environmental Audit	At least once every month.		Environmental Audits may be carried out by the Contractors, or Letter Wind Farm Ltd at any time during the works. Audit procedures and forms are included within Section 4 and TS1. These will be followed / completed by the Employer when undertaking environmental audits and may also be adopted by the Contractors,

Meeting/ Report	Schedule/ Frequency	Scope & Objective	Attendees/Responsibilities
			unless alternative procedures and forms are submitted and approved as part of the Contractors' construction stage CEMP.
Liaison with regulator / statutory Consultees	As Required	Provide regular updates to relevant authority on environmental performance and maintain good working relationships with the regulatory bodies.	Contractors and Ecological Clerk of Works where required. Meetings will be initiated as required by Planning Conditions, Management Plans or as agreed throughout the duration of the construction phase. The Contractors is responsible for obtaining all relevant permissions, consents, licenses and permits. Some permits may require application and implementation by an appropriately qualified person. In these instances, the Contractors will consult with the other specialist Environmental Consultants where required.

Table 4.3: Roles and Responsibilities

Position	Roles and Responsibilities
Construction Project Manager	The Construction Project Manager will: Ensure that the Contractors has obtained the relevant approvals and licenses and consents from regulatory bodies and statutory consultees where required. Ensure that the Contractors has submitted all relevant documentation to t, liaise with the Site Manager and the Ecological Clerk of Works and ensure that corrective actions and variations to the CEMP have been instigated.
Project Site Manager/ Engineer	The Site Manager will provide liaison between the Ecological Clerk of Works and the Contractors where environmental sensitivities, instruction for environmental performance improvements or corrective actions are requested by the Ecological Clerk of Works or other appropriate person(s)

Position	Roles and Responsibilities
	as a result of environmental checks or audits conducted by these person(s). The Site Manager will ensure that all notifications of environmental sensitivities and incidents as well as other general observations on environmental performance are reported back to the Construction Project Manager. The Project Site Manager is responsible for review and further development of the CEMP.
Environmental Manager	The Contractors Environmental Manager will be a member of the Environmental Management group and will work with the Contractors to ensure compliance with best practice and with all environmental mitigation and monitoring requirements as detailed within the relevant planning conditions, compliance documents and CEMP during both the pre-construction and construction phases. The main roles of the Environmental Manager are as follows: • Organise start-up meeting / Toolbox talks with the Contractors to agree working methods, specifically including communications; schedules; monitoring of data storage; and preparation of plans indicating location of key features including mitigation measures, monitoring points and sensitive habitats (where not previously highlighted and approaches agreed). • Give tool box talks as agreed with the Contractors to address key areas, including water pollution prevention, protected species management, and on-site biodiversity. Highlight to staff the requirement for compliance with planning conditions. • Undertake a pre-construction walkover with the Site Engineer / Site Manager to confirm that access routes remain appropriate to the conditions present at the time of construction • Delineate any sensitive habitats or features with wooden stakes and high visibility tape • Undertake or delegate to an appropriately qualified person, a pre-construction Invasive Alien Species survey along the works route • Monitor the installation of poles and infrastructure • Inspect pollution control measures during the works • Maintain a presence on site during the pre-construction and construction works, including setting out of access routes. • Organise a minimum of weekly meetings with the Site Environmental Supervisor and / or Foreman, to allow briefing on the programme of works on site and to provide on-site guidance during construction.

Position	Roles and Responsibilities
	• Identify environmentally sensitive areas and ecological hazards for demarcation by the Contractors. • Develop written reports / audits and submit to the Contractors and present findings at meetings as required. Prepare updated reports and a final report on mitigation measures, procedures and monitoring. • Monitor potential environmental impacts and the successful implementation of all mitigation as detailed in the NIS and this CEMP. • Maintain a weekly presence on site during the main construction works • Prepare a pre-construction Invasive Alien Species survey along the works route • Identify environmentally sensitive areas and ecological hazards for demarcation by the Contractors. • Produce written reports to the Contractors following site visits and meetings. This includes monthly reports and a final report. The Contractors will provide comprehensive information on all proposed works and all scheduling to the Ecological Clerk of Works in advance, in order to anticipate and address any issues, especially access to new areas including areas where Invasive Alien Species may occur, vegetation clearance, setting out of buffer zones, excavation and silt mitigation measures, temporary compound works and vegetation reinstatement.
Ecological Clerk of Works and/ or Water Quality Specialist	The Ecological Clerk of Works will work with Letter Wind Farm Ltd., the Contractors to see that compliance is achieved with best practice and with all environmental mitigation and monitoring requirements as detailed within the NIS and CEMP, relevant planning conditions and CEMP. The Ecological Clerk of Works will delegate and oversee the work to ensure competency of tasks achieved. Where a particular ecological concern exists at the Site, or specific habitat management activities are to be undertaken in conjunction with the main civils construction works, a Specialist Ecologist / Environmental Consultant may also be required unless the Ecological Clerk of Works is suitably qualified to undertake the particular ecological responsibilities. The main roles of the Ecological Clerk of Works are as follows: • Organise start-up meeting / Tool box talks with the Contractor to agree working methods, specifically including communications; weekly schedules; monitoring of data storage; and preparation of plans indicating location of key features including mitigation measures, monitoring points and sensitive habitats.

Position	Roles and Responsibilities
	• Maintain a weekly presence on site during the main construction works. • Organise a minimum of weekly meetings with the Environmental Manager, Site Manager and / or Foreman, to allow briefing on the programme of works on site and to provide on-site guidance during construction. Note: It is essential that the Contractor supplies information on works and scheduling to the ECoW in advance in order to anticipate and address any issues, specifically including drainage, buffer /protection zones, silt mitigation measures, cabling, roads, turbine bases, met masts, compounds, landscaping, topsoil removal, storage and replacement, vegetation reinstatement and restoration works, planting, felling and habitat management. • Highlight the need for compliance with planning conditions. Contractors Note: If failures occur and actions are taken which contravene legislation then the Project Ecologist has the power to stop works in the affected area with immediate effect. These actions will only be taken where appropriate. Notification to stop works will be by verbal means, followed up with written confirmation recording the time and date of the instruction, personnel involved and reasons for the instruction. Upon recommencement of works, details of any corrective actions and / or remedial measures implemented will be recorded within Section 4. • Give tool box talks as agreed with the site contractor to address key areas, including water pollution prevention, protected species management, and on-site biodiversity. • Monitor potential environmental impacts, including: - Use of and storage of oils and toxic chemicals on site, e.g. cement - Dewatering of excavations (including turbine bases) - Silt control - Water management, including working in or close to watercourses - Protection of ecological interests, e.g. protected species and habitats • Identify environmentally-sensitive areas and ecological hazards for demarcation by the Contractor • Produce written reports to the Contractor following site visits and meetings. This includes monthly reports and a final report.
Specialist Ecologist/ Environmental Consultant	Where a Specialist Ecologist / Environmental Consultant is employed, this person(s) will:

Position	Roles and Responsibilities
	• Provide advice and maintain regular liaison with the Project Site Manager, Project Manager, Ecological Clerk of Works and Contractors and / or other specialist Environmental Consultant as and when required. • Undertake specific monitoring activities and reporting as defined in agreed documentation prepared as part of the planning process. • The Ecological Clerk of Works or a Water Quality Specialist will be appointed. They will have responsibility for fulfilling the requirements of the Water Quality Management Plan, including: - Daily visual inspection of: access roads for signs of ground damage or solids escape to nearby watercourses in vicinity of construction works - The ground between the structure under construction and the nearest downslope watercourse for signs of solids escape or ground damage - Surface water features in vicinity of construction works - Any pollution control measures at structures and along access roads (e.g. silt fences, drain or stream crossings etc.) for evidence of contaminated run-off or mitigation failure - Attendance at the critical work phases including, access road construction, foundation excavation, watercourse crossings, concrete pouring and back-filling. - Collection and analysis of water samples at a number of monitoring locations before, during (if potential pollution visually identified) and after construction works at that location. - EPA Q Value Biological Monitoring at monitoring locations (i.e., upstream & downstream of instream construction work locations) before and after construction works.
Archaeological Clerk of Works	The main roles of the Archaeological Clerk of Works (licenced) are as follows: • Maintain regular liaison with the Project Site Manager, Project Manager, Ecologist and Ecological Clerk of Works as appropriate. • Maintain liaison with officers of the Planning Authority, specifically the Council Archaeologist and Planning Officers as appropriate. • Where applicable apply for licence application; the Minister for Dept of Culture Heritage and Gaeltacht can approve and issue a licence under Section 26 of the National Monuments Act 1930.

Position	Roles and Responsibilities
	• Facilitate compliance with planning conditions and agreed Archaeological Programme of Works. • Demarcate any archaeologically-sensitive areas and set up exclusion zones as required on site. • Immediately notify the relevant authorities in the event of the discovery of archaeological finds or remains and suspend works in the immediate area pending consultation. Allowance will also be made for full archaeological excavation if required. • Complete a full report for submission to the Planning Authority and the Department of Arts, Heritage and the Gaeltacht on completion of the works.
Geotechnical Clerk of Works or Appointed Geotechnical Consultant	The Geotechnical Clerk of Works will be responsible for preparation and monitoring of a geotechnical risk register as well as specific duties relating to geotechnical issues as they may arise during site construction works. Soil instability and the potential for slide even can have a significant impact on environmental receptors. In completing the geotechnical risk register, the Geotechnical Clerk of Works will work with the Contractors to identify suitable mitigation and monitoring methods. Where possible, construction works will avoid causing change to local hydrological and hydrogeological flow patterns and water levels.
Contractors Appointments	
Construction Manager	[The Contractors is required to specify roles and responsibilities for each individual below]
Site Agent	[To Be Confirmed]
Foreman	[To Be Confirmed]
Other Nominated Person(s)	[To Be Confirmed]

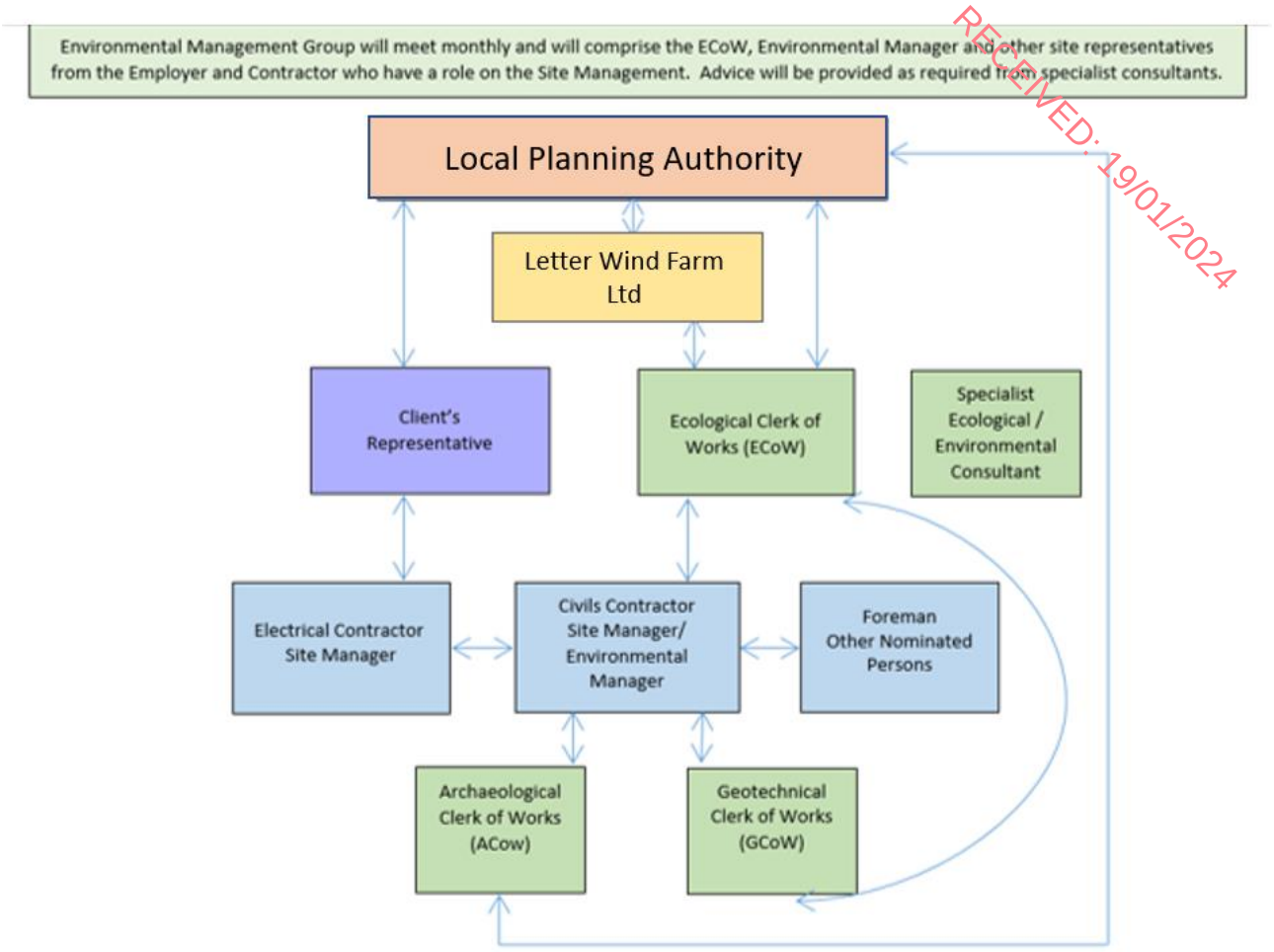

Figure 4.1 General Communication Plan

4.6 TRAINING, AWARENESS AND COMPETENCE

All site personnel will receive environmental awareness information as part of their initial site briefing. The detail of the information will be tailored to the scope of their work on site. This will ensure that personnel are familiar with the environmental aspects and impacts associated with their activities, the procedures in place to control these impacts and the consequences of departure from these procedures.

The CEMP will be posted on the main site notice board during the project. The environmental performance at the Site will be on the agenda of the monthly project management meetings for the project. Elements of the CEMP will be discussed at these meetings including objectives and targets, the effectiveness of environmental procedures etc. Two-way communication will be encouraged by inviting all personnel to offer their comments on environmental performance at the Site.

4.7 EMERGENCY PREPAREDNESS AND RESPONSE

An emergency preparedness and response procedure is required to prevent environmental pollution incidents. Suitable spill kits and absorbent material for dealing with oil spills will be maintained on site. In the event of pollution or potential risk of pollution, Leitrim County Council will be informed immediately. In the case of water pollution, in addition to Leitrim County Council, Inland Fisheries Ireland will also be informed immediately. Further details in relation to emergency responses are provided at **Management Plan 1: Emergency Response Plan.**

5 CORRESPONDENCE, RECORDS & REPORTS

5.1 REQUIREMENTS

The Contractors will insert / file all communication records and reports associated with Environmental Management and implementation of this CEMP under this Section 5. As a guide, the following sub-sections of filed information will be required (at a minimum):

5-A) Meeting minutes and attendance record

5-B) Weekly Environmental Reports

5-C) Monthly Environmental Reports

5-D) Environmental Checks

5-E) Audit Reports

5-F) Ecology documentation and monitoring records

5-G) Pollution Prevention, including a Pollution Prevention Measures Register

5-H) Water Quality documentation and monitoring records

5-I) Archaeology documentation and monitoring records

5-J) Ground Risk, including a Geotechnical Risk Register

5-K) Waste Management documentation

5-L) Licensing and Consents: copies of all permissions, consents, licenses and permits and related correspondence. A summary record of all such documents shall also be provided in accordance with **Table 5.1** of this CEMP.

5-M) General Correspondence: all other relevant internal and external communication records relating to environmental management issues and implementation of the CEMP.

5-N) Training Records

5-O) Toolbox Talk Records

5-P) Ecological Clerk of Works Reports

All of these documents and records will be made available for inspection in the site office. The documentation will be maintained and will be reviewed on a regular basis with revisions controlled in accordance with the site quality plan.

5.2 ENVIRONMENTAL AUDITS

The Contractors Ecological Clerk of Works will consult and assist with the Client in evaluating compliance with applicable legislation by means of a monthly Environmental Audit. A blank Environmental Audit Report form is included in **Management Plan 1: Emergency Response Plan**. All completed audit report forms and records of corrective actions (and close outs) must be filed within this section of the CEMP.

5.3 ENVIRONMENTAL CONSENTS, LICENSES & PERMITS

The Environmental Manager (or otherwise nominated responsible person(s)), will complete the summary record for all applicable permissions, consents, licenses and permits obtained for the Site. This record will follow the format provided in **Table 5.1**.

Table 5.1: Record of Environmental Consents, Licenses and Permits Issued

Consents, Licenses & Permits	Governing Legislation	Licensed Activity
Pollution Control & Hydrology		
Biodiversity		
Waste Management / Contaminated Land		
Noise / Vibration		
Archaeology		
Transport		
Other		

Letter Wind Farm Ltd will apply for consent for the construction of one water crossing within the wind farm site under Section 1 of the Arterial Drainage Act, 1945.

5.4 ENVIRONMENTAL MONITORING AND MEASURING

All of the mitigation measures outlined in Section 3.0 will be monitored, where applicable. The Contractors will put in place a program of monitoring for dust, noise, vibration and water sampling in accordance with the requirements of this CEMP.

Copies of all records will be maintained in the site office and will be reviewed by the Contractors.

5.5 NON-CONFORMANCE, CORRECTIVE AND PREVENTATIVE ACTION

Non-Conformance Notices will be issued where there is a situation where limits associated with activities on the project are exceeded, or there is an internal/external complaint associated with environmental performance.

Non-Conformance is the situation where essential components of the CEMP are not met, or where there is insufficient control of the activities and processes to the extent that the functionality of the CEMP, is compromised in terms of the policy, objectives and management programmes.

Correction will be required in order to improve the identified non-conformance. The CEMP must conform to its objectives and targets and the requirements of the ISO 14001 management standard. In the event of non-conformance with any of the above, the following must be undertaken:

- Investigate the non-compliance;
- Develop a plan for correction of the non-compliance;
- Determine preventive measures and ensure they are effective;
- Verify the effectiveness of the correction of the non-compliance.
- Ensure that any procedures affected by the corrective action taken are revised accordingly.

Responsibility must be designated for the investigation, correction, mitigation and prevention of non-conformance.

6 MANAGEMENT PLANS & AVAILABLE INFORMATION

6.1 MANAGEMENT PLANS

Various Management Plans have been prepared. as listed in **Table 6.1**. These are intended to provide a benchmark for best practice and to define Letter Wind Farm Ltd.'s minimum requirements for environmental management and mitigation.

6.2 CONTRACTORS REQUIREMENTS

The Contractors are required to further develop the Management Plans into detailed site and works specific environmental plans, method statements and procedural documents. **Table 6.1** provides a summary of the content of the Management Plans and the Contractor's obligations for their further development.

Table 6.1: List of Management Plans

No.	Name	Details
MP1	Emergency Response Plan	The Contractors will further develop the Environmental (Incident and Emergency) Communication Response Plan. This will include procedures for dealing with containment of accidental chemical or fuel spills, potential overload of the drainage system by silt during unforeseen adverse weather conditions etc. The Contractors will prepare a Communication Plan for emergency response in the event of a spillage. Detailed procedures will be outlined in this document.
MP2	Water Quality Management Plan	The Contractors are obliged to implement the water quality monitoring proposals set out therein.
MP3	Surface Water Management Plan	The Contractors are obliged to implement the water quality monitoring proposals set out therein. Where changes to the plan are required the Contractors must consult with the Ecological Clerk of Works.
MP4	Peat and Spoil Management Plan	The Peat and Spoil Management Plan has estimated the volume of spoil that will be generated during the construction phase and it outlines the locations where the material can be re-used on site. The Peat and Spoil

No.	Name	Details
		Management Plan is a live document and can be amended by the Contractors where required.
MP5	Waste Management Plan	The Contractors will further develop the Waste Management Plan. The detailed plan will specify the licensed waste facilities that will be used for the duration of the Project.
MP6	Decommissioning Plan	The Contractors will further develop the Decommissioning Plan. Where changes to the plan are required, the Contractors must consult with the Ecological Clerk of Works.
MP7	Traffic Management Plan	The Contractors will further develop the Traffic Management Plan. Where changes to the plan are required, it can be amended by the Contractors.

MANAGEMENT PLAN 1 -

EMERGENCY RESPONSE PLAN

MANAGEMENT PLAN 2 –

WATER QUALITY MANAGEMENT PLAN

MANAGEMENT PLAN 3 –

SURFACE WATER MANAGEMENT PLAN

MANAGEMENT PLAN 4 –

PEAT AND SPOIL MANAGEMENT PLAN

MANAGEMENT PLAN 5 –
WASTE MANAGEMENT PLAN

MANAGEMENT PLAN 6 – DECOMMISSIONING PLAN

MANAGEMENT PLAN 7 – TRAFFIC MANAGEMENT PLAN