APPENDIX 4-8

CONSTRUCTION AND ENIRONMENTAL MANGEMENT PLAN (CEMP)

Planning and Environmental Consultants

Construction and Environmental Management Plan

Coole Wind Farm Development, Co. Westmeath

DOCUMENT DETAILS

Client:	**Coole Wind Farm Ltd.**
Project Title:	**Coole Wind Farm Development, Co. Westmeath**
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Document Title:	**Construction and Environmental Management Plan**
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07	Final	16.03.2021	PH	MW/EC

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1. INTRODUCTION

This Construction and Environmental Management Plan (CEMP) has been developed by MKO on behalf of Coole Wind Farm Ltd., who intend to apply to An Bord Pleanála for planning permission to construct a wind energy development and all associated infrastructure, as well as the provision of an underground grid connection (c. 26.km in length) suitable to link the proposed substation to the national electricity transmission network via the existing Mullingar substation at Irishtown, near Mullingar. The proposal also includes upgrade works to the existing 110kV Mullingar substation consisting of the construction of an additional dedicated bay to facilitate connection of the cable.

This CEMP has been prepared in conjunction with the Environmental Impact Assessment Report (EIAR) which will accompany the planning application for the proposed development to be submitted to An Bord Pleanála. This report is intended as a single, amalgamated document that can be used during the future phases of the project, as a single consolidated point of reference relating to all construction, environmental and drainage requirements for the Planning Authority, developer and contractors alike.

This report provides the environmental management framework to be adhered to during the pre-commencement, construction and operational phases of the proposed development and it incorporates the mitigating principles to ensure that the work is carried out in a way that minimises the potential for any environmental impacts to occur. This report has been prepared in accordance with the mitigation measures and commitments made in the EIAR, Appropriate Assessment Screening Report (AASR), Natura Impact Statement (NIS) and other planning documents for the development.

Should the project secure planning permission, the CEMP will be updated, in line with all conditions and obligations which apply to any grant of permission. The CEMP should be read in conjunction with the EIAR and planning drawings.

1.1 Potential Amendment Scenario's

The CEMP will also require updating by the selected contractor in order to identify, assess and satisfy the contract performance criteria as set out by the various stakeholders. The CEMP due to its structure and nature will also require constant updating and revision throughout the construction period as set out below. Therefore, this is a working document and will be developed further prior to and during construction.

Triggers for amendments to the CEMP will include:

- When there is a perceived need to improve performance in an area of environmental impact;
- As a result of changes in environmental legislation applicable and relevant to the project;
- Where the outcomes from auditing establish a need for change;
- Where Work Method Statements identify changes to a construction methodology to address high environmental risk; and
- As a result of an incident or complaint occurring that necessitates an amendment. Complaints will be documented in the site complaints log and the Environmental Manager will arrange to meet with those affected. The situation will be acted upon immediately and reviewed by the Project Manager. A copy of the complaints procedure is included in Appendix 1 of this document.

1.2 Scope of the Construction and Environmental Management Plan

This report is presented as a guidance document for the construction phase of the proposed Coole Wind Farm. It outlines clearly the mitigation measures and monitoring proposals that are required to be adhered to in order to construct the wind farm in an appropriate manner. The report is divided into nine sections, as outlined below.

- Section 1 provides a brief introduction as to the scope of the report and the planning conditions it is intended to satisfy.
- Section 2 outlines the site and project details, detailing the targets and objectives of this plan along with providing an overview of anticipated construction methodologies that will be adopted throughout the proposed project.
- Section 3 sets out an overview of the construction methodologies for all elements of the proposed development
- Section 4 sets out details of the environmental controls on site which looks at noise and dust controls. Site drainage measures, peat management, invasive species management, traffic management and a waste management plan are also included in this section.
- Section 5 sets out a fully detailed implementation plan for the environmental management of the proposed project outlining the roles and responsibilities of the project team.
- Section 6 outlines the Emergency Response Procedure to be adopted in the event of an emergency in terms of site health and safety and environmental protection.
- Section 7 provides a summary of the Safety and Health Plan for the proposed development outlining the responsibilities and inputs required from the project team
- Section 8 consists of a summary table of all mitigation proposals to be adhered to during the implementation of the proposed project, categorised into three separate headings, 1) pre-commencement measures; 2) construction-phase measures and 3) operational-phase measures.
- Section 9 consists of a summary table of all monitoring requirements and proposals to be adhered to during the implementation of the proposed project, categorised into three separate headings, 1) pre-commencement measures; 2) construction-phase measures and 3) operational-phase measures.
- Section 10 sets out an anticipated programme for the timing of the proposed works.
- Section 11 outlines the proposals for reviewing compliance with the provisions of this report.

1.3 Targets and Objectives

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

The key site targets are as follows;

- Ensure construction works and activities are completed in accordance with mitigation and best practice approach presented in the EIAR, AASR, NIS and associated planning documentation;
- Ensure construction works and activities are completed in accordance with all planning conditions for the development and that the CEMP is updated as required;
- Ensure construction works and activities have minimal impact/disturbance to local landowners and the local community;

- Ensure construction works and activities have no adverse effect on the integrity of any European Site;
- Adopt a sustainable approach to construction; and,
- Provide adequate environmental training and awareness for all project personnel.

The key site objectives are as follows;

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

2. SITE AND PROJECT DETAILS

2.1 Site Location

The site of the proposed wind farm development is located in north Co. Westmeath, approximately 2.4 kilometres north of Coole village. The town of Castlepollard is located approximately 6.7 kilometres southeast of the site, at its nearest point. Table 2-1 sets out the townlands in all elements of the wind farm, grid connection route and ancillary works are located.

The proposed permanent footprint of the Proposed Development measures approximately 26.4 hectares. The overall layout of the Proposed development is shown on Figure 2-1a and 2-1b. Land-use on the subject site is associated with commercial peat harvesting, commercial forestry and pastoral agriculture. Land-use in the wider landscape comprises a mix of large-scale peat extraction, pastoral agriculture, low density residential and commercial forestry.

The site is partially bound by the Inny River to the west, agricultural land to the south and east, and coniferous forestry and an active peat harvesting bog to the north. The River Glore intersects the northern section of the site as it flows from southeast to northwest.

It is proposed to deliver turbines to the site from the port of delivery (i.e. Dublin, Cork or Waterford) via the M4 motorway and then the N4 National Primary Road single-lane carriageway between Mullingar and Edgeworthstown. From the N4, the turbine delivery route turns northwards on the L1927 local road, then turns right onto the L5828 at Boherquill, and from here onto the R395 Regional Road at Corralanna. From the R395, the turbine delivery route will then connect to the R396 via a proposed new section of access road ("link road") in the townland of Coole, thereby avoiding the existing left-hand-turn in Coole village. A Traffic Management Plan is located in Section 4.12.3 of this CEMP with further information on traffic and transportation outlined in Chapter 14 of the EIAR.

The Proposed Development will connect to the national electricity grid via Mullingar 110 kV substation. The proposed grid connection route measures approximately 26km in length from the proposed wind farm site to the existing substation near Mullingar. The grid connection route would comprise underground cabling located primarily within the public road corridor, with a short section of underground cabling (approximately 700m) across private lands at the northernmost end.

It is proposed to upgrade the existing Mullingar 110kV substation to accommodate the connection of the Proposed Development consisting of the construction of an additional dedicated bay to facilitate connection of the cable.

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

Development Works	Townland
Wind Farm, including Turbines and Access Roads, Substation, Construction Compound	Camagh, Carlanstown, Coole, Clonrobert, Clonsura, Doon, Monktown, Mullagh, and Newcastle.
Proposed Borrow Pit	Mullagh
Junction Accommodation Works	Boherquill, Coole, Corralanna, Culvin,Joanstown and Mayne
Grid Connection Route	Camagh, Monktown, Coole, Fearmore (Fore by), Newtown (Fore by), Mayne, Simonstown (fore by), Ballinealoe, Shrubbywood, Clonava,

Development Works	Townland
	Lackan (Corkaree by), Soho, Ballynaclonagh, Abbeyland, Rathganny, Ballindurrow, Cullendarragh, Culleenabohoge, Ballynafid, Knightswood, Portnashangan, Culleen More, Farranistick, and Irishtown (Moyashel by)

Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout
- Proposed Hardstand
- Internal Roads (new)
- Internal Roads (Upgrades to existing)
- External Roads (Upgrades to Existing)
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Onsite Substation
- Proposed Grid Connection Route
- Proposed Upgrade Works to Existing Mullingar Substation
- Temporary Hardcore Surfacing Areas

Drawing Title: Proposed Site Layout

Project Title: Coole Wind Farm, Co. Westmeath

Drawn By	Checked By
EC	MW
Project No.	Drawing No.
200445	Figure 2-1a
Scale	Date
1:65000	11.02.2021

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N

Drawing Title: Proposed Site Layout

Project Title: Coole Wind Farm, Co. Westmeath

Drawn By	Checked By
EC	MW
Project No.	Drawing No.
200445	Figure 2-1b
Scale	Date
1:25000	11.02.2021

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2.2 Geological Conditions

The ground conditions at the Wind Farm Site (including the link road area) can be categorised into the following deposits:

- Peat – Typically described as brown/dark brown fibrous and amorphous peat. Peat thicknesses from peat probing, window sampling and drilling ranged from 0 to 12.5m. The average peat depths recorded at infrastructure locations across the Wind Farm Site was 3.9m.
- Calcareous Mud/Shell Marl – Soft cream coloured mud with local deposits of shell fragments.
- Lacustrine Clay – Locally grey to dark grey soft to firm clay. The marl is considered to be a lacustrine deposit.
- Glacial Granular Soils – Locally loose to dense wet grey sandy clayey silty gravel. The glacial granular soils are likely to have a mixed strength/density.
- Weathered Bedrock – Possible weathered bedrock was only encountered in trial pit TP2-C. Arisings from the trial pit comprised of large angular cobbles and a matrix of sandy silt and angular gravel.
- Limestone bedrock – Limestone bedrock was encountered during the rotary core boreholes drilled at 13 no. locations. The bedrock is described as generally medium strong to strong, dark grey, fine grained, thinly to thickly bedded Limestone.

The ground conditions at the borrow pit can be typically categorised into the following deposits:

- Topsoil – Typically described as sandy gravelly clay.
- Glacial Till – Consisted of orange to brown slightly gravelly Clay.
- Weathered Bedrock – Typically consisting of angular gravels, cobbles and boulders of weathered limestone in a clay matrix.
- Bedrock – Bedrock comprises of strong intact limestone at typically 1.5 metres below ground level.

The published soils map (www.epa.ie) for the area indicates that the majority of the Grid Connection Route, north of Multyfarnham, including the area of the proposed onsite substation, is mapped as cut over peat, while the area around Coole village is mapped as basic, well drained mineral soil (BminDW). South of Multyfarnham, soils are mapped as being predominantly acidic, well drained mineral soil (AminDW) with some pockets of Fen Peat. The soils between the southern tip of Lough Owel and Mullingar town are mapped as BminDW. Subsoils in the area are mapped by the GSI as generally cut over raised peat and Tills derived from Limestone north of Multyfarnham, transitioning to Tills derived from chert, raised peat and minor areas of Tills derived from Limestone.

A peat stability assessment was carried out to determine the stability i.e. Factor of Safety (FoS), of the peat slopes where construction is proposed during the development of the wind farm. The findings, which involved analysis of over 200 no. locations, showed that the site has an acceptable margin of safety and is suitable for the proposed wind farm development. The findings include recommendations and control measures for construction work in peatlands to ensure that all works adhere to an acceptable standard of safety as set out in the Peat Stability Management Section 4.6 of this CEMP.

2.3 Hydrological Conditions

On a regional scale, the proposed wind farm is located in the Inny River surface water sub-catchment which is in the Upper Shannon catchment within Hydrometric Area 26 of the Shannon International River Basin District (SIRBD).

On a more local scale the site is located in the Inny River sub-catchment and two sub basins of the Inny River. The majority of the site is within the Inny_050 sub basin with a small section in the south of the

site near the R396 within the Inny_060 sub basin. The Inny River flows in a southerly direction along the western boundary of the site and discharges into Lough Derraverragh approximately 7.5km downstream of the site.

The western section of the site drains directly to the Inny River via a number of settlement ponds and outfall channels which are discussed further below in the site drainage section. The River Glore flows from across the northern section of the site from east to west and merges with the Inny River on the western boundary of the site.

A drain (henceforth known as drain D1), which divides the northern basin in two sections, discharges directly to the Inny River northwest of the Wind Farm Site. Lough Bane, proposed Natural Heritage Area (pNHA) is located adjacent to the northern boundary of the Proposed Development site; however, no part of the Proposed Development footprint is located within the pNHA. Lough Bane itself is located approximately 180 metres north of the internal access road between Turbines T2 and T4. An unnamed small dystrophic lake is located on the northwestern corner of the site.

The proposed link road is located within the Inny River catchment, and the junction improvement works are also located within sub-catchments to the Inny River. The Inny River flows south from the Wind Farm Site into Lough Derraverragh approximately 7.5km downstream of the site.

The Grid Connection Route is located within the Shannon International River Basin District. With respect to regional hydrology, the Grid Connection Route is located in 2 no. regional surface water catchments (the River Inny and the River Brosna) and 3 no. regional surface water sub-catchments. The southern section of the Grid Connection Route, along the eastern edge of Lough Owel and on to Mullingar (~8km long) is located within the Brosna sub-catchment (Brosna_SC_010) within the regional Lower Shannon catchment (25A). The area north of Lough Owel to the northern edge of Lough Derravargh is located within the Inny sub-catchment (Inny[Shannon]_SC_030). North of Lough Derravargh, towards Coole, falls within the boundary of the Inny sub-catchment (Inny[Shannon]_SC_020). Both of these subcatchments are located within the regional Upper Shannon Catchment (26F).

Drainage measures on the site will include swales, silt traps, settlement ponds, field drains and headland drains as discussed further in Section 4.2 below.

2.4 Ecological Conditions

The Coole Wind Farm Site study area is dominated by Cutover Bog (PB4). Much of Coole bog comprises milled peat and is divided up by drains, spaced approximately 15m apart, which separate long parallel peat production fields. The lands to the east of the site comprise agricultural land. The edge of the main wind farm site is bordered by Conifer Plantation (WD4) to the east and south while the lands surrounding T15 are predominantly agricultural in nature. The proposed Turbine 15 is located to the east of the site within agricultural grassland categorized as Improved Agricultural Grassland (GA1)/Wet Grassland (GS4). The proposed Turbine 5 and Turbine 14 are located within Conifer Plantation (WD4). The remaining turbines locations are situated in Cutover Bog (PB4).

The proposed grid connection route will be located within the carriageway/verge of existing public roads. There is no requirement to use habitats located outside the road carriageway except at the Northern and Southern ends where the connection points leave the public road for termination. All roads within/adjacent to the proposed cable route were classified as Building and Artificial Surfaces (BL3). Much of the cable route was bordered by a verge supporting Dry Meadows and Grassy Verges (GS2).

Third Schedule invasive species, Rhododendron (Rhododendron ponticum), Japanese Knotweed (Fallopia japonica) and Bohemian Knotweed (Fallopia bohemica) were recorded at 5 locations along the grid connection route in the townlands of Clonava, Multyfarnham and Ballinealoe. All works in

these areas will be confined to the existing road. Best practice measures are in place to ensure no Third Schedule invasive plants are spread as a result of the Proposed Development.

The assessment identifies a number of Key Ecological Receptors: Degraded Raised Bog, Dystrophic Lake, River Glore Corridor and River Inny, Bog Woodland, Otter, Badger and Bat species. Habitats listed in Annex I of the EU habitats Directive were not recorded within the development footprint or along the turbine delivery or grid connection routes. No Annex I habitats will be impacted as a result of the Proposed Development. Levels of faunal activity were extremely low and evidence recorded was associated with the periphery of the site.

2.5 Archaeological Conditions

Through a detailed examination of the baseline data available and a detailed site inspection, it was concluded that while the archaeological potential of the area is high, however no new sites were noted within the peatland areas of the Proposed Development, nor are any recorded archaeological or architectural assets located therein. One new potential archaeological monument was detected within the Wind Farm Site boundary at Clonrobert townland. It comprises an enclosed rectangular area in pasture c. 74m east of the proposed access road to T15. No direct impacts to this potential monument as a result of the proposed development have been identified. Furthermore, direct impacts to recorded archaeological and architectural assets as a result of the proposed turbines, substation, associated infrastructure and borrow pit have not been identified.

Where potential impacts are possible appropriate mitigation measures have been recommended in order to minimise any such impacts. Recommended mitigation includes re-assessment surveys due to the changing levels within the bog as a result of peat harvesting, pre-development archaeological testing where turbine bases, roads etc will be excavated and archaeological monitoring during the construction stage of the project. Indirect effects on the setting of National Monuments within 15km, RMPs within 5km and RPS/NIAH within 5km were included in order to assess impacts on setting in the wider landscape.

The proposed Grid Connection Route was subject to assessment. All cultural heritage assets within 100m of either side of the route were assessed for potential impacts to same as a result of the proposed Grid Connection Route. No direct impacts to the recorded or unrecorded archaeological, architectural or cultural heritage resource as a result of the proposed Grid Connection Route have been identified. Mitigation measures are recommended where deemed appropriate and include archaeological monitoring of ground works in specified areas along the proposed route. An assessment of potential impacts as a result of proposed Junction Accommodation Works along the proposed Turbine Delivery Route was also carried out. No direct or indirect impacts to the recorded archaeological or cultural heritage resource were identified.

An archaeological assessment will be completed in areas prior to the commencement of works. The details of the required assessment are summarised in Section 4.7 below.

3. CONSTRUCTION MANAGEMENT

3.1 Introduction

An experienced main contractor will be appointed for the civil works for the construction phase. The appointed contractor for the works will be required to comply with this CEMP and any revisions made to this document.

The proposed wind farm development will comprise of the following:

i. *Up to 15 No. wind turbines with a tip height of up to 175 metres and all associated foundations and hardstanding areas;*
ii. *1 no. onsite electrical substation including a control building, associated electrical plant and equipment, welfare facilities and a wastewater holding tank;*
iii. *1 no. temporary construction compound;*
iv. *Provision of new site access roads, upgrading of existing access roads and hardstand areas;*
v. *Excavation of 1 no. borrow pit;*
vi. *All associated underground electrical and communications cabling connecting the turbines to the proposed onsite substation;*
vii. *Laying of approximately 26 km of underground electricity cabling to facilitate the connection to the national grid from the proposed onsite substation located in the townland of Camagh to the existing 110kV Mullingar substation located in the townland of Irishtown;*
viii. *Upgrade works to the existing 110kV Mullingar substation consisting of the construction of an additional dedicated bay to facilitate connection of the cable;*
ix. *Construction of a link road between the R395 and R396 Regional Roads in the townland of Coole to facilitate turbine delivery;*
x. *Junction improvement works to facilitate turbine delivery, at the N4 junction with the L1927 in the townland of Joanstown, on land to the South East of railway line level crossing on the L1927 in the townland of Culvin, the L1927 and L5828 junction in the townland of Boherquill and the L5828 and R395 junction in the townland of Corralanna;*
xi. *Site Drainage;*
xii. *Forestry Felling;*
xiii. *Signage, and;*
xiv. *All associated site development works.*
xv. *This application is seeking a ten-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.*

The developer and/or contractor for the main construction works will liaise directly with Westmeath County Council and An Garda Síochána in relation to securing any necessary permits to allow the works to take place including for example:

- Commencement notice
- Special Permits in relation to oversized vehicles on public roads
- Temporary Road Closures (if required)
- Road Opening Licence (if required)

Complaints will be documented in the site complaints log and the Site Environmental Officer will arrange to meet with those affected. The situation will be acted upon immediately and reviewed by the Project Manager. A copy of the complaints procedure is included in Appendix 1 of this document.

An overview of the proposed anticipated Construction Methodologies is provided below.

3.1.1 Overview of Proposed Construction Methodology

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

- Temporary Construction Compound;
- Tree Felling
- Borrow Pit;
- Road Construction
- Hard Standing Areas;
- Turbine Foundations;
- Electricity Substation and Control Buildings;
- Proposed upgrade works to the existing 110kV Mullingar substation;
- Peat and Spoil Management;
- Grid Connection Cable Trench
- Existing Underground Services
- Grid Connection Watercourse/Culvert Crossings and Irish Rail Level Crossing
- Link Road Junction Accommodation and Public Road Works

3.1.1.1 Temporary Construction Compound

A temporary construction compound is proposed, located inside the wind farm site entrance from the R396 Regional Road, as shown in Figure 2-1. The proposed compound area measures approximately 6,610m2. The layout of the proposed compound comprises of temporary site offices, staff facilities and car-parking areas.

A dedicated waste management area will be located within the compound, with waste to be sorted and collected from site by permitted collectors. Potable drinking water will be supplied via water coolers located within the staff facilities, which will be restocked on a regular basis as required during the construction phase. A supply contract will be set up with a water cooler supply company with water supplies delivered to site as required for the duration of the construction period.

Temporary port-a-loo toilets located within portacabins will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. Power will be supplied by a diesel generator, located within the compound. The construction compound will be used for temporary storage of some construction materials, prior to their delivery to the required area of the site.

3.1.1.2 Tree Felling

The majority of the proposed wind farm site is occupied by cutover peat, with some areas occupied by commercial forestry and agricultural grassland. As part of the Proposed Development, some tree felling is required within and around the development footprint to allow the construction of turbine bases, access roads and other ancillary infrastructure. There are two turbines within the Proposed Development that are located within an area of forestry; T5 and T14. It should be noted that all forestry on the site of the proposed wind farm was originally planted as a commercial crop, and will be felled in the coming years should the proposed wind farm proceed or not.

A total of 16.36 hectares of forestry is required to be felled within and around the Proposed Development footprint.

The tree felling activities required as part of the Proposed Development will be the subject of a Felling Licence application to the Forest Service, as per the Forest Service's policy on granting felling licenses for wind farm developments. The policy requires that a copy of the planning permission for the wind farm be submitted with the felling licence applications; therefore the felling licenses cannot be applied for until such time as planning permission is obtained for the Proposed Development.

3.1.1.3 Borrow Pit

It is proposed to develop 1 No. borrow pit as part of the Proposed Development, the location of which is shown on Figure 2-1 and in the design drawings in Appendix 4-1 of the EIAR. The site of the proposed borrow pit is located on agricultural grassland, approximately 700 metres southeast of the nearest proposed turbine location (T14). The proposed borrow pit will be accessed from the L5755 local road, which will connect the borrow pit to the proposed wind farm site. The borrow pit access road is located less than 0.1 kilometre west of the access road to T15.

It is proposed to obtain the majority of all rock and hardcore material that will be required during the construction of the proposed development from the on-site borrow pit. Usable rock may also be won from other infrastructure construction including the substation and the turbine base excavations.

The borrow pit will, on removal of all necessary and useful rock, be reinstated and made safe from a health and safety perspective and the slopes will be graded using the subsoils and topsoil currently at this location. A gate will be in place at the borrow pit entrance location, set back from the local road.

3.1.1.4 Road Construction

3.1.1.4.1 *New Floating Roads*

New roadways will be required onsite for access to turbine locations, with the majority of these access roads floated unless ground conditions permit the use of excavated roads. New roadways will have a running width of approximately five metres, with wider section at corners and on the approaches to turbine locations. The proposed road layout also incorporates 2 No. passing bays to allow two trucks pass each other while travelling around the site.

All new roadways will be constructed with a camber to aid drainage and surface water runoff. The gradient and slope of the camber will depend on the site characteristics where the road is actually being constructed.

Construction of floating access roads across the peat is the proposed technique for the majority of the site access roads. Given the flat topography and deep nature of peat on site, floating access roads are deemed an appropriate construction technique.

The general construction methodology for floating access roads, as presented in FT's Peat and Spoil Management Plan in Appendix 4-2 of the EIAR, is summarised as follows:

- Prior to commencing floating road construction movement monitoring posts will be installed in areas where the peat depth is greater than 4m.
- Base geogrid to be laid directly onto the existing peat surface along the line of the road in accordance with geogrid provider's requirements.
- Construction of road to be in accordance with appropriate design from the designer.
- The typical make-up of the new floated access road is up to 1,000mm of selected granular fill with 2 no. layers of geogrid with possibly the inclusion of a geotextile separator.
- Granular fill to be placed and compacted in layers in accordance with the TII Specification for Road Works.
- Following the detailed design of the floated access roads it may be deemed necessary to include pressure berms either side of the access road in some of the deeper peat areas. The inclusion of a 2 to 5m wide pressure berm (typically 0.5m in height) either side of the access road will reduce the likelihood of potential bearing failures beneath the access road.
- The finished road width will be approximately 5m, with wider sections on bends and corners.

- Stone delivered to the floating road construction shall be end-tipped onto the constructed floating road. Direct tipping of stone onto the peat shall not be carried out.
- To avoid excessive impact loading on the peat due to concentrated end-tipping all stone delivered to the floating road shall be tipped over at least a 10m length of constructed floating road.
- Where it is not possible to end-tip over a 10m length of constructed floating road then dumpers delivering stone to the floating road shall carry a reduced stone load (not greater than half full) until such time as end-tipping can be carried out over a 10m length of constructed floating road.
- Following end-tipping a suitable bulldozer shall be employed to spread and place the tipped stone over the base geogrid along the line of the road.
- A final surface layer shall be placed over the full width of the floating road, as per design requirements, to provide a road profile and graded to accommodate wind turbine construction and delivery traffic.

3.1.1.4.2 *Upgrade of Existing Access Roads or Tracks*

Upgrading of existing tracks through peat is proposed for limited sections of access track across the site. Given the flat topography and deep nature of peat on site, upgrading of existing excavated access roads is deemed appropriate only where specified.

The general construction methodology for upgrading of existing sections of onsite roads or tracks, as presented in FT's Peat and Spoil Management Plan in Appendix 4-2 of the EIAR, is summarised below.

- This methodology includes procedures that are to be included in the construction to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations. Access road construction shall be to the line and level requirements as per design/planning conditions.
- For upgrading of existing excavated access roads the following guidelines apply:
    - Excavation of the widened section of access road should take place to a competent stratum beneath the peat and backfilled with suitable granular fill.
    - Benching of the excavation may be required between the existing section of access road and the widened section of access road depending on the depth of excavation required.
    - The surface of the existing access road should be overlaid with up to 500mm of selected granular fill.
    - Access roads to be finished with a layer of capping across the full width of the track
    - A layer of geogrid/geotextile may be required at the surface of the existing access road and at the base of the widened section of access road
    - For excavations in peat, side slopes shall be not greater than 1 (v): 3 (h). This slope inclination should be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required to ensure stability.

- For upgrading of existing floated access tracks (Type B – Figure 4-6) the following guidelines apply:
    - The make-up of the existing floating access roads on site is generally locally tree brash/trunks laid directly onto the peat surface and/or geotextile overlain by up to 500mm of coarse granular fill/till type (fine granular/cohesive) site won material. It should be noted that there are

localised variations in the make-up of the existing floated access tracks on site, frequently no tree brash/trunks were used in the make-up and the presence of a geogrid was also noted in localised sections of the existing track.
    - The surface of the existing access track should be levelled prior to the placement of any geogrid/geotextile, where necessary (to prevent damaging the geogrid/geotextile).
    - Where coarse granular fill has been used in the existing floated access road make-up, a layer of geogrid should be placed on top of the existing floated access track.
    - Where fine granular/cohesive type material has been used in the existing floated access road make-up (as is the case on some of the existing access roads in the southeast of the site), a layer of geotextile is likely to be required as a separator layer with a layer of geogrid.
    - The geogrid will be overlaid with up to 500mm of selected granular fill. Granular fill to be placed and compacted in layers.

- The finished road width will have a running width of 5m, with wider sections on bends and corners.
- On side long sloping ground any road widening works required will be done on the upslope side of the existing access road, where possible.
- At transitions between new floating and existing excavated roads a length of about 10 to 20m shall have all peat excavated and replaced with suitable fill. The surface of this fill shall be graded to accommodate wind turbine construction and delivery traffic.

Where possible, internal cabling may be placed within the internal road corridor, subject to ESB/Eirgrid specifications.

3.1.1.4.3 *Excavated Road Construction Methodology*

The excavation of peat and spoil and founding of access roads on competent stratum (below the peat) for new access roads will be carried out at various locations on the site.

Excavate and replace type access roads are the conventional method for construction of access roads on peatland sites and the preferred construction technique in shallow peat provided sufficient placement/reinstatement capacity is available on site for the excavated peat.

This methodology includes procedures that are to be included in the construction to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations.

- Prior to commencing the construction of the excavated roads movement monitoring posts will be installed in areas where the peat depth is greater than 2.0m.
- Interceptor drains will be installed upslope of the access road alignment to divert any surface water away from the construction area.
- Excavation of roads swill be to the line and level given in the design requirements. Excavation will take place to a competent stratum beneath the peat.
- Road construction will be carried out in sections of approximately 50m lengths i.e. no more than 50m of access road should be excavated without re-placement with stone fill.
- Excavation of materials with respect to control of peat stability:

- Acrotelm (to about 0.3 to 0.4m of peat) is generally required for landscaping and will be stripped and temporarily stockpiled for re-use as required. Acrotelm stripping will be undertaken prior to main excavations.
- Where possible, the acrotelm shall be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation.
- All catotelm peat (peat below about 0.3 to 0.4m depth) shall be transported immediately on excavation to the designated placement areas.

- Side slopes in peat shall be not greater than 1 (v): 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required. Battering of the side slopes of the excavations will be carried out as the excavation progresses.
- The excavated access road will be constructed with up to 1000mm of selected granular fill. Granular fill to be placed and compacted in layers in accordance with the TII Specification for Road Works.
- Access roads to be finished with a layer of capping across the full width of the road.
- A layer of geogrid/geotextile may be required at the surface of the competent stratum.
- At transitions between floating and excavated roads a length of road of about 10 to 20m shall have all peat excavated and replaced with suitable fill. The surface of this fill shall be graded so that the road surface transitions smoothly from floating to excavated road.
- Where slopes of greater than 5 degrees are encountered along with relatively deep peat (i.e. greater than 1.5m) and where it is proposed to construct the access road perpendicular to the slope contours it is best practice to start construction at the bottom of the slope and work towards the top, where possible. This method avoids any unnecessary loading to the adjacent peat and greatly reduces any risk of peat instability.
- A final surface layer shall be placed over the excavated road and graded to accommodate wind turbine construction and delivery traffic.

3.1.1.4.4 *Hardstanding Areas*

Hard standing areas consisting of levelled and compacted hardcore are required around each turbine base to facilitate access, turbine assembly and turbine erection. The hard-standing areas are typically used to accommodate cranes used in the assembly and erection of the turbine, offloading and storage of turbine components, and generally provide a safe, level working area around each turbine position. The hard-standing areas are extended to cover the turbine foundations once the turbine foundation and tower is in place. The sizes, arrangement and positioning of hard standing areas are dictated by turbine suppliers. The hard-standing area is intended to accommodate a crane during turbine assembly and erection. The proposed hard standing areas shown on the detailed layout drawings included in Appendix 4-1 of the EIAR are indicative of the sizes required, but the extent of the required areas at each turbine location may be optimised on-site depending on topography, position of the site access road, the proposed turbine position and the turbine supplier's exact requirements.

3.1.1.5 Turbine Foundations

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level. The size of the foundation will be dictated by the turbine manufacturer, and the final turbine selection will be the subject of a competitive tender process. Different turbine manufacturers use different shaped turbines foundations, ranging from circular to hexagonal and square, depending on the requirements of the final turbine supplier. The turbine foundation transmits any load on the wind turbine into the ground.

After the foundation level of each turbine has been formed using piling methods or on competent strata, the bottom section of the turbine tower or the "Anchor Cage" is levelled and reinforcing steel is then built up around and through the anchor cage. The outside of the foundation is shuttered with demountable formwork to allow the pouring of concrete and is backfilled accordingly with appropriate granular fill to finished surface level.

3.1.1.6 Electricity Substation and Control Buildings

It is proposed to construct one on site electricity substation within the Proposed Development site, as shown in Figure 2-1. The proposed substation site is located within an area of forestry, which will screen it from view from the R396 Regional Road, located approximately 40 metres west of the substation at its nearest point.

The footprint of the proposed electricity substation compound measures approximately 142 metres by 72 metres, and will include a wind farm control building and the electrical components necessary to consolidate the electrical energy generated by each wind turbine and export that electricity from the wind farm to the national grid.

The substation compound will be surrounded by a 2.65-metre high steel palisade fence (or as otherwise required by ESB/Eirgrid), and internal fences will also segregate different areas within the main substation. The construction and exact layout of electrical equipment in the electricity substation will be to ESB/Eirgrid networks specifications.

A wind farm control building will be located within the substation compound. The building will measure approximately 25.6 metres by 15 metres, and approximately 7.8 metres in height. The layout and elevation of the proposed wind farm control building are shown on Figure 4-14a of the EIAR. The wind farm control building will include a small office space and staff welfare facilities for the staff that will work on the operational phase of the proposed project. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin.

An IPP (independent power producer) building and ESB control rooms will also be located withing the substation compound. The building will measure approximately 20.37 metres by 5.83 metres, and approximately 5.5 metres in height. The layout and elevation of the proposed IPP control building are shown on Figure 14-14b of the EIAR. The IPP building will include a small office space and staff welfare facilities for the staff that will work on the operational phase of the Proposed Development.

It is proposed to install a rainwater harvesting tank adjacent to the control building. During the operational phase, potable drinking water will be supplied by a water cooler at the control building. A supply contract will be set up with a water cooler supply company with water supplies delivered to site as required on a regular basis.

It is proposed to manage wastewater from the staff welfare facilities in the control building by means of a sealed storage tank located adjacent to the building, with all wastewater being tankered off site by a permitted waste collector to a wastewater treatment plant. Detailed measures to address surface water management based upon the design criteria and philosophy will be implemented. The drainage system will be excavated and constructed in conjunction with the road and hard standing construction. Drains will be excavated and settlement ponds constructed to eliminate any material level of suspended solids within surface water running off the site. The drainage regime will be installed in accordance with details submitted in the EIAR.

3.1.1.7 Proposed Upgrade works at Existing Electricity Substation

It is proposed to upgrade the existing Mullingar 110kV substation to accommodate the connection of the proposed wind farm development. The upgrade works at the substation will consist of the construction of an additional dedicated bay. Three potential connection points have been identified for

this connection in consultation with ESB and EirGrid with the exact location to be identified at detail design stage, as indicated on the planning drawings in Appendix 4-1 of the EIAR.

3.1.1.8 Proposed Watercourse Crossings

It is proposed to replace the existing timber bridge over the River Glore within the proposed wind farm site with a 5-metre clear span bridge. The proposed bridge crossing will form part of the internal site road network, connecting Turbines T5-T12 to Turbines T1-T4. The crossing location is at Grid Reference E 641,560 N 776,452, as shown in Figure 4-23 of the EIAR and the design avoids the need for in-stream works.

A second crossing will be required to provide access to Turbine T1 located to the north of an OPW drain. This will require a 3-metre clear span bridge as shown on Figure 4-24 of the EIAR which shows the typical clear span bridge design.

A third crossing will be required to provide access to Turbine T15 over the River Glore. This will require a 5-metre clear span bridge as shown in Figure 4-25 which shows the typical clear span bridge design. The clear span bridge's will be constructed to the specifications of the OPW bridge design guidelines 'Construction, Replacement or Alteration of Bridges and Culverts - A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945', and in consultation with Inland Fisheries Ireland. Abutments will be constructed from precast units combined with in-situ foundations, placed within an acceptable backfill material.

The typical construction methodology for the installation of clear span bridges is presented below:

- The access road on the approach to the watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the watercourse crossing.
- All drainage measures along the proposed road will be installed in advance of the works.
- The abutment will consist of concrete panels which will be installed on a concrete lean mix foundation to provide a suitable base. The base will be excavated to rock or competent ground with a mechanical excavator with the foundation formed in-situ using a semi-dry concrete lean mix. The base will be excavated along the stream bank with no instream works required.
- Access to the north or opposite side of the river for excavation and foundation installation will require the installation of pre-cast concrete slab across the river to provide temporary access for the excavator.
- All pre-cast concrete panels and slabs/beams will be installed using a crane which will be set up on the southern side of the stream and will be lifted into place from the stream back with no contact with the watercourse.
- A concrete deck will be poured over the beams/slabs which span across the river. This will be shuttered, sealed and water tested before concrete pouring can commence.

3.1.1.9 Peat and Spoil Management

The management of excavated peat and spoil, and the methods of storage are described in FT's Peat and Spoil Management Plan in Appendix 4-2 of the EIAR and summarised below.

The peatland areas of the Proposed Development site have been extensively harvested using mechanical harvesting equipment, resulting in a well-drained and extensively trafficked peat. Experience has shown that the most environmentally sensitive and stable way of handling and moving peat is its placement across the site and at locations as close as possible to the excavation areas. The peat and overburden that is excavated as part of the construction works will be placed/spread locally alongside the excavations for the infrastructure elements.

The proposed methodology for the placement and storage of peat, as described in the FT's Peat and Spoil Management Plan, is summarised below.

- The peat and overburden that is excavated as part of the construction works will be locally placed/spread alongside the excavations for the infrastructure elements. Given the flat topography/nature of the site, this approach for the placement of excavated spoil is deemed appropriate.
- During the construction process, the spoil will be relayed locally to the side of the excavation by an excavator and spread on the bog on one or both sides of the excavations.
- The spoil will be spread to a depth not exceeding 1.0m in height over a typical width of 5m. The placed peat shall be tracked in to ensure it is adequately compacted and stable and graded to complement the topography and drainage system on the site.
- Where practical, it will be ensured that the surface of the placed material is shaped to allow efficient run-off of surface water. Where possible, shaping of the surface of the spread material shall be carried out as placement of material progresses. This will reduce the likelihood of debris run-off and ensure stability of the spread material.
- The placement of excavated material will be avoided without first establishing the adequacy of the ground to support the load. This may involve a visual inspection by competent personnel. The placement of material may require the use of long reach excavators and low ground pressure machinery in localised areas.
- Where there is any doubt as to the stability of the peat surface then no material shall be placed on to the peat surface.
- Finished/shaped side slopes in the placed material is likely to be in the region of 1 (v): to 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker material are encountered then slacker slopes may be required.
- All placed/spread material will be allowed to revegetate naturally from the extensive seed source of the plants that have already colonised in the area. Alternatively, and possibly in addition, seeding of the placed material could be carried out which would aid in stabilising the placed material in the long term.

3.1.1.10 Grid Connection Cable Trench

Underground electrical cables will connect the proposed wind turbines to the proposed onsite substation. From here, the proposed wind farm will connect to the national grid via an underground cable connection between the site and the existing Mullingar 110 kV substation. The grid connection route follows the public road network and the exact location of the cable within the road curtilage will be subject to ESB/Eirgrid specifications and agreement with Westmeath County Council. The specifications for cables and cable installation will be in accordance with Eirgrid/ESB requirements.

What is provided below are the grid connection methodologies for:

- Cable Trench Installation in non-peatland environments
- Cable Trench Installation through peatland
  - Trench Type A (Through Floating Road Trench in Road with >2.5m to base of peat)
  - Trench Type B (Through Floating Road Trench in Verge with >2.5m to base of peat)
  - Trench Type C (Through Raised Floating Road Trench in Verge with <2.5m to base of peat)
  - Trench Type D (Through Floating Road Trench in Verge with <2.5m to base of peat)
  - Trench Type E1 (Through Floating Grid Route Track with >2.5m to base of peat)

- Trench Type E2 (Through Solid Grid Route Track with <2.5m to base of peat)

3.1.1.10.1 *Typical Cable Trench Installation in Non-Peatland Environments*

The underground cable required to facilitate grid connection will be laid beneath the surface of the site and/or public road using the following typical methodology:

- The area where excavations are planned will be surveyed, prior to the commencement of works, to identify all existing underground services.
- Two teams consisting of tracked excavators, dumpers and a tractor and stone cart with side-shoot or similar will dig the trench and lay approximately 300m of the underground cable ducting between them per day.
- One team will start at one end of the grid route with the other team starting approximately half way along the grid connection route. Both teams will be constructing in the same direction.
- The excavators will open a trench at the edge of the road surface, the trench will be a maximum of approximately 600mm wide and 1,250mm deep.
- The excavated material will be loaded into the dumpers to be transported to a designated temporary stockpiling area to be reused as backfilling material where appropriate.
- Clay plugs will be installed at 50m intervals to prevent the trench becoming a conduit for surface water runoff.
- Once the trench has been excavated, a level 65mm blinding layer with semi-dry lean-mix concrete will be placed at the base of the trench;
- The cable trefoil 160mm HDPE power ducts will be placed in the trench and tied at 3m intervals to keep the trefoil formation;
- Lean-mix concrete (CBM4 or similar) will be compacted around the ducts and to 75mm above the top trefoil duct where a red cable marker strip will be placed;
- Two 125mm HPDE comms cable ducts will be laid, spaced a clear 200mm apart using appropriate spacers;
- Lean-mix concrete (CBM4 or similar) will be compacted around the ducts and to 75mm above the comms duct where a red cable marker strip will be placed
- Final backfill layer to include a 500mm wide yellow warning tape 300mm below the finished surface.
- The trench will be surfaced as per the road surface specifications of the national, regional or local public road.
- Cable joint pits will be located at approximately 500m intervals or as otherwise required by ESB/Eirgrid requirements along the proposed cable route, each joint pit will be approximately 2.5m x 6m in size and contain a communications chamber, an earth link box and a cable joint bay, all of which will be located in the road edge and accessible for cable pulling and future maintenance.

3.1.1.10.2 *Cable Trench Installation through peatland*

The following are a list of typical general requirements for the ducting work in peat:

- The ducting shall be placed in the trench as per the specific cable design drawings to ESB / Eirgrid specifications, generally following the sequence outlined below.
- Appropriate traffic management would be implemented on site. This will involve road closures.
- Suitable drainage and environmental mitigation measures would be established along the section of road.
- Detailed method statement regarding the ducting works will be provided by the contractor.

- An assessment of all areas of natural drainage from the area of works will be carried out, and measures put in place to prevent any material draining from the trenching works into adjacent drainage ditches or streams.
- Spill kits shall be available during trenching. A spill mat will be used by the fuel tanker while refuelling.
- Following the trench excavation, ducts will generally be installed and surrounded with concrete. The placement of the concrete will be controlled in such a manner as to prevent any concrete entering adjacent drainage ditches or streams.
- Upon completion of trenching works the site shall be cleaned and any waste will be disposed of at a licenced facility.
- Note that monitoring of floating road settlement may be required before, during and after construction to ensure the stability of the trench and the floating road.
- Where the road surface is to be sealed, a suitable road surfacing build-up/reinforcement will be agreed with the road authorities.
- Where the depth of the peat is greater than 2.5m, generally roads and grid route infrastructure would be constructed at the surface of the existing road or verge, in order to limit excavation of the underlying peat for the trench.

3.1.1.10.3 *Trench Type A (Through Floating Road Trench in Road with >2.5m to base of peat)*

The typical general trench installation sequence is as follows and is shown in drawing COLE d005.2.1 in Appendix 4-3 of the EIAR:

- Existing road build-up will be planed off/excavated as required.
- The trench will be excavated within the road build-up.
- The lower combi-grid layer (or geotextile separating layer plus geogrid) will be placed within the trench and adequately supported along the shoulders of the trench excavation.
- Place a level 65mm blinding layer with semi-dry lean-mix concrete at the base of the trench.
- Place and joint the cable trefoil 160mm HDPE power ducts using cable ties at 3m intervals.
- Lay in and compact the layer of lean-mix concrete (CBM4 or similar) around the ducts to the top of the trefoil.
- Place an additional 90mm of CBM4 or similar from the top of the trefoil and install the 400mm wide red marker strips.
- Install two 125mm HPDE comms cable duct, spaced a clear 200mm apart using appropriate spacers.
- Lay in and compact an additional 185mm of CBM4 or similar around the comms ducts, and place another 400mm wide red marker strip above.
- Lay the second geogrid layer across the road and trench.
- Final backfill layer to include a 500mm wide yellow warning tape 300mm below the finished surface.
- Lay in and compact a 300mm (approximately) layer of Cl 804 material or similar above the geogrid. This material will form part of the road build-up and act to anchor the geogrid supporting the cable trench.
- Lay the road surfacing layers, including any surfacing reinforcement as required. Road surfacing will be agreed with the relevant road authorities prior to obtaining a road opening licence.
- Reinstate the road verges and any grassed areas or berms.

3.1.1.10.4 *Trench Type B (Through Floating Road Trench in Verge with >2.5 to base of peat)*

The typical general trench installation sequence is as follows and is shown in drawing COLE d005.2.2 in Appendix 4-3 of the EIAR:

- Existing road build-up and verge will be planed off/excavated as required.
- The trench will be excavated within the verge.
- The lower combi-grid layer (or geotextile separating layer plus geogrid) will be placed within the trench and adequately supported along the shoulders of the trench excavation.
- Place a level 65mm blinding layer with semi-dry lean-mix concrete at the base of the trench.
- Place and joint the cable trefoil 160mm HDPE power ducts using cable ties at 3m intervals.
- Lay in and compact the layer of lean-mix concrete (CBM4 or similar) around the ducts to the top of the trefoil.
- Place an additional 90mm of CBM4 or similar from the top of the trefoil and install the 400mm wide red marker strips.
- Install a two 125mm HPDE comms cable duct, spaced a clear 200mm apart using appropriate spacers.
- Lay in and compact an additional 185mm of CBM4 or similar around the comms ducts, and place another 400mm wide red marker strip above.
- Lay the second geogrid layer across the road and trench.
- Final backfill layer to include a 500mm wide yellow warning tape 300mm below the finished surface.
- Lay in and compact a 300mm (approximately) layer of Cl 804 material or similar above the geogrid. This material will form part of the road build-up and act to anchor the geogrid supporting the cable trench.
- Lay the road surfacing layers, including any surfacing reinforcement as required. Road surfacing will be agreed with the relevant road authorities prior to obtaining a road opening licence.
- Reinstate the road verges and any grassed areas or berms.

3.1.1.10.5 *Trench Type C (Through Raised Floating Road Trench in Verge with <2.5m to base of peat)*

The typical general trench installation sequence is as follows and is shown in drawing COLE d005.2.3 in Appendix 4-3 of the EIAR:

- Existing verge will be excavated to the trench width.
- The lower section of the excavation, beneath the trench, will be filled with CBM or similar to support the trench. Note, provision will be made within this lower section to ensure continuity of groundwater flow underneath the trench (e.g. intermittent sections with permeable stone surrounded with a geotextile and/or sections of pipe).
- The lower combi-grid layer (or geotextile separating layer plus geogrid) will be placed within the trench and adequately supported along the shoulders of the trench excavation.
- Place a level 65mm blinding layer with semi-dry lean-mix concrete at the base of the trench.
- Place and joint the cable trefoil 160mm HDPE power ducts using cable ties at 3m intervals.
- Lay in and compact the layer of lean-mix concrete (CBM4 or similar) around the ducts to the top of the trefoil.
- Place an additional 90mm of CBM4 or similar from the top of the trefoil and install the 400mm wide red marker strips.
- Install two 125mm HPDE comms cable duct, spaced a clear 200mm apart using appropriate spacers.
- Lay in and compact an additional 185mm of CBM4 or similar around the comms ducts, and place another 400mm wide red marker strip above.
- Layer the second geogrid layer across the road and trench.

- Final backfill layer to include a 500mm wide yellow warning tape 300mm below the finished surface.
- Lay in and compact a 300mm (approximately) layer of Cl 804 material or similar above the geogrid. This material will form part of the road build-up and act to anchor the geogrid supporting the cable trench.
- Lay the road surfacing layers, including any surfacing reinforcement as required. Road surfacing will be agreed with the relevant road authorities prior to obtaining a road opening licence.
- Reinstate the road verges and any grassed areas or berms.

3.1.1.10.6 *Trench Type D (Through Floating Road Trench in Verge with <2.5m to base of peat)*

The typical general trench installation sequence is as follows and is shown in drawing COLE d005.2.4 in Appendix 4-3 of the EIAR:

- Existing road build-up and verge will be planed off/excavated as required.
- The trench will be excavated within the verge.
- The lower section of the excavation, beneath the trench, will be filled with CBM or similar to support the trench. Note, provision will be made within this lower section to ensure continuity of groundwater flow underneath the trench (e.g. intermittent sections with permeable stone surrounded with a geotextile and/or sections of pipe).
- The lower combi-grid layer (or geotextile separating layer plus geogrid) will be placed within the trench and adequately supported along the shoulders of the trench excavation. A layer of brash or timber logs may be required on the verge side beneath the geogrid layer.
- Place a level 65mm blinding layer with semi-dry lean-mix concrete at the base of the trench.
- Place and joint the cable trefoil 160mm HDPE power ducts using cable ties at 3m intervals.
- Lay in and compact the layer of lean-mix concrete (CBM4 or similar) around the ducts to the top of the trefoil.
- Place an additional 90mm of CBM4 or similar from the top of the trefoil and install the 400mm wide red marker strips.
- Install two 125mm HPDE comms cable duct, spaced a clear 200mm apart using appropriate spacers.
- Lay in and compact an additional 185mm of CBM4 or similar around the comms ducts, and place another 400mm wide red marker strip above.
- Lay the second geogrid layer across the road and trench.
- Final backfill layer to include a 500mm wide yellow warning tape 300mm below the finished surface.
- Lay in and compact a 300mm (approximately) layer of Cl 804 material or similar above the geogrid. This material will form part of the road build-up and act to anchor the geogrid supporting the cable trench.
- Lay the road surfacing layers, including any surfacing reinforcement as required. Road surfacing will be agreed with the relevant road authorities.
- Reinstate the road verges and any grassed areas or berms.

3.1.1.10.7 *Trench Type E1 (Through Floating Grid Route Track with >2.5 to base of peat)*

The typical general trench installation sequence is as follows and is shown in drawing COLE d005.2.5 in Appendix 4-3 of the EIAR:

- Fell trees within the construction corridor.

- Where required, turn the tree stumps over to create a starting platform for the access track and/or lay a layer of brash or timber logs.
- Lay the combigrid and construct the lower section of the road to act as a construction access track. Install drainage crossings along the route as it progresses (usually corrugated pipes slung down beneath the road into the existing drains or incorporated into the road itself).
- The trench will be excavated within the track build-up.
- Place a level 65mm blinding layer with semi-dry lean-mix concrete at the base of the trench.
- Place and joint the cable trefoil 160mm HDPE power ducts using cable ties at 3m intervals.
- Lay in and compact the layer of lean-mix concrete (CBM4 or similar) around the ducts to the top of the trefoil.
- Place an additional 90mm of CBM4 or similar from the top of the trefoil and install the 400mm wide red marker strips.
- Install two 125mm HPDE comms cable ducts, spaced a clear 200mm apart using appropriate spacers.
- Lay in and compact an additional 185mm of CBM4 or similar around the comms ducts, and place another 400mm wide red marker strip above.
- Lay the second geogrid layer across the road and trench.
- Final backfill layer to include a 500mm wide yellow warning tape 300mm below the finished surface. An additional geogrid layer may be required in the upper section of the road.
- A layer of Cl 804 material or similar will form part of the final access track running surface.
- Install any reflective posts or fencing and cable identification marker posts.

3.1.1.10.8 *Trench Type E2 (Through Solid Grid Route Track with <2.5m to base of peat)*

The typical general trench installation sequence is as follows and is shown in drawing COLE d005.2.6 in Appendix 4-3 of the EIAR:

- Fell trees within the construction corridor.
- Peat would be excavated to subgrade, with stone placed to build up the lower sections of the road.
- Install drainage crossings along the route as it progresses (usually corrugated pipes incorporated into the road build up).
- Lay a layer of combigrid and construct the lower section of the road to act as a construction access track.
- The trench would be excavated within the track build-up.
- Place a level 65mm blinding layer with semi-dry lean-mix concrete at the base of the trench.
- Place and joint the cable trefoil 160mm HDPE power ducts using cable ties at 3m intervals.
- Lay in and compact the layer of lean-mix concrete (CBM4 or similar) around the ducts to the top of the trefoil.
- Place an additional 90mm of CBM4 or similar from the top of the trefoil and install the 400mm wide red marker strips.
- Install two 125mm HPDE comms cable duct, spaced a clear 200mm apart using appropriate spacers.
- Lay in and compact an additional 185mm of CBM4 or similar around the comms ducts, and place another 400mm wide red marker strip above.
- Layer the second geogrid layer across the road and trench.

- Final backfill layer to include a 500mm wide yellow warning tape 300mm below the finished surface. An additional geogrid layer may be required in the upper section of the road.
- A layer of Cl 804 material or similar will form part of the final access track running surface.
- Install any reflective posts or fencing and cable identification marker posts.

3.1.1.11 Existing Underground Services

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

3.1.1.11.1 *Joint Bays*

Joint bays are pre-cast concrete chambers where lengths of cable ducting will be connected. They will be located at various points along the ducting route approximately every 500 meters or as otherwise required by ESB requirements along the proposed cable route. Where possible joint bays will be located in areas where there is a natural widening/wide grass margin on the road in order to accommodate easier construction, cable installation and create less traffic congestion. During construction, the joint bay locations will be completely fenced off and will be incorporated into the traffic management system. Once they have been constructed they will be backfilled temporarily until cables are being installed.

3.1.1.12 Grid Connection Watercourse/Culvert Crossings and Irish Rail Level Crossing

There is a total of 16 no. watercourse crossings along the proposed grid connection, the locations of which are shown in Figure 3-1. There are 7 no. river/stream crossings (Locations No. 2, 3, 4, 10, 14, 15 & 16), with the remaining crossings being classified as culverts.

The proposed grid connection route will traverse one Irish Rail level crossing in the townlands of Farranistick and Culleen More adjacent to water course crossing No 16. Any such works on properties of Córas Iompair Éireann (CIE) who are the authority for such properties requires a license agreement to be put in place between the developer and CIE.

The preferred methodologies for the provision of the grid connection at these locations is set out in Appendix 2, which provides a summary of the watercourse crossing/culvert survey and description of works for all crossings. Should an alternative methodology option be required for individual crossings during the construction process this will be agreed with the relevant authorities including Westmeath County Council prior to works commencing. A description of each crossing option is provided below. Instream works are not required at any watercourse crossing along the proposed grid connection.

3.1.1.12.1 *Crossings over Culverts – Option1*

The watercourse at any of the crossings will not be disturbed because no instream works or bridge/culvert alterations are proposed. Watercourses will not be directly impacted upon since no

instream works or bridge/culvert alterations are proposed. Where adequate cover exists above a culvert, the ESB/Eirgrid specified flat formation ducting arrangement will be used where the cable ducts pass over a culvert maintaining 300mm minimum clearance to the top of the culvert . A heavy duty steel plate will be placed over the ducts as distance between the road surface and the ducts will have been reduced. The cable trench will pass over the culvert in a standard trench as outlined in Figure 3-2.

3.1.1.12.2 *Crossing under Piped Culverts – Option 2*

Where the watercourse crossing is a piped culvert consisting of either a socketed concrete or sealed plastic pipe where there is inadequate cover above the culvert to excavate, a trench will then be excavated beneath the culvert and cable ducts will be passed under the sealed pipe as outlined in Figure 3.3. If this duct installation method cannot be achieved due to the invert level of the existing culvert or due to the composition of the culvert e.g. stone culverts, the ducts will be installed by alternative means as set out in the following sections as outlined in Figure 3-3.

3.1.1.12.3 *Flatbed formation over Culverts – Option3*

Where sufficient cover and road width isn't available to place the ducting in the bridge decking, the cable can be placed in a stainless steel conduit with a minimum wall thickness of 4mm secured to the outside of the bridge deck supported by cleats at 1m intervals as per ESB/Eirgrid specifications. This method of crossing a bridge structure is detailed in Figure 3-4.

3.1.1.12.4 *Outside of Bridge Decking – Option 4*

Where sufficient cover and road width isn't available to place the ducting in the bridge decking, the cable can be placed in a stainless steel conduit with a minimum wall thickness of 4mm secured to the outside of the bridge deck supported by cleats at 1m intervals as per ESB/Eirgrid specifications. This method of crossing a bridge structure is detailed in Figure 3-5

3.1.1.12.5 *Directional Drilling – Option 5*

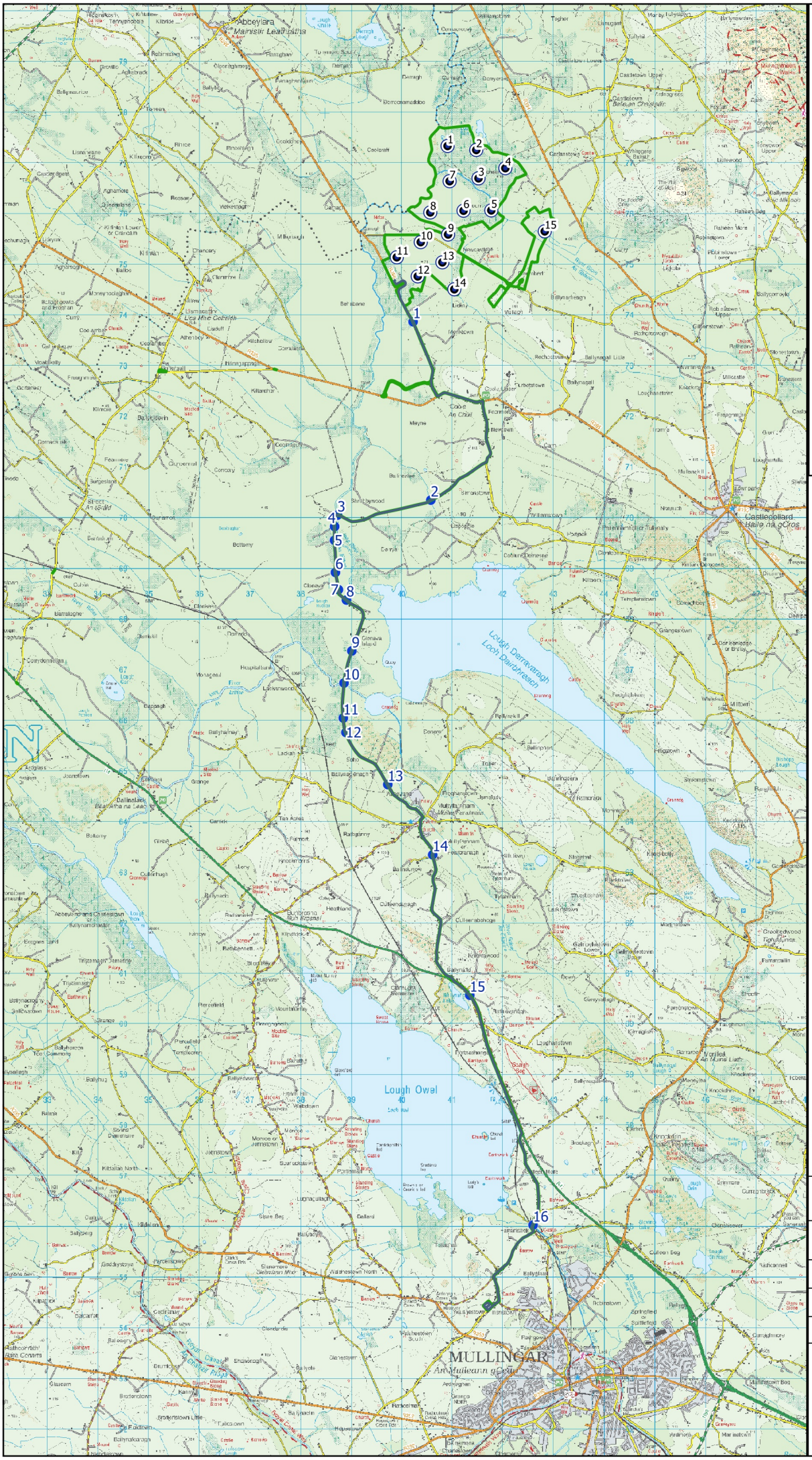
In the event that none of the above methods are appropriate, directional drilling will be utilised. The directional drilling method of duct installation will be carried out using Vermeer D36 x 50 Directional Drill (approximately 22 tonnes) or similar. The launch and reception pits will be excavated with a suitably sized excavator. The drilling rig will be securely anchored to the ground by means of anchor pins which will be attached to the front of the machine. The drill head will then be secured to the first drill rod and the operator shall commence to drill into the launch pit to a suitable angle which will enable him to obtain the depths and pitch required to the line and level of the required profile. Drilling of the pilot bore shall continue with the addition of 3.0m long drill rods, mechanically loaded and connected into position.

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

The use of a natural, inert and biodegradable drilling fluid such as Clear Bore™ is intended to negate any potential adverse impacts arising from the use of other, traditional polymer-based drilling fluids and will be used sparingly as part of the drilling operations. It will be appropriately stored prior to use and deployed in the required amounts to avoid surplus. Should any excess drilling fluid accumulate in the

reception or drilling pits, it will be contained and removed from the site in the same manner as other subsoil materials associated with the drilling process to an approved disposal site.

Backfilling of launch and reception pits will be conducted in accordance with the normal specification for backfilling excavated trenches. The directional drilling methodology is further detailed in Figure 3-6.



Map Legend

- EIAR Site Boundary
- Grid Connection Route Watercourse Crossing Locations
- Proposed Grid Connection Route

Drawing Title	Grid Connection Route Watercourse Crossing Locations
Project Title	Coole Wind Farm, Co. Westmeath
Drawn By: EC	Checked By: MW
Project No.: 200445	Drawing No.: Figure 3-1
Scale: 1:100000	Date: 11/02/2021

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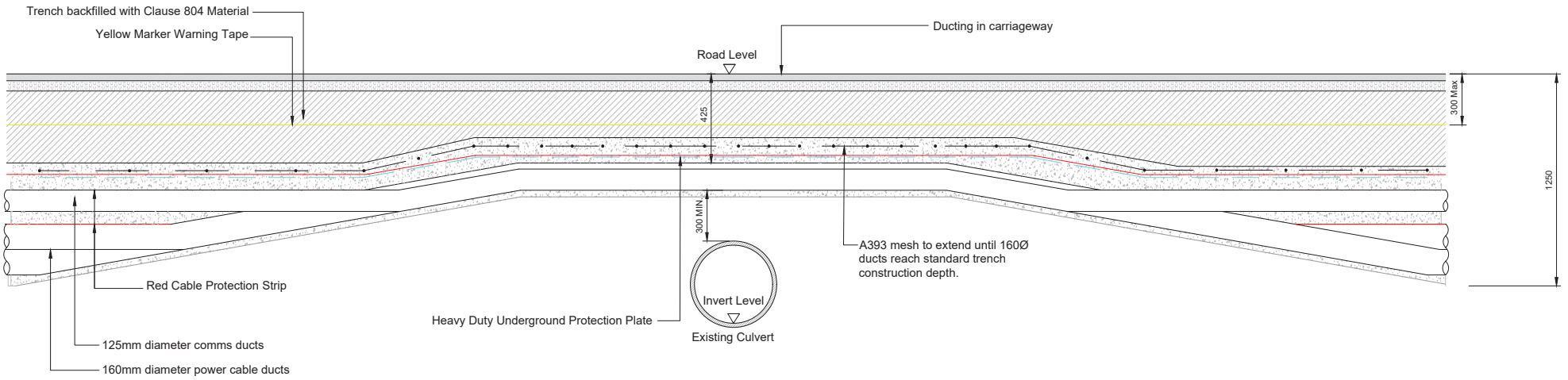

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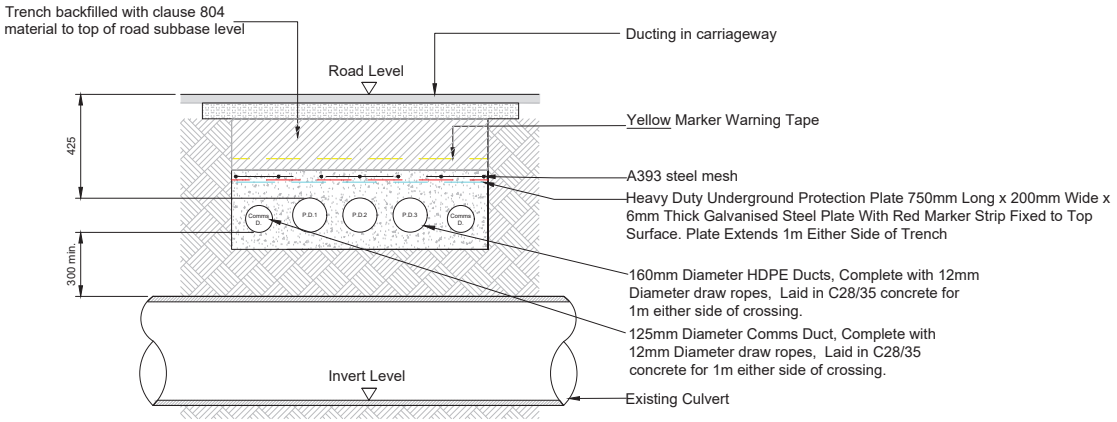

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Figure 3-2

Option 1 - Crossing over Culvert

NOTES

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A	17.01.2020	M.B.	J.S.	FIRST ISSUE

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CLIENT

PROJECT: COOLE WIND FARM GRID ROUTE

TITLE: WATER CROSSINGS TYPICAL DETAIL - OVER

REVISION: A

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CHECKED AND APPROVED: J. SHANAHAN	DATE: 19/01/2020	STATUS: DRAFT	DRAWING NUMBER: COLE d005.4.3

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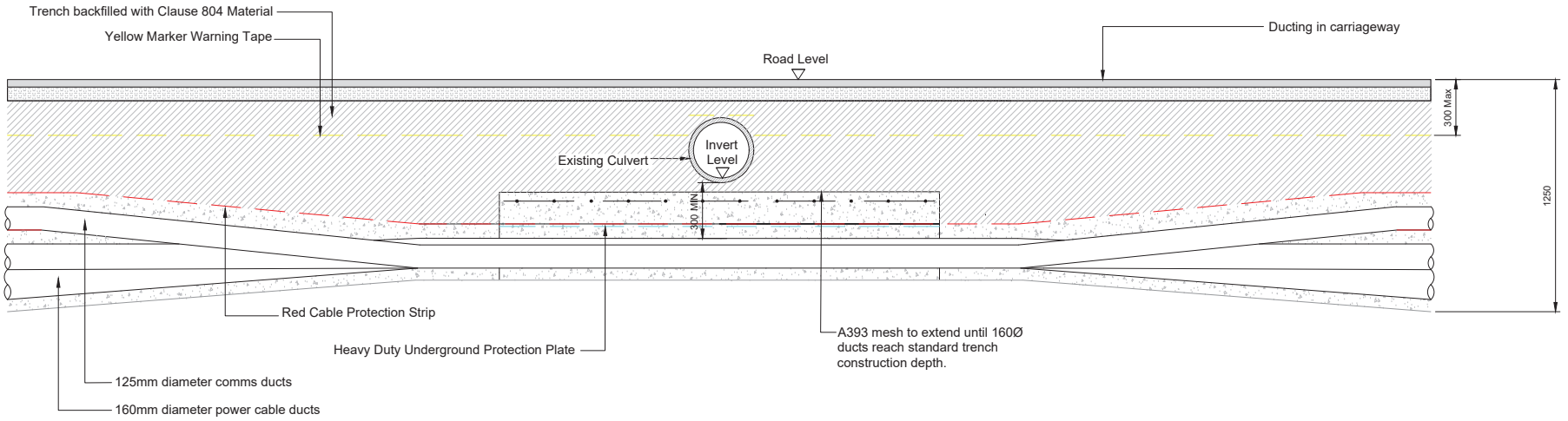

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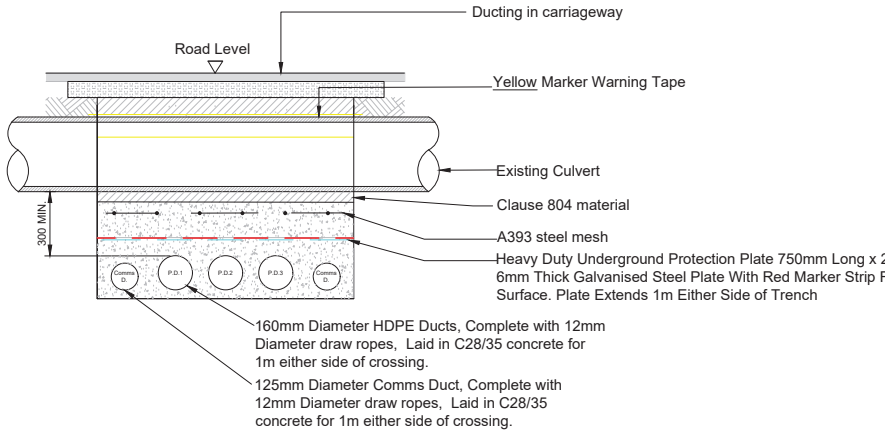

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Figure 3-3

Option 2 - Crossing under Piped Culvert

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PROJECT: COOLE WIND FARM GRID ROUTE

TITLE: WATER CROSSINGS TYPICAL DETAIL - UNDER CULVERT

REVISION: A

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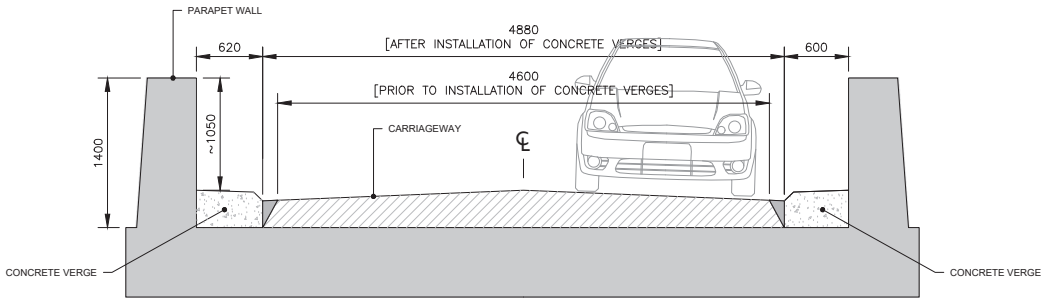

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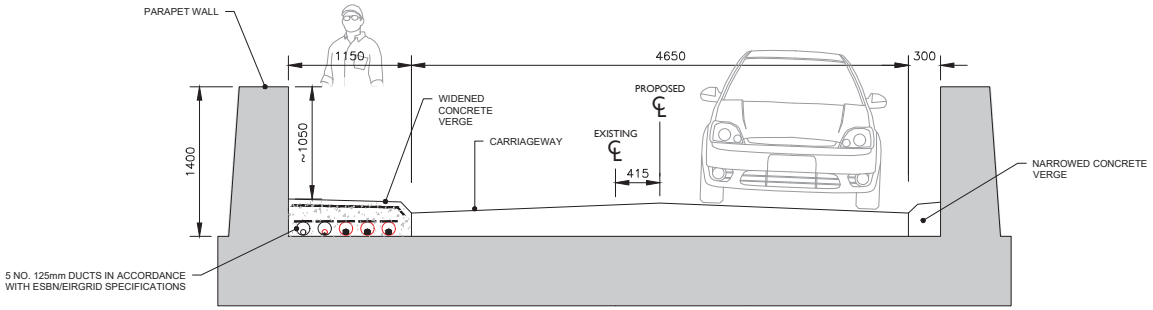

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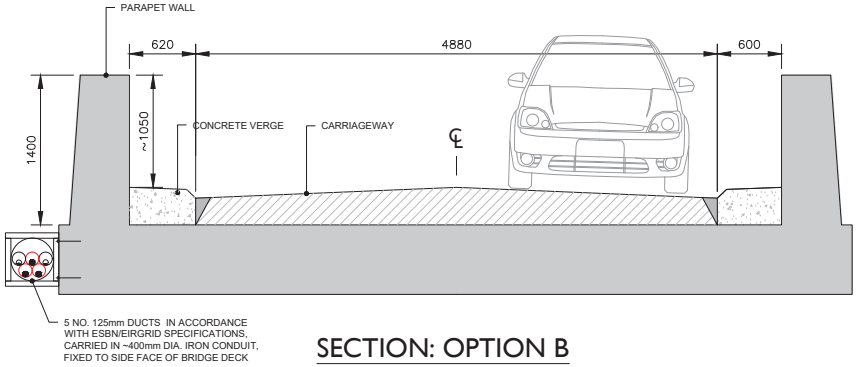

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Figure 3-4

Option 3 - Flatbed Formation over Culverts

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TITLE: BRIDGE CROSSINGS WH-L1825-001.00

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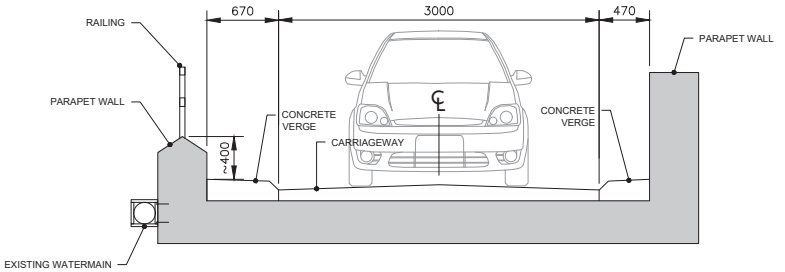

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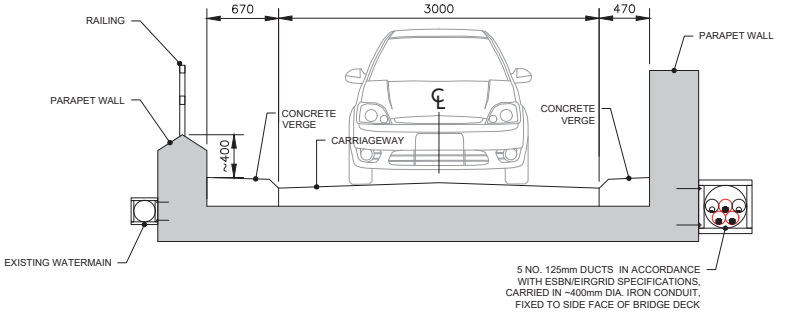

SECTION: OPTION A

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Figure 3-5

Option 4 - Outside of Bridge Decking

NOTES

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PROJECT: COOLE WIND FARM GRID ROUTE

TITLE: BRIDGE CROSSINGS WH-L1825-002.00

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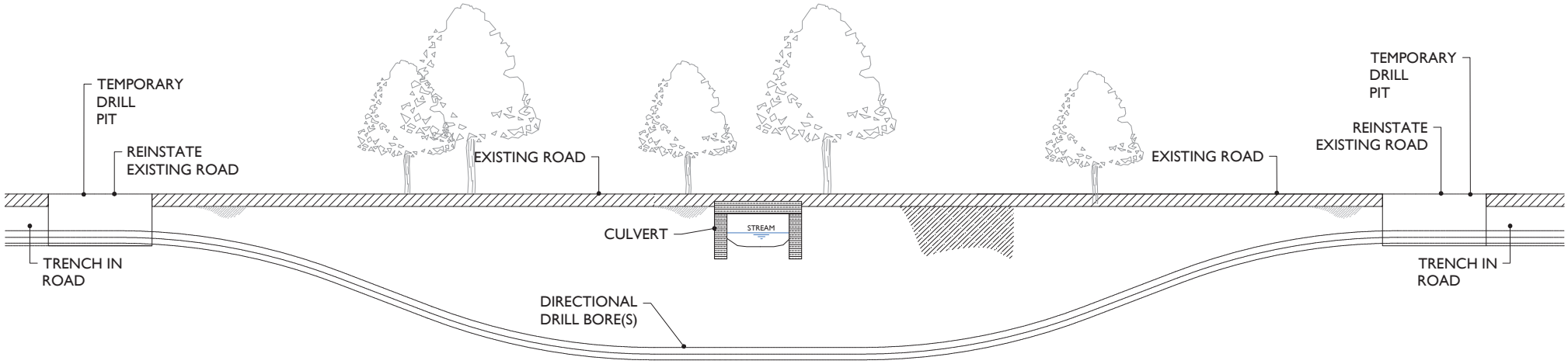

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NOTE: No. and diameter of bores to be confirmed at detailed design.

Figure 3-6

Option 5 - Directional Drilling

NOTES

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PROJECT
COOLE WIND FARM
GRID ROUTE

TITLE
WATER CROSSINGS
TYPICAL DETAIL - DIRECTIONAL DRILL

REVISION
A

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3.1.1.13 Link Road, Junction Accommodation and Public Road Works

Improvements and modifications to the existing public road network to facilitate turbine delivery will be required as part of the Proposed Development works. This will include construction of a link road between the R395 and R396 Regional Roads and junction improvement works, including providing hardsurfacing at eleven locations; along the public road corridor at: the N4 junction with the L1927 in the townland of Joanstown, clearing of existing verge and vegetation to the south east of the railway line level crossing on the L1927, hardsurfacing and widening of the L1927 and L5828 junction in the townland of Boherquill, clearing of existing verge and vegetation and hardsurfacing at the gentle right turn from the L5828 onto the R395; hardsurfacing including clearance of vegetation and road verge to provide access and egress at proposed link road; hardsurfacing including clearance of vegetation and road verge at site access points off the R396, and at four points contained within the proposed wind farm site at junctions along the L5755.

The proposed link road between the R395 and R396 measures approximately 1.2 kilometres in length with a running width of approximately 5m. The road will traverse areas of cutover peat and improved agricultural grassland. The construction methodology for the link road is summarised as follows:

- Overburden within the required areas for the accommodation works will be excavated and temporarily stockpiled adjacent to the works area, where possible, until a competent stratum is reached.
- A layer of geogrid/geotextile may be required at the surface of the competent stratum to provide further structural formation.
- The competent stratum will be overlain with granular fill.
- A final surface running layer will be placed over the granular fill to provide a suitable surface to accommodate the turbine delivery/abnormal load vehicles.
- The accommodation works when not in use during the construction phase will be cordoned off from the public road, using bollards/fencing as required.
- Upon completion of the turbine delivery phase of the proposed wind farm the granular fill and final surface running layer will be left in situ, within the works areas.
- A barrier/ gate will be put in place at the entrance to the link road and a gate will be installed at the exit. An existing stone wall at the exit will be reinstated either side of the gate.
- Gates/barriers will be left in situ post construction to prevent access.

Leaving the granular fill and final surface running layer in place within the link road will allow these to be used again in the future should it become necessary (i.e. at decommissioning stage for turbine removal, or in the unlikely event of having to swap out a blade component during the operational phase).

The minor junction improvement works will require clearing back the existing road verge and field vegetation at the junctions, and excavation of material to allow the placing of stone/hard surfacing within the proposed areas. A series of removable bollards and/or temporary fencing will be placed along the existing road edge in order to preserve the structure of the junctions outside of those periods when deliveries of turbine components are underway. Once deliveries are completed the areas and boundaries will be reinstated restoring the junctions to their original configurations except as stated otherwise.

A Method Statement for the junction improvement works along the turbine delivery route is included in Appendix 3. All accommodation and link road works will be the subject of a method statement and traffic management plan prepared by the appointed contractor with the approval of Westmeath County Council, prior to the commencement of construction works.

4. ENVIRONMENTAL MANAGEMENT

4.1 Introduction

This CEMP includes all best practice measures required to construct the Proposed Development. It sets out the drainage proposals that will be developed further prior to the commencement of construction however, any such improvements will be in line with the principles set out here and will also be in full compliance with the planning consent and mitigation measures as presented in the EIAR, NIS and all other relevant planning documents. The following sections give an overview of the drainage design proposals, tree felling, refuelling, dust and noise control measures. An outline of the management of invasive species, waste materials, archaeological features, traffic, site reinstatement and decommissioning is also provided.

4.2 Protecting Water Quality

4.2.1 Introduction

The drainage design for the Proposed Development has been prepared by Hydro Environmental Services Ltd. (HES). The drainage design has been prepared based on experience of the project team of other wind farm sites in peat-dominated environments, and the number of best practice guidance documents referred to in the References section of the EIAR.

The protection of the watercourses within and surrounding the site, and downstream catchments that they feed is of utmost importance in considering the most appropriate drainage proposals for the site of the Proposed Development. There is an existing drainage system and surface water discharges from the site. The Proposed Development's drainage design has been proposed specifically with the intention of having no negative impact on the water quality of the site and discharges from the site and its associated rivers and lakes, and consequently no impact on downstream catchments and ecological ecosystems.

No routes of any natural drainage features will be altered as part of the Proposed Development and turbine locations and associated new roadways were originally selected to avoid natural watercourses in so far as possible. One existing water crossing within the proposed wind farm site will be upgraded as part of the Proposed Development, with the construction of two clear span bridges over the River Glore in the northern sections of the site – see Section 4.8.3 of the EIAR for further details.

There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows. All discharges from the proposed works areas will be made via settlement ponds, and over vegetation filters at a significant distance from natural watercourses.

Section 1.4.1 in Chapter 1 of the EIAR provides detail on the coordinated management of site activities, including drainage, between peat harvesting operations on the site should they continue and the construction and operation of the Proposed Development.

4.2.2 Existing Drainage Features

On a regional scale, the proposed wind farm site is located in the Inny River surface water sub-catchment, which is in the Upper Shannon catchment within Hydrometric Area 26 of the Shannon International River Basin District (SIRBD). On a more local scale, the proposed wind farm site is located in the Inny River sub-catchment and two sub-basins of the Inny River. The majority of the site is within the Inny_050 sub basin with a small section in the south of the site near the R396 Regional Road within the Inny_060 sub basin. The Inny River flows in a southerly direction along the western boundary of the site and discharges into Lough Derraverragh approximately 7.5km downstream of the site.

The elevation of the proposed wind farm site ranges between approximately 60m OD and 66m OD. The vast majority of the site is situated on cutover peatland The site comprises three separate peat basins, the northern, central and southern basins, each with its own separate drainage system. Further details on outfall drainage directions in each area of the site are provided in Section 9.3.5 of the EIAR:

A drain, which divides the northern basin in two sections, discharges directly to the Inny River northwest of the site. Lough Bane proposed Natural Heritage Area(pNHA) is located adjacent to the northern boundary of the Proposed Development site; however, no part of the Proposed Development footprint is located within the pNHA. Lough Bane itself is located approximately 180 metres north of the internal access road between Turbines T2 and T4. An unnamed small dystrophic lake is located on the north western corner of the site. The presence of perimeter boundary drains and intermediate high banks (uncut sections of high bog) means that there is no runoff from the peat harvesting area into Lough Bane or the dystrophic lake.

The western section of the proposed wind farm site drains directly to the Inny River via a number of settlement ponds and outfall channels. The River Glore flows from across the northern section of the site from east to west and merges with the Inny River on the western boundary of the site.

The proposed wind farm site has parallel-running peat drains that are spaced approximately every 12-15 metres on the bog surface for surface water runoff removal. Surface water runoff collected in these drains is conveyed to a headland silt trap, from where it flows into a larger boundary drain and then onto a sedimentation basin for retention and controlled discharge. The parallel running bog surface drains are only approximately 1.5m deep and therefore do not intercept the mineral subsoil underlying the peat. These internal field drains are deepened as harvesting progresses. The larger boundary drains are generally deeper and regularly intercept the mineral subsoils.

The proposed underground grid connection route is located within the Shannon International River Basin District. With respect to regional hydrology, the grid route is located in 2 no. regional surface water catchments (the River Inny and the River Brosna) and 3 no. regional surface water sub-catchments. The southern section of the proposed grid route, along the eastern edge of Lough Owel and on to Mullingar (~8km long) is located within the Brosna sub-catchment (Brosna_SC_010) within the regional Lower Shannon catchment (25A). The area north of Lough Owel to the northern edge of Lough Derravargh is located within the Inny sub-catchment (Inny[Shannon]_SC_030). North of Lough Derravargh, towards Coole, falls within the boundary of the Inny sub-catchment (Inny[Shannon]_SC_020). Both of these subcatchments are located within the regional Upper Shannon Catchment (26F).

4.2.3 Drainage Design Principles

Drainage water from any works areas of the site will not be directed to any natural watercourses within the site. Two distinct methods will be employed to manage drainage water within the site. The first method involves keeping clean water clean by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waters from works areas within the site that might carry silt or sediment, to allow attenuation and settlement prior to controlled diffuse release.

The drainage design is intended to maximise erosion control, which is more effective than having to control sediment during high rainfall. Such a system also requires less maintenance. The area of exposed ground will be minimised. The drainage measures will prevent runoff from entering the works areas of the site from adjacent ground, to minimise the volume of sediment-laden water that has to be managed. Discoloured run-off from any construction area will be isolated from natural clean run-off.

A schematic line drawing of the proposed drainage design is presented in Figure 4-1 below.

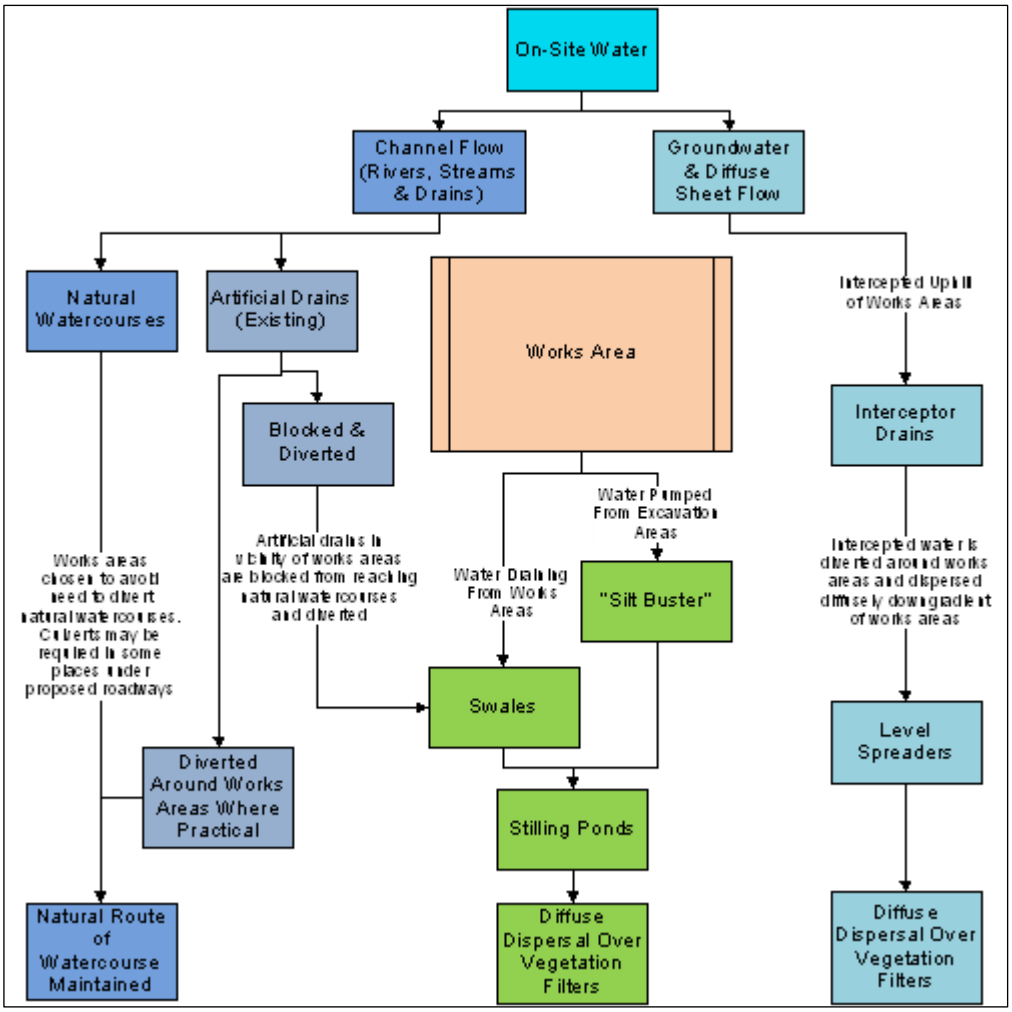

Figure 4-1 Schematic drawing of proposed drainage design

4.2.4 Drainage Design

A preliminary drainage design for the Proposed Development, incorporating all principles and measures outlined in this drainage design description, has been prepared, and is included in the drainage design drawings in Appendix 4-9 to the EIAR and Appendix 4 of this document. The drainage design employs the various measures further described and is cognisant of the following guidance documents:

- Environmental Requirements for Afforestation (Forest Service, 2016a);
- Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh;
- Coillte (2009): Forest Operations & Water Protection Guidelines;
- Forest Services (Draft) Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures;
- Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford;
- COFORD (2004): Forest Road Manual – Guidelines for the Design, Construction and Management of Forest Roads;
- Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Watercourses;
- Good Practice During Wind Farm Construction (Scottish Natural Heritage, 2010);
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note);
- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note);

- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006); and,
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.

4.2.4.1 Interceptor Drains

Interceptor drains will be installed up gradient of any works areas to collect surface flow runoff and prevent it reaching excavations and construction areas of the site where it might otherwise have come into contact with exposed surfaces and picked up silt and sediment. The drains will be used to divert upslope runoff around the works area to a location where it can be redistributed over the ground surface as sheet flow. This will minimise the volume of potentially silty runoff to be managed within the construction area.

The interceptor drains will be installed in advance of any main construction works commencing. The material excavated to make the drain will be compacted on the downslope edge of the drain to form a diversion dike. On completion of the construction phase works, it is envisaged that the majority of the interceptor drains could be removed. At that stage, there will be no open excavations or large areas of exposed ground that are likely to give rise to large volumes of potentially silt-laden run off. Any areas in which works were carried out to construct roads, turbine bases or hardstands, will have been built up with large grade hardcore, which even when compacted in place, will retain sufficient void space to allow water infiltrate the subsurface of these constructed areas. It is not anticipated that roadways or other installed site infrastructure will intercept ground-conveyed surface water runoff to any significant extent that would result in scouring or over-topping or spill over. Where the drains are to be removed, they will be backfilled with the material from the diversion dike. Interceptor drains may have to be retained in certain locations, for example where roadways are to be installed on slopes, to prevent the roadways acting as conduits for water that might infiltrate the roadway sub-base. In these cases, interceptor drains would be maintained in localised areas along the roadway with culverts under the roadway, which would allow the intercepted water to be discharged to vegetation filters downgradient of the roadway. Similarly, in localised hollows where water is likely to be funnelled at greater concentrations than on broader slopes, interceptor drains and culverts may be left in situ following construction.

The velocity of flow in the interceptor will be controlled by check dams (see Section 4.2.4.3 below), which will be installed at regular intervals along the drains to ensure flow in the channel is non-erosive. On steeper sections where erosion risks are greater, a geotextile membrane will be added to the channel.

Interceptor drains will be installed horizontally across slopes to run in parallel with the natural contour line of the slope. Intercepted water will travel along the interceptor drains to areas downgradient of works areas, where the drain will terminate at a level spreader. Across the entire length of the interceptor drains, the design elevation of the water surface along the route of the drains will not be lower than the design elevation of the water surface in the outlet at the level spreader.

4.2.4.2 Collector Drains/Swales

Collector drains or swales are shallow drains that will be used to intercept and collect run off from construction areas of the site during the construction phase. Drainage swales will remain in place to collect runoff from roads and hardstanding areas of the proposed development during the operational phase. A swale is an excavated drainage channel located along the downgradient perimeter of construction areas, used to collect and carry any sediment-laden runoff to a sediment-trapping facility and stabilised outlet. Swales are proven to be most effective when a dike is installed on the downhill side. They are similar in design to interceptor drains and collector drains described above.

Collector drains will be installed downgradient of any works areas to collect surface flow runoff where it might have come into contact with exposed surfaces and picked up silt and sediment. Swales will intercept the potentially silt-laden water from the excavations and construction areas of the site and prevent it reaching natural watercourses.

Collector drains will be installed in advance of any main construction works commencing. The material excavated to make the swale will be compacted on the downslope edge of the drain to form a diversion dike.

4.2.4.3 Check Dams

The velocity of flow in the interceptor drains and collector drains, particularly on sloped sections of the channel, will be controlled by check dams, which will be installed at regular intervals along the drains to ensure flow in the collector drain is non-erosive. Check dams will also be installed in some existing artificial drainage channels that will receive waters from works areas of the site.

Check dams will restrict flow velocity, minimise channel erosion and promote sedimentation behind the dam. The check dams will be installed as the interceptor drains are being excavated. Check dams may also be installed in some of the existing artificial drainage channels on the site, downstream of where collector drains connect in.

The proposed check dams will be made up of 4/40mm non-friable crushed stone. The check dams will be installed at regular intervals along the interceptor drains to ensure the bottom elevation of the upper check dam is at the same level as the top elevation of the next down-gradient check dam in the drain. The centre of the check dam will be approximately 150mm lower than the edges to allow excess water to overtop the dam in flood conditions rather than cause upstream flooding or scouring around the dams.

The check dams will be installed at regular intervals along the interceptor drains to ensure the bottom elevation of the upper check dam is at the same level as the top elevation of the next down-gradient check dam in the drain. The centre of the check dam will be approximately 150 mm lower than the edges to allow excess water to overtop the dam in flood conditions rather than cause upstream flooding or scouring around the dams.

Check dams will not be used in any natural watercourses, only artificial drainage channels and interceptor drains. The check dams will be left in place where required at the end of the construction phase to limit erosive linear flow in the collector drain during extreme rainfall events.

Check dams are designed to reduce velocity and control erosion and are not specifically designed or intended to trap sediment, although sediment is likely to build up. If necessary, any excess sediment build up behind the dams will be removed. For this reason, check dams will be inspected and maintained regularly to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.

4.2.4.4 Level Spreaders

A level spreader will be constructed at the end of each interceptor drain to convert concentrated flows in the drain, into diffuse sheet flow on areas of vegetated ground. The levels spreaders will be located downgradient of any proposed works areas in locations where they are not likely to contribute further to water ingress to construction areas of the site, or areas where they are not likely to give rise to peat stability issues.

The water carried in interceptor drains will not have come in contact with works areas of the site, and therefore should be free of silt and sediment. The level spreaders will distribute clean drainage water onto vegetated areas where the water will not be re-concentrated into a flow channel immediately

below the point of discharge. The discharge point will be on level or only very gently sloping ground rather than on a steep slope so as to prevent erosion.

The slope in the channel leading into the spreader will be less than or equal to 1%. The slope downgradient of the spreader onto which the water will dissipate will have a grade of less than 6%. The availability of slopes with a grade of 6% or less will determine the locations of level spreaders. If a slope grade of less than 6% is not available in the immediate area downgradient of a works area at the end of a diversion drain, a piped slope drain will be used to transfer the water to a suitable location.

The spreader lip over which the water will spill will be made of a concrete kerb, wooden board, pipe, or other similar piece of material that can create a level edge similar in effect to a weir. The spreader will be level across the top and bottom to prevent channelised flow leaving the spreader or ponding occurring behind the spreader. The top of the spreader lip will be 150mm above the ground behind it. The length of the spreader will be a minimum of four metres and a maximum length of 25 metres, with the actual length of each spreader to be determined by the size of the contributing catchment, slope and ground conditions.

Clean four-inch stone can be placed on the outside of the spreader lip, and pressed into the ground mechanically to further dissipate the flow leaving the level spreader over a larger area.

4.2.4.5 Vegetation Filters

Vegetation filters are the existing vegetated areas of land that will be used to accept surface water runoff from upgradient areas. The selection of suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions.

Vegetation filters will carry outflow from the level spreaders as overland sheet flow, removing any suspended solids and discharging to the groundwater system by diffuse infiltration.

Vegetation filters will not be used in isolation for waters that are likely to have higher silt loadings. In such cases, silt-bearing water will already have passed through stilling (settlement) ponds prior to diffuse discharge to the vegetation filters via a level spreader.

4.2.4.6 Silting Ponds/Settlement Ponds

Stilling ponds will be used to attenuate runoff from works areas of the site during the construction phase, and will remain in place to handle runoff from roads and hardstanding areas of the proposed development during the operational phase. The purpose of the stilling ponds is to intercept runoff potentially laden with sediment and to reduce the amount of sediment leaving the disturbed area by reducing runoff velocity. Reducing runoff velocity will allow larger particles to settle out in the stilling ponds, before the run-off water is redistributed as diffuse sheet flow in filter strips downgradient of any works areas.

Stilling ponds will be excavated/constructed at each required location as two separate ponds in sequence, a primary pond and a secondary pond. The points at which water enters and exits the stilling ponds will be stabilised with rock aprons, which will trap sediment, dissipate the energy of the water flowing through the stilling pond system, and prevent erosion. The primary stilling pond will reduce the velocity of flows to less than 0.5 metres per second to allow settlement of silt to occur. Water will then pass from the primary pond to the secondary pond via another rock apron. The secondary stilling pond will reduce the velocity of flows to less than 0.3 metres per second. Water will flow out of the secondary stilling pond through a stone dam, partially wrapped in geo-textile membrane, which will control flow velocities and trap any sediment that has not settled out.

Water will flow by gravity through the stilling pond system. The stilling ponds will be sized according to the size of the area they will be receiving water from, but will be sufficiently large to accommodate peak

flows storm events. The stilling ponds will be dimensioned so that the length to width ratio will be greater than 2:1, where the length is the distance between the inlet and the outlet. Where ground conditions allow, stilling ponds will be constructed in a wedge shape, with the inlet located at the narrow end of the wedge. Each stilling pond will be a minimum of 1-1.5 metres in depth. Deeper ponds will be used to minimise the excavation area needed for the required volume.

The embankment that forms the sloped sides of the stilling ponds will be stabilised with vegetated turves, which will have been removed during the excavation of the stilling ponds area. All material excavated during pond construction will be used locally for landscaping and berm construction around these ponds.

Stilling ponds will be located towards the end of collector drains, close to where the water will be reconverted to diffuse sheet flow. Upon exiting the stilling pond system, water will be immediately reconverted to diffuse flow via a fan-shaped rock apron if there is adequate space and ground conditions allow. Otherwise, a collector drain will be used to carry water exiting the stilling pond system to a level spreader to reconvert the flow to diffuse sheet flow.

Stilling ponds will be inspected weekly and following rainfall events with sediment cleaned out as required. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows.

4.2.4.7 Siltbuster

A “siltbuster” or similar equivalent piece of equipment will be available to filter any water pumped out of excavation areas if necessary, prior to its discharge to stilling ponds or swales.

Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction sites.

The unit stills the incoming water/solids mix and routes it upwards between a set of inclined plates for separation. Fine particles settle onto the plates and slide down to the base for collection, whilst treated water flows to an outlet weir after passing below a scum board to retain any floating material. The inclined plates dramatically increase the effective settling area of the unit giving it a very small footprint on site and making it highly mobile. Figure 4-2 below shows an illustrative diagram of the Siltbuster.

The Siltbuster units are now considered best practice for the management of dirty water pumped from construction sites. The UK Environment Agency and the Scottish Environmental Protection Agency have all recommended/specified the use of Siltbuster units on construction projects.

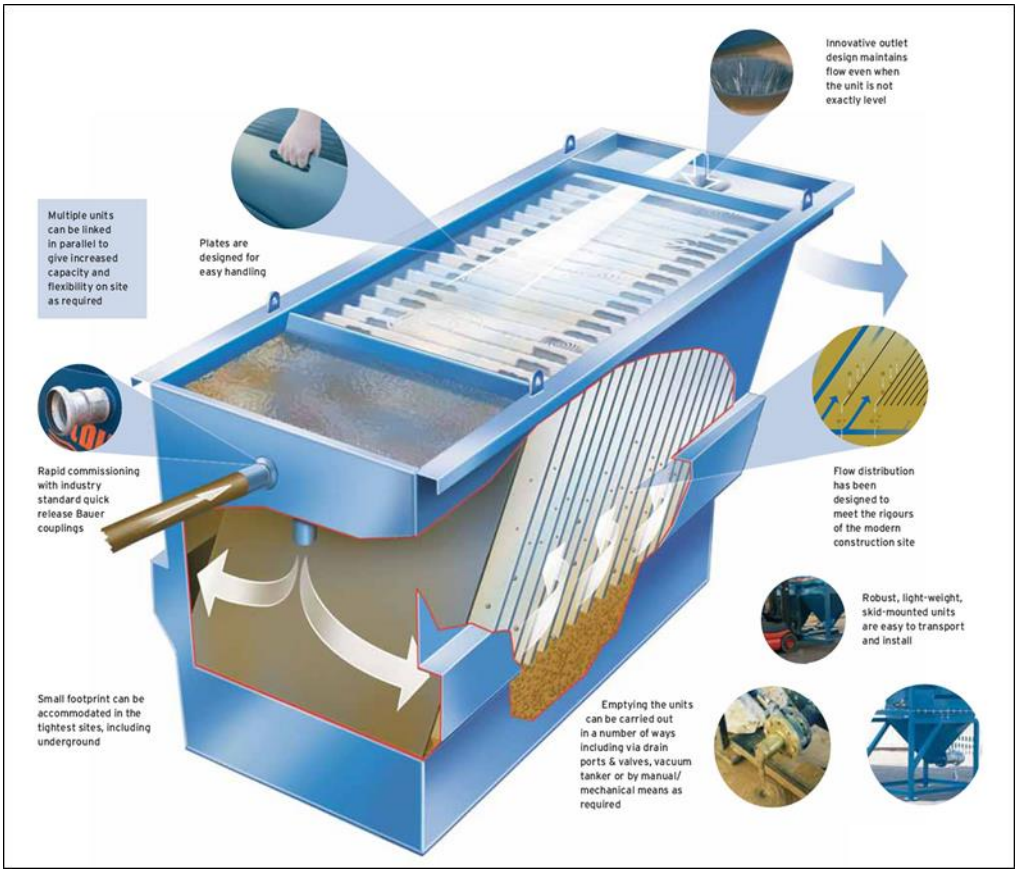

Figure 4-2 Siltbuster (Source: https://www.siltbuster.co.uk/sb_prod/siltbuster-fb50-settlement-unit/)

4.2.4.8 Silt Bags

Dewatering silt bags allow the flow of water through them while trapping any silt or sediment suspended in the water. The silt bags provide a passive non-mechanical method of removing any remaining silt contained in the potentially silt-laden water collected from works areas within the site.

Dewatering silt bags are an additional drainage measure that can be used downgradient of the stilling ponds at the end of the collector drain and will be located, wherever it is deemed appropriate, throughout the site. The water will flow, via a pipe, from the stilling ponds into the silt bag. The silt bag will allow the water to flow through the geotextile fabric and will trap any of the finer silt and sediment remaining in the water after it has gone through the previous drainage measures. The dewatering silt bags will ensure that there will be no loss of peaty silt into any stream.

The dewatering silt bag that will be used will be approximately 3 metres in width by 4.5 metres (see Plates 4-1 4-2 below) in length and will be capable of trapping approximately four tonnes of silt. The dewatering silt bag, when full, will be removed from site by a waste contractor with the necessary waste collection permit, who will then transport the silt bag to an appropriate, fully licensed waste facility.

Plate 4-1 Silt Bag with water being pumped through

Plate 4-2 Silt bag under inspection

4.2.4.9 Silt Fences

Silt fences will be installed as an additional water protection measure around existing watercourses in certain locations, particularly where watercourse crossings take place.

Silt fences can be installed as single, double or a series of triple silt fences, depending on the space available and the anticipated sediment loading. The silt fence designs follow the technical guidance document 'Control of Water Pollution from Linear Construction Projects' published by CIRIA (Ciria, No. C648, 1996). Up to three silt fences may be deployed in series.

Silt fences will be emplaced along drains and parallel to access roads edges as required, down-gradient of all new roads and turbine locations. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to watercourses of sand and gravel sized sediment, released from excavation of mineral subsoils of glacial and glacio-fluvial origin, and entrained in surface water runoff.

Inspection and maintenance of these structures during the construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase. Site fence material will be Terra Stop Premium as per the specifications provided at https://www.hy-tex.co.uk/products/geotextiles/terrastop-premium-silt-fence or equivalent manufacturer certified CE mark for erosion control of EN13253 or similar.

The most suitable type, number or combination of silt fences will be determined on a location specific basis for the various parts of the site. Although they may be indicated in the drainage designs shown in Appendix 4-1 of the EIAR to be just a single line, silt fences may be installed in series on the ground.

Site fences will be inspected regularly to ensure water is continuing to flow through and the fence is not coming under strain from water backing up behind it.

4.2.4.10 Sedimats

Sediment entrapment mats, consisting of coir or jute matting, will be placed at the outlet of the silt bag to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure.

4.2.4.11 Culverts

All new proposed culverts and proposed culvert upgrades will be suitably sized for the expected peak flows in the watercourse.

Some culverts may be installed to manage drainage waters from works areas of the Proposed Development, particularly where the waters have to be taken from one side of an existing roadway to the other for discharge. The size of culverts will be influenced by the depth of the track or road sub-base. In some cases, two or more smaller diameter culverts may be used where this depth is limited, though this will be avoided as they will have a higher associated risk of blockage than a single, larger pipe. In all cases, culverts will be oversized to allow mammals to pass through the culvert.

Culverts will be installed with a minimum internal gradient of 1% (1 in 100). Smaller culverts will have a smooth internal surface. Larger culverts may have corrugated surfaces which will trap silt and contribute to the stream ecosystem. Depending on the management of water on the downstream side of the culvert, large stone may be used to interrupt the flow of water. This will help dissipate its energy and help prevent problems of erosion. Smaller water crossings will simply consist of an appropriately sized pipe buried in the sub-base of the road at the necessary invert level to ensure ponding or pooling doesn't occur above or below the culvert and water can continue to flow as necessary.

All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance.

4.2.5 Borrow Pit Drainage

The proposed borrow pit will extract bedrock below the local groundwater table and therefore there is some moderate potential to impact on local groundwater levels. The proposed borrow pit is located on an elevated area of ground and drainage by gravity will ensue after reinstatement. The pit will be relatively shallow (5m), and therefore the potential for groundwater level impacts to extend significant distances from the pit is negligible. Relevant environmental management guidelines from the EPA quarry 2006 guidance document – "Environmental Management in the Extractive Industry" in relation to groundwater issues will be implemented during the construction phase.

The following guidelines will be implemented the construction and reinstatement of borrow pits outlined by Fehily Timoney as part of the Peat and Spoil Management Plan presented in Appendix 4-2 of this EIAR:

- Where possible, the surface of the placed spoil should be shaped to allow efficient run-off of surface water from the placed arisings.
- An interceptor drain should also be installed upslope of the borrow pit, where necessary. This drain will divert any surface water away from the borrow pit and hence prevent water from ponding and lodging during construction and also when reinstated.
- Control of groundwater within the borrow pit may be required and measures will be determined as part of the confirmatory ground investigation programme. A temporary pump and suitable outfall locations are likely to be required during construction.
- A silting pond may be required at the lower side/outfall location of the borrow pit.
- Where possible, the topsoil shall be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the spoil within the borrow pits.

4.2.6 Floating Road Drainage

Where sections of floating road are to be installed instead of excavated roads, cross drains will be installed beneath the road construction corridor to maintain existing clean water drainage paths. Large surface water drainage pipes will be placed at these locations below the level of the proposed road sub-base. These drainage pipes will be extended each side of the proposed road and cable trench construction corridor, along the paths of the existing drains.

With the exception of the installation of cross drains under the floating road corridor, minimal additional drainage will be installed to run parallel to the roads, in order to maintain the natural hydrology of the peatland areas over which the roads will be floated.

4.2.7 Cable Trench Drainage

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

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

On steeper slopes, silt fences, as detailed in Section 4.6.4.9 of the EIAR will be installed temporarily downgradient of the cable trench works area, or on the downhill slope below where excavated material is being temporarily stored to control run-off.

4.2.8 Site Drainage Management

4.2.8.1 Preparative Site Drainage Management

All materials and equipment necessary to implement the drainage measures outlined above, will be brought on-site in advance of any works commencing. An adequate amount of clean stone, silt fencing, stakes, etc will be kept on site at all times to implement the drainage design measures as necessary. The drainage measures outlined in the above will be installed prior to, or at the same time as the works they are intended to drain.

4.2.8.2 Pre-emptive Site Drainage Management

The works programme for the groundworks part of the construction phase of the project will also take account of weather forecasts, and predicted rainfall in particular. Large excavations, large movements of overburden or large scale overburden or soil stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

4.2.8.3 Reactive Site Drainage Management

The final drainage design prepared for the proposed development prior to commencement of construction will have to provide for reactive management of drainage measures. The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the Environmental Clerk of Works (ECoW) or supervising hydrologist on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor or collector drains as deemed necessary on-site. The drainage design may have to be modified on the ground as necessary, and the modifications will draw on the various features outlined above in whatever combinations are deemed to be most appropriate to situation on the ground at the particular time.

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

4.2.8.4 Drainage Maintenance

An inspection and maintenance plan for the drainage system onsite will be prepared in advance of commencement of any works. Regular inspections of all installed drainage features will be necessary, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water at parts of the systems where it is not intended. The inspection of the drainage system will be the responsibility of the ECoW or the Supervising Hydrologist.

If necessary, any excess sediment build up behind check dams will be removed. For this reason, check dams will be inspected and maintained weekly during the construction phase of the project to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.

Check dams will also be inspected weekly during the construction phase of the project and following rainfall events to ensure the structure of the dam is still effective in controlling flow. Any scouring around the edges of the check dams or overtopping of the dam in normal flow conditions will be rectified by reinforcement of the check dam.

Drainage swales will be regularly inspected for evidence of erosion along the length of the swale. If any evidence of erosion is detected, additional check dams will be installed to limit the velocity of flow in the channel and reduce the likelihood of erosion occurring in the future.

An adequate amount of clean stone, Terra Stop (or similar silt fencing material), stakes, straw bales (rectangular bales, to be used in emergency only), etc. will be kept on site at all times to ensure the drainage system can be fully maintained throughout the construction phase of the wind farm and ensure that personnel are fully equipped to provide an emergency facility to control the discharge from settlement ponds and react to any accidental silt discharges.

Silt traps will be inspected weekly during the construction phase of the project and following rainfall events with sediment build-up removed as required. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows.

The frequency of drainage system inspections will be reduced following completion of the construction phase of the project. Weekly inspections during the construction phase will be reduced to monthly, bi-monthly and eventually quarterly inspections during the operational phase. The frequency will be increased or decreased depending on the effectiveness of the measures in place and the amount of remedial action required in any given period.

4.3 Tree Felling Management Plan

Tree felling to facilitate the Proposed Development will not be undertaken simultaneously with construction groundworks. Felling will take place prior to groundworks commencing.

Before the commencement of any felling works, an Environmental Clerk of Works (ECoW) shall be appointed to oversee the keyhole and extraction works. The ECoW shall be experienced and competent, and shall have the following functions:

- Attend the site for the setup period when drainage protection works are being installed, and be present on site during the remainder of the forestry keyhole felling works.

- Prior to the commencement of works, review and agree the positioning by the Operator of the required Aquatic Buffer Zones (ABZs), silt traps, silt fencing (see below), water crossings and onsite storage facilities for fuel, oil and chemicals (see further below).
- Be responsible for preparing and delivering the Environmental Tool Box Talk (TBT) to all relevant parties involved in site operations, prior to the commencement of the works.
- Conduct daily and weekly inspections of all water protection measures and visually assess their integrity and effectiveness in accordance with Section 3.4 (Monitoring and Recording) and Appendix 3 (Site Monitoring Form (Visual Inspections)) of the *Forestry & Freshwater Pearl Mussel Requirements*.
- Take representative photographs showing the progress of operation onsite, and the integrity and effectiveness of the water protection measures.
- Collect water samples for analysis by a 3rd party accredited laboratory, adhering to the following requirements:
    - Surface water samples shall be collected upstream and downstream of the keyhole felling site at suitable sampling locations.
    - Sampling shall be taken from the stream / river bank, with no in-stream access permitted.
    - The following minimum analytical suite shall be used: pH, EC, TSS, BOD, Total P, Ortho-P, Total N, and Ammonia.
- Review of operator's records for plant inspections, evidence of contamination and leaks, and drainage checks made after extreme weather conditions.
- Prepare and maintain a contingency plan.
- Suspend work where potential risk to water from siltation and pollution is identified, or where operational methods and mitigation measures are not specified or agreed.
- Prepare and maintain a Water Protection Measure Register. This document is to be updated weekly by the ECoW.

All relevant measures set out in the *Forestry & Freshwater Pearl Mussel Requirements, Forestry & Water Quality Guidelines, Forest Harvesting & the Environment Guidelines and the Forest Protection Guidelines* will apply. To protect watercourses, the following measures will be adhered to during all keyhole/tree felling activities.

- Works will be overseen by an ECoW as described above.
- The extent of all necessary tree felling will be identified and demarcated with markings on the ground in advance of any felling commencing.
- All roads and culverts will be inspected prior to any machinery being brought on site to commence the felling operation. No tracking of vehicles through watercourses will occur. Vehicles will only use existing road infrastructure and established watercourse crossings.
- Existing drains that drain an area to be felled towards surface watercourses will be blocked, and temporary silt traps will be constructed to ensure collection of all silt within felling areas. These temporary silt traps will be cleaned out and backfilled once felling works are complete. This ensures there is no residual collected silt remaining in blocked drains after felling works are completed. No direct discharge of such drains to watercourses will occur from within felling areas.
- New collector drains and sediment traps will be installed during ground preparation to intercept water upgradient of felling areas and divert it away. Collector drains will be excavated at an acute angle to the contour (0.3%-3% gradient), to minimise flow velocities.
- All silt traps will be sited outside of buffer zones and have no direct outflow into the aquatic zone. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of away from all aquatic zones.

- All new collector drains will taper out before entering the aquatic buffer zone to ensures the discharging water gently fans out over the buffer zone before entering the aquatic zone.
- Machine combinations, such as mechanical harvesters or chainsaw felling will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance;
- Mechanised operations will be suspended during and immediately after heavy rainfall.
- Where brash is required to form brash mats, it is to be laid out at harvesting stage to prevent soil disturbance by machine movement.
- Brash which has not been pushed into the soil may be moved within the site to facilitate the creation of mats in more demanding locations.
- Felling of trees will be pointed directionally away from watercourses.
- Felling will be planned to minimise the number of machine passes in any one area.
- Extraction routes, and hence brash mats, will be aligned parallel to the ground contours where possible.
- Harvested timber will be stacked in dry areas, and outside any 50-metre watercourse buffer zone. Straw bales and check dams to be emplaced on the down gradient side of timber storage sites.
- Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but removing of natural debris deflectors will be avoided.

Table 4-1 Minimum Buffer Zone Widths (Forest Service, 2000)

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

4.4 Cement Based Products Control Measures

Only ready-mixed concrete will be used during the construction phase, with all concrete being delivered from local batching plants in sealed concrete delivery trucks. The use of ready-mixed concrete deliveries will eliminate any potential environmental risks of on-site batching. When concrete is delivered to site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the site. Concrete trucks will be washed out fully at the batching plant, where facilities are already in place.

The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area. Alternatively, a Siltbuster-type concrete wash unit or equivalent (https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/) may be used. This type of Siltbuster unit catches the solid concrete and filters and holds wash liquid for pH adjustment and further solids separation. The residual liquids and solids can be disposed of off-site at an appropriate waste facility. Where temporary lined impermeable containment areas are used, such containment areas are typically built using straw bales and lined with an impermeable membrane. Two examples are shown in Plate 4-3 and Plate 4-4 below.

Plate 4-3 Concrete Wash Out Area

Plate 4-4 Concrete Wash Out Area

The areas are generally covered when not in use to prevent rainwater collecting. In periods of dry weather, the areas can be uncovered to allow much of the water to be lost to evaporation. At the end of the concrete pours, any of the remaining liquid contents will be tankered off-site. Any solid contents that will have been cleaned down from the chute will have solidified and can be broken up and disposed of along with other construction waste.

Due to the volume of concrete required for each turbine foundation, and the requirement for the concrete pours to be continuous, deliveries are often carried out outside normal working hours in order to limit the traffic impact on other road users, particularly peak period school and work commuter traffic. Such activities are limited to the day of turbine foundation concrete pours, which are normally complete in a single day per turbine.

The risks of pollution arising from concrete deliveries will be further reduced by the following:

- Concrete trucks will not be washed out on the site, but will be directed back to their batching plant for washout.
- Site roads will initially be constructed with a subgrade and compacted with the use of a roller to allow concrete delivery trucks access all areas where the concrete will be needed. The final wearing course for the site roads will not be provided until all bases have been poured. No concrete will be transported around the site in open trailers or dumpers so as to avoid spillage while in transport. All concrete used in the construction of turbine bases will be pumped directly into the shuttered formwork from the delivery truck. If this is not practical, the concrete will be pumped from the delivery truck into a hydraulic concrete pump or into the bucket of an excavator, which will transfer the concrete to the location where it is needed.
- The arrangements for concrete deliveries to the site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout and discussing emergency procedures.
- Clearly visible signage will be placed in prominent locations close to concrete pour areas specifically stating washout of concrete lorries is not permitted on the site.

4.4.1 Concrete Pouring

Because of the scale of the main concrete pours that will be required to construct the Proposed Development, the main pours will be planned days or weeks in advance. Special procedures will be adopted in advance of and during all concrete pours to minimise the risk of pollution. These may include:

- Using weather forecasting to assist in planning large concrete pours, and avoiding large pours where prolonged periods of heavy rain is forecast.
- Restricting concrete pumps and machine buckets from slewing over watercourses while placing concrete.

- Ensuring that excavations are sufficiently dewatered before concreting begins and that dewatering continues while concrete sets.
- Ensuring that covers are available for freshly placed concrete to avoid the surface washing away in heavy rain.
- The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area, or a Siltbuster-type concrete wash unit (https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/) or equivalent.
- Disposing of surplus concrete after completion of a pour in agreed suitable locations away from any watercourse or sensitive habitats.

4.5 Refuelling, Fuel and Hazardous Materials Storage

Mitigation measures proposed to avoid release of hydrocarbons at the site are as follows:

- Wherever possible, vehicles will be refuelled off-site. This will be the case for regular, road-going vehicles. However, for construction machinery that will be based on-site continuously, a limited amount of fuel will have to be stored on site in bunded areas.
- On-site refuelling of machinery will be carried out at dedicated refuelling locations 100m from watercourses using a mobile double skinned fuel bowser. The fuel bowser, a double-axle custom-built refuelling trailer or similar will be re-filled off site, and will be towed around the site by a 4x4 jeep to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the cranes, excavators, etc. that will be used during the construction of the proposed wind farm. The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use.
- Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays, spill kits and fuel absorbent mats will be used during all refuelling operations.
- Fuels volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor;
- The electrical control building should be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage of any associated chemicals and to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- The plant used should be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages will be contained within Emergency Response Plan (Section 6). Spill kits will be available to deal with an accidental spillage.

4.6 Outline Peat Stability Management Plan

Minimal peat excavation is likely to be required on site due to the proposed construction techniques for the site. With the exception of Turbine T5 and T15, all turbines and their associated crane hardstands are likely to require a piled foundation as a result of the depth of peat and soft lacustrine deposits present. In addition, piled foundations may be required for the substation building. It is anticipated that the substation platform and construction compound platform will likely be constructed using floating techniques. The proposed construction method for all the new proposed access roads is a floated technique.

Quantities of peat and overburden to be excavated during the construction phase of the proposed development were calculated by FT as part of the Peat and Spoil Management Plan presented in Appendix 4-2 of this EIAR.

Peat instability or failure refers to a significant mass movement of a body of peat that would have an adverse impact on proposed wind farm development and the surrounding environment. Peat failure excludes localised movement of peat that could occur below an access road, creep movement or erosion type events. In the absence of appropriate mitigation, the consequence of peat failure at the study area may result in:

- Death or injury to site personnel;
- Damage to machinery;
- Damage or loss of access tracks;
- Drainage disrupted;
- Site works damaged or unstable;
- Contamination of watercourses, water supplies by sediment particulates; and,
- Degradation of the environment.

A Geotechnical & Peat Stability Assessment Report has been prepared by AGEC which provides a Geotechnical Risk Register for the site and includes details of the required mitigation/control measures. These mitigation measures are summarised below and in Appendix 8-1 of the EIAR.

4.6.1 General recommendations for Good Construction Practice

The peat stability assessment indicates that there is insignificant risk of peat failure. The following mitigation measures are recommended and should be taken into account when preparing Construction Method Statements for the proposed development:

- Avoidance of uncontrolled concentrated water discharge onto peat slopes identified as being unsuitable for such discharge.
- Avoidance of unstable excavations. All excavations shall be suitably supported to prevent collapse and development of tension cracks.
- Avoidance of placing fill and excavations in the vicinity of steeper peat slopes, that is at the crest or toe of the slope.
- Installation and regular monitoring of geotechnical instrumentation, as appropriate, during construction in areas of possible poor ground, such as deeper peat deposits.
- Site reporting procedures to ensure that working practices are suitable for the encountered ground conditions. Ground conditions to be assessed by suitably experienced geotechnical engineer.
- Regular briefing of all site staff (e.g. toolbox talks) to provide feedback on construction and ground performance and to promote reporting of any observed change in ground conditions.
- Routine inspection of wind farm site by contractor to include an assessment of ground stability conditions (e.g. cracking, excessive floating road settlement, disrupted surface, closed-up drains) and drainage conditions (e.g. blocked drains, absence of water in previously flowing drains, springs, etc).
- Peat movement monitoring posts will be installed upslope and downslope of access roads and at locations where peat depths are greater than 2.0m.

4.7 Outline Archaeological Management Plan

Archaeological monuments are safeguarded through national and international policy, which is designed to secure the protection of the cultural heritage resource.

Through a detailed examination of the baseline data available and a detailed site inspection, it was concluded that while the archaeological potential of the area is high no new sites were noted within the peatland areas of the areas proposed development, nor are any recorded archaeological or architectural assets located therein. One new potential archaeological monument was detected within the Wind Farm Site boundary at Clonrobert townland. It comprises an enclosed rectangular area in pasture c. 74m east of the proposed access road to T15. No direct impacts to this potential monument as a result of the proposed development have been identified. Furthermore, direct impacts to recorded archaeological and architectural assets as a result of the proposed turbines, substation, associated infrastructure and borrow pit have not been identified. Therefore, the following mitigation proposed is the protection and preservation of potentially new and previously undiscovered sites:

- A pre-construction walkover survey / inspection of areas proposed for excavation will be undertaken to re-assess the bog for new sites that may be exposed.
- If present, the sites shall be archaeologically excavated under licence prior to construction. The archaeologist will liaise with the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs regarding the methods being proposed for excavation.
- Pre-construction archaeological testing of turbine bases and hardstands proposed for excavation will be carried out. A report setting out the findings will be submitted to the relevant authorities.
- Archaeological monitoring of ground works and metal detection of spoil during construction. A report on the results of the monitoring shall be compiled and submitted to the relevant authorities on completion of the project.

In the event of the discovery of archaeological finds or remains, the National Monuments Service and the National Museum of Ireland shall be notified immediately. If features are revealed, the archaeological finds or remains will need to be investigated, and no further development will take place in that area until the site is fully identified, recorded and excavated or alternatively avoided to the satisfaction of the statutory authorities.

4.8 Dust Control & Air Quality

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

Proposed measures to control dust include:

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

- Daily inspection of construction sites to examine dust measures and their effectiveness.
- When necessary, sections of the haul route will be swept using a truck mounted vacuum sweeper.
- If necessary, water will be taken from stilling ponds in the site's drainage system, and will be pumped into a bowser or water spreader to dampen down haul roads and site compounds to prevent the generation of dust.
- Silty or oily water will not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust.
- Water bowser movements will be carefully monitored, as the application of too much water may lead to increased runoff.
- A road sweeper will be available if any section of the public roads requires cleaning due to construction traffic associated with the Proposed Development.

4.9 Noise & Vibration Control

Regarding construction activities, reference will be made to BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Noise*, which offers detailed guidance on the control of noise & vibration from demolition and construction activities. It is proposed that various practices be adopted during construction, including:

- managing the hours during which site activities likely to create high levels of noise or vibration are permitted as detailed below;
- establishing channels of communication between the contractor/developer, Local Authority and residents;
- appointing a site representative responsible for matters relating to noise and vibration;
- monitoring typical levels of noise and vibration during critical periods and at sensitive locations;
- keeping site access roads even to mitigate the potential for vibration from lorries.

Furthermore, a variety of practicable noise control measures will be employed. These include:

- selection of plant with low inherent potential for generation of noise and/ or vibration;
- placing of noisy / vibratory plant as far away from sensitive properties as permitted by site constraints, and;
- regular maintenance and servicing of plant items.

It is recommended that vibration from construction activities be limited to the values set out in Table 11-3 in Chapter 11 of this EIAR. It should be noted that these limits are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%.

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

- No plant used on site will be permitted to cause an on-going public nuisance due to noise.
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract.

- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.
- Any plant, such as generators or pumps, which is required to operate outside of general construction hours will be surrounded by an acoustic enclosure or portable screen.
- During the course of the construction programme, supervision of the works will include ensuring compliance with the limits detailed in Chapter 11 using methods outlined in British Standard BS 5228-1:2014+A1:2019 Code of practice for noise and vibration control on construction and open sites – Noise.
- The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 7:00hrs and 19:00hrs Monday to Saturday. However, to ensure that optimal use is made of good weather periods or at critical periods within the programme (i.e. concrete pours, large turbine component delivery, rotor/blade lifting) it could occasionally be necessary to work outside of these hours which will be agreed with the local authority where required.

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

- Fit suitably designed muffler or sound reduction equipment to the rock breaking tool to reduce noise without impairing machine efficiency.
- Ensure all leaks in air lines are sealed.
- Use a dampened bit to eliminate ringing.
- Erect acoustic screen between compressor or generator and noise sensitive area. When possible, line of sight between top of machine and reception point needs to be obscured.
- Enclose breaker or rock drill in portable or fixed acoustic enclosure with suitable ventilation.

4.9.1 Vibration

While it was concluded above that there will be no significant vibration impacts associated with the construction of the Proposed Development and that no specific mitigation measures were required, it is recommended that vibration from construction activities will be limited to the values set out in Section 11.3.2.1.3. It should be noted that these limits are not absolute but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%.

4.9.2 Operational Phase Mitigation

An assessment of the operational noise levels has been undertaken in accordance with best practice guidelines and procedures as outlined in Section 11.3.2.2 in Chapter 11 of this EIAR. The findings of the assessment identified that there are two NSLs where potential exceedances are predicted. If confirmed during post-construction monitoring, a curtailment strategy will be implemented to reduce noise levels due to the wind farm to within the criteria at all NSLs.

In the unlikely event that an issue with low frequency noise is associated with the Proposed Development, it is recommended that an appropriate detailed investigation be undertaken. Due consideration should be given to guidance on conducting such an investigation which is outlined in Appendix VI of the EPA document entitled *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4) (EPA, 2016). This guidance is based on the

threshold values outlined in the Salford University document *Procedure for the assessment of low frequency noise complaints, Revision 1, December 2011.*

The following programme of measures would be implemented in the event of an issue of aerodynamic modulation being identified and associated with the site:

- A detailed noise survey conducted by an appropriately qualified acoustic consultant will be commissioned in order to confirm the presence or not of the issue, the extent of the issue (i.e. number of locations, wind speeds and environmental conditions in which it is occurring);
- Based on the findings of this work and where aerodynamic modulation is identified a schedule of measures will be formulated and agreed with the planning authority, which would typically be envisaged to focus on control and regulation of the operation of turbine unit(s) in certain atmospheric and meteorological conditions.

4.9.3 Monitoring

Commissioning noise surveys are recommended to ensure compliance with any noise conditions applied to the Proposed Development. In the unlikely instance that an exceedance of these noise criteria is identified, the assessment guidance outlined in the IoA GPG and Supplementary Guidance Note 5: Post Completion Measurements (July 2014) should be followed and relevant corrective actions undertaken.

4.10 Invasive Species Management

Third Schedule invasive species Bohemian Knotweed, Japanese Knotweed, Himalayan Knotweed and Rhododendron were recorded along the proposed grid connection route (see Table 6-14 of the EIAR). The following mitigation will be adhered to in relation to these species:

- All earthworks machinery will be thoroughly pressure-washed prior to arrival on site and prior to their further use elsewhere.
- Care will be taken not to disturb or cause the movement of invasive species fragments, either intentionally or accidentally.
- Stands of Knotweed will be clearly demarcated by temporary fencing and tracking within them will be strictly avoided. A minimum buffer of seven metres will be applied to avoid disturbance of lateral Knotweed rhizomes.
- Where works occur within 7m of a Knotweed stand these will be carried out under the supervision of a suitably qualified ecologist.
- Where a Knotweed stand is encountered along the road the grid connection will be laid on the opposite side of the road to avoid excavation of potential Knotweed root material insofar as possible.
- Should removal of Knotweed off site be required this will be done so under the supervision of an ecologist in line with NPWS licencing.
- The machinery must be thoroughly cleaned down under supervision of an ecologist prior to moving away from the Knotweed contaminated area.
- All contractors and staff will be briefed about the presence, identification and significance of Knotweed before commencement of works.
- Good construction site hygiene will be employed to prevent the spread of these species with vehicles thoroughly cleaned down prior to leaving any site with the potential to have supported invasive species. All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) will be thoroughly cleaned down on site to prevent the spread of invasive plant species such as Knotweed and Rhododendron. All clean down must be undertaken in areas with no potential to result in the spread of invasive species.

- When working at locations in proximity to natural watercourses, a suitable barrier will be erected between the watercourse and the stand of invasive species. This will assist in preventing the spread of any invasive species into the watercourse during their removal.
- Any soils or subsoils contaminated with invasive species will sent for disposal to an appropriately licenced facility.

The treatment and control of invasive alien species will follow guidelines issued by the National Roads Authority - *The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads* (NRA 2010) and Irish Water (2016) *Information and Guidance Document on Japanese Knotweed*.

The bio security requirements in relation to all plant and equipment as set out in the Inland Fisheries Ireland (IFI) Bio-Security Protocol (copy provided in Appendix 6) will be implemented as required.

4.10.1 Good Practice on Site Management

Careful preparation of the site and planning of the works is crucial to successful treatment of invasive species. The following list of guidelines, which is not exhaustive, shall be followed by all on-site personnel. Only those who have been inducted into biosecurity measures on-site may enter the contaminated zones within the works areas. Should any risk of contaminated material escaping be observed by the site supervisor, the management plan for the site must be amended by an appropriately qualified person to mitigate against the risk. The Best Practice Management Guidelines produced by Invasive Species Ireland (Maguire et al, 2008) and is included in Appendix 5 of this document.

4.10.2 Establishing Good Site Hygiene

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

4.10.3 Decontamination of Vehicles

- Personnel may only clean down if they are familiar with the plant and rhizome material, and can readily identify it.
- Decontamination will only occur within designated wash-down areas.

- Vehicles will be cleaned using stiff-haired brush and pressure washers, paying special attention to any areas that might retain rhizomes e.g. wheel treads and arches.
- All run-off will be isolated and treated as contaminated material. This will be disposed of in already contaminated areas.

4.11 Waste Management Plan

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

- This WMP has a number of key objectives as outlined below:
- To set out management prescriptions that adhere to a waste management hierarchy
- To outline the roles and responsibilities of the Waste Manager
- Prevention and minimisation of waste at the construction stage of the proposed development.

4.11.1.1 Legislation

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

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

The Department of the Environment provides a document entitled, '*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects*'.

4.11.2 Preliminary Plan

The Department of the Environment guidelines state that, at the design stage of the project, only a preliminary WMP is required,

> "Formal production and presentation of the Plan may be at a later stage but a clear 'waste management philosophy' needs to be adopted...at the initial conceptual stage of the Project..."

This preliminary WMP has a number of key objectives as outlined below:

- To set out management prescriptions that adhere to a waste management hierarchy
- To outline the roles and responsibilities of the Waste Manager
- Prevention and minimisation of waste at the construction stage of the proposed development.

4.11.3 Waste Management Hierarchy

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

Prevention and Minimisation:

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

Reuse of Waste:

Reusing as much of the waste generated on site as possible will reduce the quantities of waste that will have to be transported off site to recovery facilities or landfill.

Recycling of Waste:

There are a number of established markets available for the beneficial use of Construction and Demolition waste such as using waste concrete as fill for new roads.

At all times during the implementation of the WMP, disposal of waste to landfill will be considered only as a last resort.

4.11.4 Construction Phase waste Management

4.11.4.1 Description of the Works

The construction of the proposed development will involve the construction of up to 15 no. turbines, new site access tracks & upgrade of existing tracks, internal cabling and grid connection, substation & control buildings, borrow pit, junction upgrade along the turbine haul and the provision of a link road for turbine delivery and upgrade works to the existing 110kV Mullingar substation.

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

After the foundation level of each turbine has been formed using piling methods or on competent strata, the bottom section of the turbine tower or the "Anchor Cage" is levelled and reinforcing steel is then built up around and through the anchor cage. The outside of the foundation is shuttered with demountable formwork to allow the pouring of concrete and is backfilled accordingly with appropriate granular fill to finished surface level.

The construction of the substation will comprise of piled concrete foundations, the piles will most likely be constructed by coring and inserting a steel sleeve which will be filled with reinforced concrete prior to sleeve removal. The reminder of the substation will consist of concrete masonry blocks and a timber roof structure with roof tile or slate covering. The roof structure will be made up of prefabricated roof trusses manufactured off site to minimise timber cutting on site.

The site roads will be constructed with rock won from the onsite borrow pit.

The waste types and list of waste (LoW) codes arising from the construction phase of the proposed development are outlined in Table 4-2 below.

Table 4-2 Expected waste types arising during the Construction Phase

Materials type	Example	LoW Code
Cables	Electrical wiring	17 04 11
Cardboard	Boxes, cartons	15 01 01
Composite packaging	Containers	15 01 05

Materials type	Example	LoW Code
Metals	Copper, aluminium, lead, iron and steel	17 04 07
Inert materials	Sand, stones, plaster, rock, blocks	17 01 07
Mixed municipal waste	Daily canteen waste from construction workers, miscellaneous	20 03 01
Plastic	PVC frames, electrical fittings	17 02 03
Plastic packaging	Packaging with new materials	15 01 02
Tiles and ceramics	Slates and tiles	17 01 03
Wooden packaging	Boxes, pallets	15 01 03
Soil & Stone	Soils and subsoils	17 05 04

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

4.11.4.2 Waste Arisings and Proposals for Minimisation, Reuse and Recycling of Construction Waste

Construction waste will arise on the project mainly from excavation and unavoidable construction waste including material surpluses and damaged materials and packaging waste.

Appropriate measures should be taken to ensure excess waste is not generated during construction, including;

- Ordering of materials should be on an 'as needed' basis to prevent over supply to site. Co-ordination is required with suppliers enabling them to take/buy back surplus stock.
- Purchase of materials pre-cut to length to avoid excess scrap waste generated on site.
- Request that suppliers use least amount of packaging possible on materials delivered to the site.
- Ensuring correct storage and handling of goods to avoid unnecessary damage that would result in their disposal
- Ensuring correct sequencing of operations.
- Use reclaimed materials in the construction works.

Hazardous waste will be kept separate from all other construction waste to prevent contamination and removed appropriately.

4.11.4.3 Waste Arising from Construction Activities

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

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

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

It is not envisaged that there will be any waste material arising from the materials used to construct the road as only the quantity of stone necessary will be excavated from the borrow pit or brought on site on an 'as needed' basis.

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

4.11.4.4 Waste Arising from Decommissioning

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

The waste types arising from the decommissioning of the development are outlined in Table 4.3below.

Table 4-3 Expected waste types arising during the Decommissioning Phase

Material Type	Example	LoW Code
Cables	Electrical wiring	17 04 11
Metals	Copper, aluminium, lead and iron	17 04 07
Inert Materials	Crushed Stone, Concrete	17 01 07

4.11.4.5 Reuse

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

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

4.11.4.6 Recycling

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

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

4.11.4.7 Implementation

4.11.4.7.1 *Roles and Responsibilities for Waste Management*

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

4.11.4.7.2 *Training*

It is important for the Construction Waste Manager to communicate effectively with colleagues in relation to the aims and objectives of the waste management plan. All employees working on site during the construction phase of the project will be trained in materials management and thereby, should be able to:

- Distinguish reusable materials from those suitable for recycling;
- Ensure maximum segregation at source;
- Co-operate with site manager on the best locations for stockpiling reusable materials;
- Separate materials for recovery; and
- Identify and liaise with waste contractors and waste facility operators.

4.11.4.7.3 *Record Keeping*

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

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

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

- Date and Time of Waste Arrival at Destination
- Site Address of Destination Facility

4.11.4.8 Conclusion

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

4.12 Outline Construction Traffic Management Plan

4.12.1.1 Introduction

The Construction Traffic Management Plan can only be finalised when a contractor has been appointed to carry out and schedule the works. It is also appropriate that the Project Supervisor Construction Stage when appointed, along with the turbine supplier shall have an input in the preparation and review of the Traffic Management Plan.

The purpose of this Outline Construction Traffic Management Plan is to set out the volume of traffic generated by each element of the works. The plan will be reviewed and updated by the appointed contractor prior to the commencement of construction

4.12.2 Construction Phases

The construction phase of the proposed development will run for between 12 - 18 months. Due to the size of the site, its general layout and the total number of turbines proposed, it is unlikely that the construction phase will require phasing. Therefore, the following sequence of construction activities are proposed:

- Construction of main road access and site entrances.
- Initial installation of on-site tracks and drainage.
- Installation of new access tracks and upgrade of existing.
- Development of the construction compound and any other temporary works.
- Construction of substation and control building.
- Preparation of crane hard standings.
- Construction of turbine foundations.
- Installation of internal site cabling within wind farm
- Installation of the grid connection cabling
- Wind Turbine erection
- Land reinstatement.

4.12.2.1 Site Access Tracks

The internal access tracks will provide the required access to all turbine and associated infrastructure. The new and proposed upgraded access tracks have been designed to provide a minimum 5m running width along the straight sections of track with wider sections proposed at bends where required. Passing bays will be installed to allow a mechanism for two-way traffic. Appropriate signage at the location of these passing bays as well as instruction on priority vehicles will be installed throughout the site. The running surface on the existing and proposed new access tracks will facilitate the delivery of large and abnormal loads on oversized trucks.

Where upgrade of existing public road junctions as well as the provision of the link road for turbine deliveries are to be completed as outlined in Section 3 above, the traffic management on the public road at these locations will be provided by the appointed contractor with the approval of Westmeath County Council.

4.12.2.2 Access to the Site from National Roads

It is proposed to upgrade the existing forestry track entrance off the R396 Regional Road for use as the wind farm site entrance for the construction and operational phases. This entrance will be widened to facilitate the delivery of the construction materials and turbine components. The site entrance was subject to Autotrack assessment to identify the turning area required, as described in the Traffic and Transport Assessment in Section 14.1 of the EIAR. Appropriate sightlines will be established to the north and south of the proposed site entrance for the safe egress of traffic. The proposed works will result in a permanent upgrade of this current site access from the R396 Regional Road, which will also form the wind farm site entrance during the operational phase. The site entrance location is shown in Figure 4-1, and included in the detailed layout drawings in Appendix 4-1 of the EIAR.

The delivery of all turbine and construction materials to the site will be via the site entrance off the R396. From here, the vehicles will use the internal site roads to access the proposed infrastructure locations within the site.

The delivery of turbine and construction materials to Turbines T14 & T15 will be via the L5755 from the aforementioned crossing point on the L5755. There will be an entrance south to T14 approximately 0.3 kilometres east of the crossing point on the L5755 and an entrance north to T15 approximately 1.6 kilometres east of the crossing point on the L5755. Appropriate sightlines will be established to the east and west of these access junctions for the safe egress of traffic. The proposed works will result in permanent upgrade of the L5755 local road which will also form part of the wind farm site entrances to T14 and T15 during the operational phase. The section of L5755 and entrances to T14, T15 and the proposed borrow pit will be controlled appropriately to allow the safe passage of construction vehicles along the road, as described in the Traffic Management Plan in section 4.12.3. Priority along the section of road and at the site entrances will be maintained for public traffic.

4.12.2.3 Turbine Components Delivery

The proposed turbine delivery route is described in Section 4.3.17 of the EIAR. All deliveries of turbine components to the site will be by way of the proposed transport route outlined in Figure 4-18 of the EIAR.

Other construction materials will be delivered to the site via the proposed haul routes shown on Figure 4-19 of the EIAR. This general construction traffic will use the Regional roads in the area surrounding the site.

4.12.2.4 Grid Connection Consents

The proposed grid connection route will require a Road Opening Licence (ROL) prior to the commencement of any grid connection works on the public road. The ROL will require a detailed traffic management plan for the grid connection cabling works which will set out any proposed road closures, diversions, signage etc. The final details of such a traffic management proposals cannot be determined without the input of the appointed contractor.

The proposed grid connection route will traverse an Irish Rail level crossing in the townlands of Farranistick and Culleen More. Any such works on properties of Córas Iompair Éireann (CIE) who are authority for such properties requires a license agreement to be put in place between the developer and CIE. This license can only be agreed and signed a maximum of one year prior to the undertaking of

any works at CIE properties as CIE put a one year expiry on all such agreements to allow for amendments to any of the conditions should the standards change.

4.12.3 Detailed Traffic Management Plan

A detailed Traffic Management Plan (TMP), incorporating all the mitigation measures set out in the Outline TMP will be prepared by the appointed contractor which will details in respect of traffic management agreed with the roads authority and An Garda Síochána prior to construction works commencing on site. The detailed TMP will include the following:

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

Delivery Programme – a programme of deliveries will be submitted to Westmeath County Council in advance of deliveries of turbine components to site.

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

A Pre and Post Construction Condition Survey – A pre-condition survey of roads associated with the proposed development will be carried out prior to construction commencement to record the condition of the road. A post construction survey will be carried out after works are completed. Where required the timing of these surveys will be agreed with the local authority. All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers.

Liaison with the relevant local authority - Liaison with the relevant local authority including the roads sections of local authorities that the delivery routes traverse and An Garda Siochana, during the delivery phase of the large turbine vehicles, when an escort for all convoys will be required. Liaison with the relevant local authority including the roads sections of local authorities that the cable route traverses. Once the surveys have been carried out and "prior to commencement" status of the relevant roads established, the Roads section will be informed of the name and contact number of the Project Supervisor of the construction stage as well as the Site Environmental Manager.

Implementation of temporary alterations to road network at critical junctions – At locations highlighted in Section 14.1.8. of the EIAR.

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

Travel plan for construction workers – While the assessment above has assumed the worst case that construction workers will drive to the site, the construction company will be required to provide a travel plan for construction staff, which will include the identification of a routes to / from the site and identification of an area for parking.

Temporary traffic signs – As part of the traffic management measures temporary traffic signs will be put in place at all key junctions, including all new junctions providing access to the site and temporary access road on the R395, R396 and the L5755. All measures will be in accordance with the *"Traffic Signs Manual, Section 8 – Temporary Traffic Measures and Signs for Road Works"* (Department of Transport, Tourism and Sport (DoTT&S)) and "Guidance for the Control and Management of Traffic at Roadworks" (DoTT&S). A member of construction staff (flagman) will be present at key junctions during peak delivery times and at each construction site location along the Grid Connection Route.

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

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

Re-instatement works - All road surfaces and boundaries will be re-instated as described in section 14.1.8. A roads conditions survey (and any other analyses required by the Roads Section of the Council) would be undertaken immediately prior to construction commencement of the project to assess the condition of the road network at that time and to agree any required works with the local authority. Such a survey would be repeated immediately after completion of the construction phase of the project in order to ensure that any reinstatement works were carried out to a satisfactory standard as required by the local authority.

Road Opening Licence – Roads works associated with the grid connection cabling will be undertaken in line with the requirements of a road opening licence as agreed with Westmeath County Council.

Diversions and road closures – reasonable access to residences, farms and businesses will be maintained at all times during any road closures associated with the Grid Connection Route works. The details of this will be agreed with the roads authority in advance of works taking place. The network of local roads in the area will be used for traffic diversions for local traffic in order to expedite the works and limit the duration of the impact owing to the Grid Connection Route works.

Trench Reinstatement - Trenches on public roads, once backfilled, will be temporarily reinstated to the satisfaction of the roads authority. Following temporary reinstatement of trench sections on public roads along which the Grid Connection Route travels will receive a surface overlay subject to agreement with the roads authority. The roads conditions survey, which will be undertaken immediately prior to construction commencement of the project, will ensure that any section of road along the grid connection route is not left in a degraded condition. The repetition of the survey immediately after completion of the construction phase of the Proposed Development will ensure that any reinstatement works were carried out to a satisfactory standard.

4.13 Outline Site Reinstatement Plan

4.13.1 Post-Construction

Upon the completion of the major infrastructural elements of the project such as site roads, turbine bases and the substation, the initial site restoration will commence. This will involve the removal of machinery from the site which will have come to its end of use such as excavators, haulage vehicles and storage containers. As this equipment is removed, particularly from stoned areas such as the temporary construction compound, these areas will then be restored to their original state to promote revegetation. The restoration procedure for the site areas adjacent to infrastructure for which the original site conditions have been altered for the purpose of the construction of the wind farm are outlined in the following sections.

4.13.1.1 Site Roads and Turbine Foundations

Where the upgrade of existing roads and the construction of new roads has been completed, the restoration of either side of these roads will be carried out immediately after construction of this element of the works. The restoration along these road edges will mainly involve backfilling and landscaping with the material which will be removed during excavation and set aside for this purpose. The turbine foundations when complete will also be backfilled with this material. The replacing of this

material will restore the areas adjacent to the construction to its original state and will enhance revegetation opportunities.

4.13.1.2 Temporary Construction Compound

The site compound will be constructed using a similar methodology to that of the new site roads. This compound will be removed after the commissioning of the turbines. The stoned area will be excavated and all stone transported off site by a licensed haulier for reuse or recovery at an appropriately permitted site. The peat or overburden excavated prior to the installation of the site compound will be transported back to this original location and levelled with the area being restored to the original ground level.

Where restoration takes places in areas which have been previously used for agricultural purposes then the area will be reseeded for agricultural grassland. In areas of peat or blanket bog the areas in question will be restored with the similar material and will be allow to recolonise naturally. All restoration procedures will be carried out under the supervision and guidance of the supervising project ecologist.

4.13.1.3 Drainage Features

The supervising project hydrologist will provide supervision throughout the construction phase of the project. On completion of the construction phase, any drainage features which have been installed (as outlined in Section 4.2.4 prior to or during the construction phase and are deemed to be unnecessary for the operational phase by the hydrologist will be removed. Each area which has a drainage feature removed will be restored to its original condition. This will again be carried out under the supervision of the supervising project hydrologist.

4.13.1.4 Junction Works

All road junction will be reinstated once deliveries are completed the areas and boundaries will be reinstated restoring the junctions to their original configurations except where stated otherwise.

For the proposed link road between the R395 and R396 which measures approximately 1.2 kilometres in length the granular fill and final surface running layer will be left in place within the link road and will allow these to be used again in the future should it become necessary (i.e. at decommissioning stage for turbine removal, or in the unlikely event of having to swap out a blade component during the operational phase). A barrier/ gate will be put in place at the entrance to the link road and a gate will be installed at the exit. An existing stone wall at the exit will be reinstated either side of the gate

4.13.2 Decommissioning Plan

The wind turbines proposed as part of the Proposed Development are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Development may be decommissioned fully. The substation will remain in place as it will be under the ownership of ESB/EirGrid.

Upon decommissioning of the Proposed Development, the wind turbines would be disassembled in reverse order to how they were erected. All above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in significant environment nuisances such as noise, dust and/or vibration.

Site roadways could be in use for purposes other than the operation of the wind farm by the time the decommissioning of the Proposed Development is to be considered, and therefore it is considerd more

appropriate to leave the site roads in situ for future use. If it were to be confirmed that the roads were not required in the future for any other useful purpose, they could be removed where required. The underground cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance for an underground element that is not visible.

A Decommissioning Plan has been prepared (Appendix 4-11 of the EIAR) the detail of which will be agreed with the local authority prior to any decommissioning. The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will agreed with the competent authority at that time. The potential for effects during the decommissioning phase of the proposed renewable energy development has been fully assessed in the EIAR.

As noted in the Scottish Natural Heritage report (SNH) Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms (SNH, 2013) reinstatement proposals for a wind farm are made approximately 30 years in advance, so within the lifespan of the wind farm, technological advances and preferred approaches to reinstatement are likely to change. According to the SNH guidance, it is therefore:

“best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the wind farm”.
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5. IMPLEMENTATION

5.1 Roles and Responsibilities

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

In general, the Environmental Manager will maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. The Environmental Manager will act as the regulatory interface on environmental matters by reporting to and liaising with Westmeath County Council and other statutory bodies as required.

The Environmental Manager will report directly to the Site Supervisor/Wind Farm Construction Manager. An Environmental Clerk of Works or Project Ecologist, Project Hydrologist, Project Archaeologist and Project Geotechnical engineer will visit the site regularly and report to the Site Environmental Office. This structure provides a "triple lock" review/interaction by external specialists. An organogram structure for the construction stage is as follows:

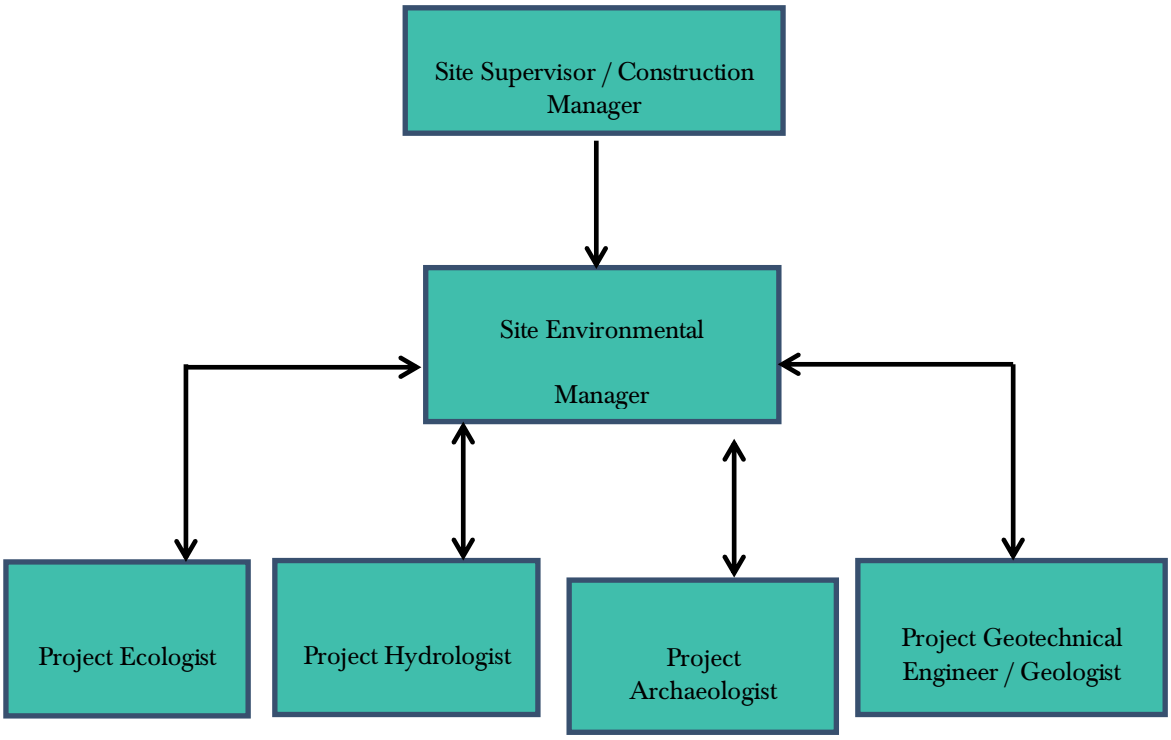


Figure 5-1 Site Management Chain of Command

Any requirement of the granted permission, for the works to be supervised by an engineer with professional indemnity insurance, who upon completion of the works, including site stability, shall certify the said works, will be adhered to. Such an engineer will be appointed to oversee and supervise the construction phase of the project.

There are currently peat extraction activities ongoing at the proposed development site. In order to ensure adequate interaction between the ongoing peat activities and the construction and operation of the wind farm an Interactions Management Group (IMG) will be set up. Refer to Section 5.1.7 for further details.

5.1.1 Wind Farm Construction Manager/Site Supervisor

The Site Supervisor/Construction Manager will have overall responsibility for the organisation and execution of all related environmental activities as appropriate, in accordance with regulatory and project environmental requirements. The duties and responsibilities of the Site Supervisor/Construction Manager will include:

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

5.1.2 Environmental Manager

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

The Environmental Manager will report to the Site Supervisor/Construction Manager. The responsibilities and duties of the Environmental Manager will include the following:

- Preparation of the CEMP and supporting environmental documentation and review/approval of contractor method statements;
- Undertake inspections and reviews to ensure the works are carried out in compliance with the CEMP;
- Monitor the implementation of the CEMP, particularly all proposed/required Environmental Monitoring;
- Generate environmental reports as required to show environmental data trends and incidents and ensure environmental records are maintained throughout the construction period;
- Advise site management/contractor/sub-contractors on:
    - Prevention of environmental pollution and improvement to existing working methods;
    - Changes in legislation and legal requirements affecting the environment;
    - Suitability and use of plant, equipment and materials to prevent pollution;
    - Environmentally sound methods of working and systems to identify environmental hazards;
- Ensure proper mitigation measures are initiated and adhered to during the construction phase;
- Liaise with Project Ecologist, Project Hydrologist and Project Geotechnical Engineer to ensure regular site visits and audits/inspections are completed;
- Ensure adequate arrangements are in place for site personnel to identify potential environmental incidents;
- Ensure that details of environmental incidents are communicated in a timely manner to the relevant regulatory authorities, initially by phone and followed up as soon as is practicable by e-mail;

- Support the investigation of incidents of significant, potential or actual environmental damage, and ensure corrective actions are carried out, recommend means to prevent recurrence and communicate incident findings to relevant parties; and,
- Identify environmental training requirements, and arrange relevant training for all levels of site based staff/workers.
- The level, detail and frequency of reporting expected from the Environmental Manager for the Construction Manager, developer's project manager, and any Authorities or other Agencies, will be agreed by all parties prior to commencement of construction, and may be further adjusted as required during the course of the project.

5.1.3 Project Ecologist

The Project Ecologist will report to the Environmental Manager and is responsible for the protection of sensitive habitats and species encountered during the construction phase of the wind farm. The Project Ecologist will not be full time on site but will visit the site when required to fulfil ones duties.

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

- Review and input to the final construction phase CEMP in respect of ecological matters;
- In liaison with Environmental Manager, oversee and provide advice on all relevant ecology mitigation measures set out in the EIAR and planning permission conditions;
- Regular inspection and monitoring of the development, through all phases of construction/operation and provide ecological advice as required;
- Carry out ecological monitoring and survey work as may be required by the planning authority.

5.1.4 Project Hydrologist

The Project Hydrologist will report to the Environmental Manager and is responsible for inspection and review of drainage and water quality aspects associated with construction of the wind farm. The Project Hydrologist will not be full time on site but will visit the site at least once a month during construction and on a weekly basis during site preparation/groundworks.

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

- Assist in compiling a detailed drainage design before construction commences and attend the site to set out and assist with micro siting of proposed drainage controls. This will be completed over several site visits at the start of the construction phase;
- Review and input to the final construction phase CEMP in respect of drainage and water quality management;
- Following the initial stage of drainage construction regular site visits will be required, at least once a month, to complete hydrological and water quality audits and reviews and report any issues noted to the Site Supervisor/Construction Manager; and,
- Complete ongoing inspection and monitoring of the development, particularly in areas of drainage control, through all phases of construction (including pre, during and post construction) and ensure construction is carried out as specified in the EIAR, and in relevant planning conditions.

5.1.5 Project Archaeologist

The Project Archaeologist will report to the Environmental Manager and is responsible for archaeological monitoring of the site during the construction phase. This will include monitoring of site

investigations and excavation works as well as the monitoring and metal detection of spoil during construction.

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

5.1.6 Project Geotechnical Engineer/Geologist

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

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

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

5.1.7 Interactions Management Group

As detailed above there are currently peat extraction activities ongoing at the proposed development site. In order to ensure adequate interaction between the ongoing peat activities and the construction and operation of the wind farm at the proposed site an Interactions Management Group (IMG) will be set up. The key role of the IMG will be to establish an interface between the wind farm and peat activities at the proposed site. The setup of the IMG will allow for a co-ordinated approach in the management of site activities where there will be interactions between the two activities and to allow for the environmental management of all activities associated with the proposed wind farm including site drainage, ecology, archaeology, geology etc. The IMG will include the applicable Developers Construction/Operations Project Manager, the Main Contractors Construction Manager and Site Environmental Manager and the Operations Manager or Site Supervisor from each of the peat companies operating at the proposed development site. Coole Wind Farm Ltd will have control over the construction, operation and maintenance of the wind farm development for the lifetime of the project including its drainage system and any surface water discharges. The IMG will be set up prior to construction commencement and will continue for the duration of the lifetime of the wind farm project.

5.2 Water Quality Monitoring

5.2.1 Pre-construction Baseline Monitoring

Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of felling and construction at the site. The baseline monitoring programme will be subject to agreement with Westmeath County Council.

Analysis will be for a range of parameters with relevant regulatory limits along with EQSs and sampling will be undertaken for each stream that drains from the construction site.

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

5.2.2 Construction Phase Monitoring

5.2.2.1 Daily Visual Inspections

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

5.2.2.2 Continuous Turbidity Monitoring

Turbidity monitors or sondes can be installed where required at locations surrounding the wind farm and Grid Connection site. The sondes will provide continuous readings for turbidity levels in the watercourse. This equipment will be supplemented by daily visual monitoring at their locations as outlined in the sections below.

5.2.2.3 Monthly Laboratory Analysis

Baseline laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for each watercourse e.g. at SW01 to SW05 in the wind farm as outlined in Section 9 of the EIAR and along all primary watercourses along the grid connection route on a monthly basis. This will not be restricted to these four locations and further sampling points will be added as deemed necessary by the Environmental Manager in consultation with the Project Hydrologist and Site Manager.

5.2.2.4 Field Monitoring

Field chemistry measurements of unstable parameters, (pH, conductivity, temperature) analyses will be carried out by either the Environmental Manager or the Project Hydrologist at all surface water monitoring locations. In-situ field monitoring will be completed on a weekly basis. In-situ field monitoring will also be completed after major rainfall events, i.e. after events of >25mm rainfall in any 24-hour period. The supervising hydrologist will monitor and advise on the readings collected by in-situ field monitoring.

5.2.2.5 Monitoring Parameters

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

- pH (field measured)
- Electrical Conductivity (field measured)
- Temperature (field measured)
- Dissolved Oxygen (field measured)
- Total Phosphorus
- Chloride
- Nitrate
- Nitrite
- Total Nitrogen

- Ortho-Phosphate
- Ammonia N
- Biochemical Oxygen Demand
- Total Suspended Solids

5.2.3 Construction Phase Drainage Inspections

Drainage performance will form part of the civil works contract requirements. During the construction phase the effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treatment of potentially silt-laden water from the works areas will be monitored periodically (daily, weekly, and event based monitoring, i.e. after heavy rainfall events) by the Environmental Manager and/or the Project Hydrologist. The Environmental Manager will respond to changing weather and drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained.

Prior to the commencement of construction an inspection and maintenance plan for the on-site drainage system which will be prepared by the Environmental Manager in consultation with the Project Hydrologist. Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended.

Regular inspections of all existing and installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water within the system. Any excess build-up of silt levels at check dams, the settlement ponds, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.

The following periodic inspection regime is likely to be proposed:

- Daily general visual inspections by Environmental Manager;
- Weekly (existing & new drains) inspections by the Environmental Manager and/or the site Construction Manager;
- Inspection to include all elements of drainage systems and all monitoring. Inspections required to ensure that drainage systems are operating correctly and to identify any maintenance that is required. Any changes, such as discolouration, odour, oily sheen or litter should be noted and corrective action should be implemented. High risk locations such as settlement ponds will be inspected daily. Daily inspections checks will be completed on plant and equipment, and whether materials such as silt fencing or oil absorbent materials need replacement;
- Event based inspections by the Environmental Manager as follows:
    - >10 mm/hr (i.e. high intensity localised rainfall event);
    - >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
    - Rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week).
- Monthly site inspections by the Project Hydrologist during construction phase; and,
- Quarterly site inspections by the Project Hydrologist after construction for a period of one year following the construction phase.
- A written record will be maintained or available on-site of all construction phase monitoring undertaken.

5.2.4 Surface Water Monitoring Reporting

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

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

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

5.2.5 Post-Construction Monitoring

5.2.5.1 Monthly Laboratory Analysis Sampling

Monthly sampling for laboratory analysis for a range of parameters adopted during pre-commencement and construction phases will continue for six months after construction is complete. The supervising hydrologist will monitor and advise on the readings being received from the testing laboratory.

5.3 Environmental Induction

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

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

5.3.1 Toolbox Talks

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

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

Site meetings would be held on a regular basis involving all site personnel. The objectives of the site meetings are to discuss the coming weeks proposed activities and identify the relevant work method statements and sub plans that will be relevant to that week's activities. Additionally, any non-compliance

identified during the previous week would also be discussed with the aim to reduce the potential of the same non-compliance reoccurring.

6. EMERGENCY RESPONSE PLAN

An Emergency Response Plan (ERP) has been prepared to provide details of procedures to be adopted in the event of an emergency in terms of site health and safety and environmental protection during the construction and operational phases of the Coole Wind Farm Development. The construction phase of the development will have the highest volume of works activity and site personnel resulting in this phase being the most likely to engage this ERP should a situation require it. The operational phase is a much less intensive phase of the development. The physical site presence during operation is significantly reduced with every element of the site monitored remotely.

The decommissioning phase will adopt this ERP during that phase in the event of an incident during the works associated with decommissioning and site restoration

6.1 Emergency Response

The chain of command during an emergency response sets out who is responsible for coordinating the response. The appointed Site Manager will lead the emergency response which makes him responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response are presented in Figure 6-1. In a situation where the Site Manager is unavailable or incapable of coordinating the emergency response, the responsibility will be transferred to the next person in the chain of command outlined in Figure 6-1. This will be updated throughout the various stages of the project.

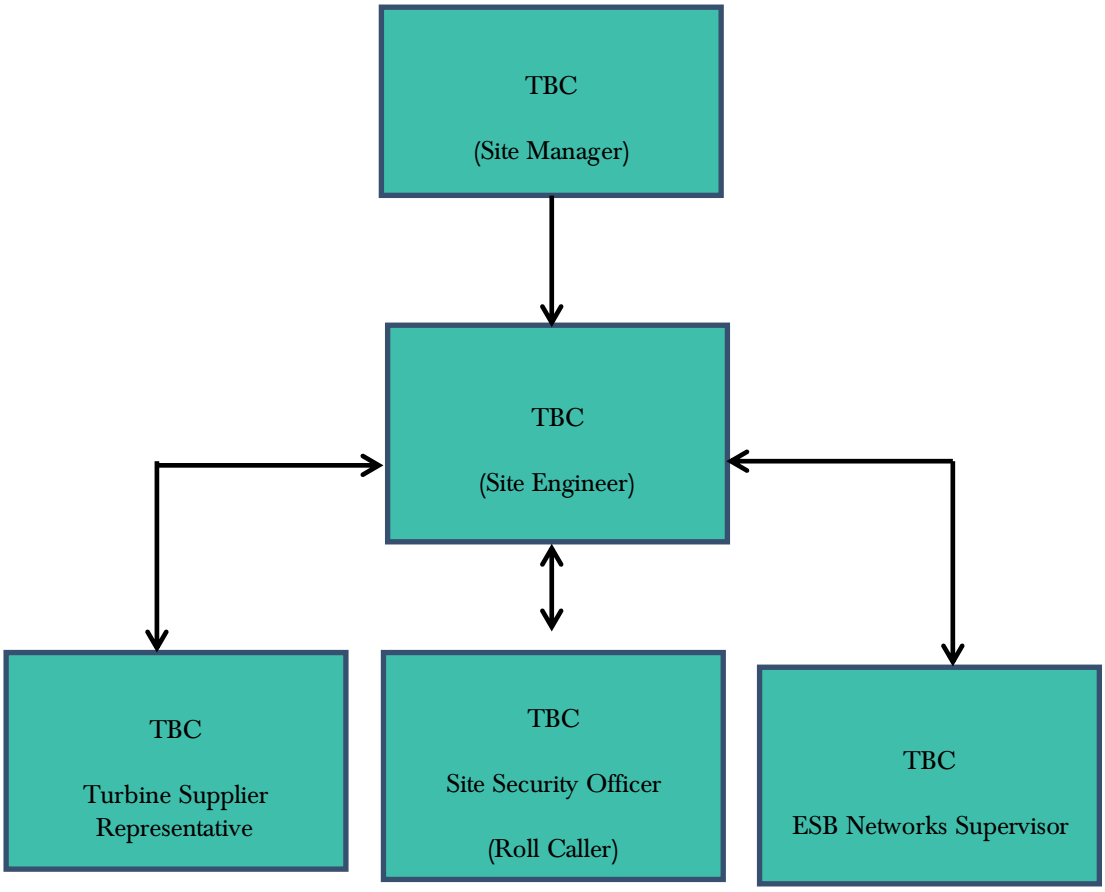


Figure 6-1 Emergency Response Procedure Chain of Command

6.1.1 Initial Steps

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

Table 6-1 Hazards associated with potential emergency situations

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

In the event of an emergency situation associated with, but not restricted to, the hazards outlined in Table 6-1 the Site Manager will carry out the following:

- Establish the scale of the emergency situation and identify the number of personnel, if any, have been injured or are at risk of injury.
- Where necessary, sound the emergency siren/fog horn that activates an emergency evacuation on the site. The Site Manager must proceed to the assembly point if the emergency poses any significant threat to their welfare and if there are no injured personnel at the scene that require assistance. The Site Manager will be required to use his own discretion at that point. In the case of fire, the emergency evacuation of the site should proceed, without exception. The site evacuation procedure is outlined in Section 6.1.2
- Make safe the area if possible and ensure that there is no identifiable risk exists with regard to dealing with the situation e.g. if a machine has turned over, ensure that it is in a safe position so as not to endanger others before assisting the injured.
- Contact the required emergency services or delegate the task to someone if he is unable to do so. If delegating the task, ensure that they follow the procedures for contacting the emergency services as set out in Section 6.3.
- Take any further steps that are deemed necessary to make safe or contain the emergency incident e.g. cordon off an area where an incident associated with electrical issues has occurred.
- Contact any regulatory body or service provider as required e.g. ESB Networks the numbers for which as provided in Section 6.3.2.
- Contact the next of kin of any injured personnel where appropriate. The procedure for this is outlined in Section 6.3.3.

6.1.2 Site Evacuation/Fire Drill

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

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

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

6.2 Environmental Emergency Response Procedure

6.2.1 Excessive Peat Movement

Where there is excessive peat movement or continuing peat movement recorded at a monitoring location or identified at any location within the site but no apparent signs of distress to the peat (e.g. cracking, surface rippling) then the following shall be carried out.

- All construction activities shall cease within the affected area.
- Increased monitoring at the location shall be carried out. The area will be monitored, as appropriate, until such time as movements have ceased.
- Re-commencement of limited construction activity shall only start following a cessation of movement and the completion of a geotechnical risk assessment by a geotechnical engineer.

6.2.1.1 Onset of Peat Slide

Where there is the onset or actual detachment of peat (e.g. cracking, surface rippling) then the following shall be carried out.

- On alert of a peat slide incident, all construction activities will cease and all available resources will be diverted to assist in the required mitigation procedures.
- Where considered possible action will be taken to prevent a peat slide reaching any watercourse. This will take the form of the construction of check barrages on land. Due to the terrain, the possible short run-out length to watercourses, speed of movement and the inability to predict locations it may not be possible to implement any on-land prevention measures, in this case a watercourse check barrage will be implemented.
- For localised peat slides that do not represent a risk to a watercourse and have essentially come to rest the area will be stabilised initially by rock infill, if required. The failed area and surrounding area will then be assessed by the engineering staff and stabilisation procedures implemented. The area will be monitored, as appropriate, until such time as movements have ceased.

6.2.2 Spill Control Measures

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

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

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

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

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

6.3 Contacting the Emergency Services

6.3.1 Emergency Communication Procedure

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

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

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

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

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

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

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

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

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

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

6.3.2 Contact Details

A list of emergency contacts is presented in Table 6-2. A copy of these contacts will be included in the Site Safety Manual and in the site offices and the various site welfare facilities.

Table 6-2 Emergency Contacts

Contact	Telephone no.
Emergency Services – Ambulance, Fire, Gardaí	999/112
Doctor – Coole Surgery	044 9661104

Hospital – Midland Regional Hospital, Mullingar	044 9340221
ESB Emergency Services	1850 372 999
Bórd Gais Emergency	1850 20 50 50
Gardaí –Multyfarnham Garda Station	044 9371112
Health and Safety Co-oordinator - Health & Safety Services	TBC
Health and Safety Authority	1890 289 389
Inland Fisheries Ireland (IFI)	1890 347 424
Project Supervisor Construction Stage (PSCS): TBC	TBC
Project Supervisor Design Stage (PSDS): McCarthy, Keville, O' Sullivan Ltd.	091 735611
Client – Coole Wind Farm	021 2427786

6.3.3 Procedure for Personnel Tracking

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

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

6.4 Induction Checklist

Table 6-3 provides a list of items highlighted in this ERP which must be included or obtained during the mandatory site induction of all personnel that will work on the site. This will be updated throughout the various stages of the project.

Table 6-3 Emergency Response Plan Items Applicable to the Site Induction process

ERP Items to be included in Site Induction	Status
All personnel will be made aware of the evacuation procedure during site induction.	
Due to the location of the site it may be necessary to liaise with and assist the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.	

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

7. SAFETY & HEALTH MANAGEMENT PLAN

7.1 Introduction

The Safety and Health Management Plan (SHMP) sets out the work practices procedures and management framework and responsibilities for the management of health and safety during the design, construction and operational phases of the proposed Coole Wind Farm development. The Safety and Health Management Plan shall be finalised by the appointed contractor who will ensure that all site personnel are familiarised with their individual responsibilities as set out the SHMP. The contractor will ensure that adequate site induction and ongoing training of site personnel will inform all operatives of their responsibilities.

7.2 Project Supervisor Design Process

MKO have been appointed to the role of Project Supervisor Design Process (PSDP) for the proposed Coole Wind Farm. In fulfilling this role, the PSDP is required to:

- Identify hazards arising from the design or from the technical, organisational, planning or time related aspects of the project
- Eliminate the hazards or reduce the risks, where possible,
- Communicate necessary control measure, design assumptions or remaining risks to the PSCS so they can be dealt with in the safety and health plan
- Ensure that the work of designers is coordinated to ensure safety
- Organise co-operation between designers
- Prepare a written safety and health plan for any project and deliver it to the client prior to tender

7.2.1 Preliminary Safety and Health Plan

A Preliminary Health and safety Plan has been developed by PSDP. The Safety, Health and Welfare at Work Act 2005 requires under Section 15 that the appointed Project Supervisor for the Construction Stage (PSCS) assume the responsibility of the 'person in control of places of work'. The PSCS is required to ensure that access, egress, articles or substances are safe and pose no risk to health.

This Preliminary Health and safety Plan has been developed by the PSDP as required by Regulation 12 of The Safety, Health and Welfare at Work (Construction) Regulations 2006. This document provides a general description of the project, client's considerations and management requirements, environmental restrictions and existing on-site risks i.e. Safety hazards, health hazards and any significant design and construction hazards. This information may assist the PSCS in the further development of the Health & Safety Plan as required under Regulation 16 of The Safety, Health & Welfare (Construction) Regulations 2006, in order to demonstrate that appropriate account will be taken of the health and safety arrangements, prior to the commencement of works on site.

- The preliminary safety and health plan includes the following information:
- General Project Description
- Construction Activities Overview
- Designers Risk Assessment
- Management and Site Rules
- Construction timing

7.3 Project Supervisor Construction Stage

The role of Project Supervisor Construction Stage will be awarded to the appointed contractor undertaking the construction phase of the works. The PSDP will facilitate the handover of the Preliminary Health & Safety Plan as well as all other necessary documents prepared during the planning process to enable the PSCS prepare the Construction Stage Health & Safety Plan.

7.3.1 Construction Stage Safety and Health Plan

On awarding of the contract, the PSCS shall submit to the developer before commencing the works, his customised Construction Phase Site Specific Safety and Health Plan. This document will include a Hazard Identification and Risk Assessment Plan for their activities on site during the execution of the Works. This plan must also include safety barrier analysis for the works proposed. Site Specific Risk Assessments and Method Statements will be submitted on behalf of each of the subcontractors before works commence on Site.

The Site-Specific Method Statements and Risk Assessments shall be subject to revision in order to maintain compatibility with the Construction Stage Safety and Health Plan prepared for the site. The PSCS will be responsible for preparing this plan before Works commence on site, and for maintaining and updating this plan as part of their role as PSCS.

A Daily Job Safety Plan is to be completed before each task commences with each work crew. This practice is to be followed by all contractors on site.

The Contractor shall be required to ensure that individual responsibility for safety measures are detailed in his Site-Specific Safety and Health Plan. This should be taken into account at the tendering, planning and execution stages of the work. The Construction Stage Safety and Health shall include but not be limited to the following:

- Provisions for the management of safety during the construction phase including a management organisation chart clearly showing those who perform a statutory safety role;
- Method statements for each and every component of their works on site;
- Risk assessments for site hazards identified prior to site mobilisation and provisions for subsequent hazard identification and risk assessment procedures for the site;
- A comprehensive inspection checklist, which the Contractor shall use on a weekly basis on site to ensure implementation of the controls detailed in this site-specific safety statement;
- Provisions for safety training of personnel upon their induction on Site and subsequently as the project proceeds;
- Provisions for the safe control and use of chemicals on site;
- Provisions for the control of the Contractor's and Subcontractor's activities on the site including permit to work, entry into confined spaces, hot work permits, etc.;
- The provision and maintenance of safe electrical supplied on the site;
- The provision of fire-fighting facilities on the Site;
- Site emergency procedures (fire, accident, etc.);
- Site first aid facilities and trained personnel;
- Arrangements for the promotion of safety on Site;
- Disciplinary procedures for breaches in safety by site personnel, including management staff;
- Personal protective equipment (PPE) policy;
- Inspection and control of work equipment;
- Recording of weekly Contractor/Subcontractor site labour returns;
- Accident reporting, recording and investigation;

- Provisions for ensuring the adequacy of Subcontractors safety standards prior to their appointment on site; and
- Safety consultation procedures for site workforce. This should Illustrate how the Contractor will meet the execution and deliverable requirements of the HSSE Obligations.

Should the extent, nature or method of working be changed in the course of its execution, the Contractor shall take account of the change by amending the Construction Stage Safety and Health for the works and submitting it for approval of the Employer. The Contractors revised risk assessments and method statements for works that change during the course of its execution must also be submitted to the PSCS. The amended Safety and Health must be distributed and fully understood by all the relevant persons before works relating to the revised Statement take place.

8. MITIGATION PROPOSALS

All mitigation measures relating to the pre-commencement, construction and operational phases of the proposed development were set out in the relevant chapters of the EIAR submitted as part of the planning permission application.

This section of the CEMP groups together the mitigation measures presented in the EIAR. It is intended that the CEMP would be updated where required prior to the commencement of the development, to include all mitigations measures, conditions and or alterations to the EIAR and application documents should they emerge during the course of the planning process, and would be submitted to the Planning Authority for written approval.

All mitigation measures which will be implemented during the pre-commencement, construction and operational phases of the project are outlined in Table 8-1. The mitigation measures have been grouped together according to their environmental field/topic and are presented under the following headings:

- Construction Management
- Drainage Design and Management
- Felling
- Peat, subsoils and bedrock
- Flora and Fauna
- Noise
- Air Quality/Dust
- Landscape and Visual
- Traffic

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

Table 8-1 Monitoring Measures

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Pre-Commencement Phase					
MM1	Environmental Management	EIAR Chapter 4	All proposed site activities will be provided for in an Environmental Management Plan, prepared prior to the commencement of any operations onsite. The environmental management plan will set out all measures necessary to ensure works are carried out in accordance with the mitigation measures set out in the EIAR and will set out the monitoring and inspections procedures and frequencies.		
MM2	Environmental Management	EIAR Chapter4 CEMP Section 4	The Environmental Manager will maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. In addition, an Environmental Clerk of Works or Project Ecologist, Project Hydrologist, Project Geotechnical engineer will visit the site regularly and report to the Site Environmental Office.		
MM3	Environmental Management	EIAR Chapter 4 CEMP Section 4	A Site Environmental Manager will oversee the site works and implementation of the Environmental Management Plan and provide on-site advice on the mitigation measures necessary to ensure the project proceeds as intended. The level, detail and frequency of reporting expected from the Site Environmental Manager for the Construction Manager, developer's project manager, and any Authorities or other Agencies, will be agreed by all parties prior to commencement of construction, and may be further adjusted as required during the course of the project.		
MM4	Environmental Management	EIAR Chapter 6	› An Ecological Clerk of Works (ECoW) will be appointed. Duties will include: o Undertake a pre-construction transect/walkover bird survey to ensure that significant effects on breeding birds will be avoided.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			○ Inform and educate on-site personnel of the ornithological and ecological sensitivities within the proposed development site. ○ Oversee management of ornithological and ecological issues during the construction period and advise on ornithological issues as they arise ○ Provide guidance to contractors to ensure legal compliance with respect to protected species onsite. ○ Liaise with officers of consenting authorities and other relevant bodies where required with regular updates in relation to construction progress.		
MM5	Concrete Deliveries	EIAR Chapter 4 CEMP Section 4	The arrangements for concrete deliveries to the site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout of trucks and discussing emergency procedures.		
MM6	Wastewater Management	EIAR Chapter 4, 9 CEMP Section 4	The removal and disposal of wastewater from the site will be carried out by a fully permitted waste collector holding valid Waste Collection Permits as issued under the Waste Management (Collection Permit) Regulations, 2007.		
MM7	Site Drainage Plan	CEMP Section 4	The Project Hydrologist/Design Engineer will complete a site drainage plan before construction commences.		
MM8	Drainage Swales	EIAR Chapter 4, 9.	Drainage swales will be installed in advance of any construction works commencing.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 4			
MM9	Culverts	EIAR Chapter 4. CEMP Section 4	Culverts will be installed at locations where drainage channels cross the new proposed track route. All works involving culverts, whether they are new, upgraded or extended, will be carried out to follow a method statement to be agreed with Inland Fisheries Ireland.		
MM10	Protection of watercourses	EIAR Chapter 4	All materials and equipment necessary to implement the drainage measures outlined above, will be brought on-site in advance of any works commencing. An adequate amount of clean stone, silt fencing, stakes, etc. will be kept on site at all times to implement the drainage design measures as necessary. The drainage measures outlined in the above will be installed prior to, or at the same time as the works they are intended to drain.		
MM11	Pre-emptive site drainage management	EIAR Chapter 4. CEMP Section 4	The works programme for the groundworks part of the construction phase of the project will also take account of weather forecasts, and predicted rainfall in particular.		
MM12	Drainage Inspection	CEMP Section 5	Prior to commencement of works in sub-catchments across the site main drain inspections will be competed to ensure ditches and streams are free from debris and blockages that may impede drainage.		
MM13	Drainage Maintenance	EIAR Chapter 4.	An inspection and maintenance plan for the drainage system on site will be prepared in advance of commencement of any works. Regular inspections of all		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 5	installed drainage systems will be necessary, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water at parts of the systems where it is not intended. The inspection of the drainage system will be the responsibility of the site Environmental Manager or the supervising hydrologist.		
MM14	Earthworks	EIAR Chapter 8	Drainage and associated pollution control measures will be implemented onsite before the main construction works commence. Where possible drainage controls will be installed during seasonally dry ground conditions. This will reduce the possibility of impact on surface waters by suspended sediment released during construction and entrained in surface run-off.		
MM15	Earthworks	EIAR Chapter 8	A 50-metre buffer zone will be maintained around watercourses during the windfarm construction. With the exception of road crossings of streams and associated culvert construction, no other development infrastructure, construction activity or stock-piling of construction materials or construction waste will take place within this zone.		
MM16	Felling	EIAR Chapter 6 CEMP Section 10	The removal of woody vegetation will be undertaken in full compliance with Section 40 of the Wildlife Act 1976 – 2018. Any required removal of vegetation will be undertaken following inspection by a suitable qualify ornithologist to ensure no nesting birds are affected.		
MM17	Archaeology	EIAR Chapter 13	› A pre-construction walkover survey / inspection of areas proposed for excavation will be undertaken to re-assess the bog for new sites that may be exposed. › If present, the sites shall be archaeologically excavated under licence prior to construction. The archaeologist will liaise with the Department of Arts, Heritage, Regional, Rural and		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			Gaeltacht Affairs regarding the methods being proposed for excavation. › Pre-construction archaeological testing of turbine bases and hardstands proposed for excavation will be carried out. Liaise with DAHRRGA should archaeology be uncovered. › A report on the results of the monitoring shall be compiled and submitted to the relevant authorities on completion of the project.		
MM18	Traffic Management Plan	EIAR Chapter 4, CEMP Section 4	A detailed Traffic Management Plan (TMP) will be provided specifying details relating to traffic management and included in the CEMP prior to the commencement of the construction phase of the proposed development. The TMP will be agreed with the local authority and An Garda Síochána prior to construction works commencing on site. The detailed TMP will include a Traffic Management Coordinator – a competent Traffic Management Co-ordinator will be appointed for the duration of the project and this person will be the main point of contact for all matters relating to traffic management.		
Construction Phase					
Construction Management					
MM19	Health and Safety	EIAR Chapter 5	During construction of the proposed development, all staff will be made aware of and adhere to the Health & Safety Authority's *'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006'*. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM20	Health and Safety	EIAR Chapter 5	Fencing will be erected in areas of the site where uncontrolled access is not permitted. Appropriate health and safety signage will be erected at locations around the site		
MM21	Health and Safety	EIAR Chapter 5	During construction of the proposed development, all staff will be made aware of and adhere to the Health & Safety Authority's *'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006'*. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan		
MM22	Groundwater quality,	EIAR Chapter 4, 5, 9 CEMP Section 4	On-site refuelling will be carried out 100m from watercourses using a mobile double skinned, bunded fuel bowser. The fuel bowser will be towed around the site by a 4x4 jeep to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the cranes, excavators, etc. that will be used during the construction of the proposed wind farm development. The 4x4 towing vehicle will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction when not in use.		
MM23	Potential Release of Hydrocarbons	EIAR Chapter 4, 5, 9 CEMP Section 4	› All plant will be inspected and certified to ensure they are leak free and in good working order prior to use on site; › Fuels stored on site will be minimised. Any storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction; › The electrical control building will be bunded appropriately to the volume of oils likely to be stored and to prevent leakage of any associated chemicals and to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor; An emergency plan for the construction phase to deal with accidental spillages will be contained within the Construction Environmental Management Plan. Spill kits will be available to deal with accidental spillages.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM24	Plant and Equipment Inspections	EIAR Chapter 9. CEMP Section 4	A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the construction phase.		
MM25	Fuel and hazardous material storage	EIAR Chapter 5, 9 CEMP Section 4	Fuel and lubricant oils will be stored within a bunded area, sized to 110% of the volume of stored oils. The storage area will be located within a safe part of the sub-station building, with due attention to fire hazard. The bunded area will be roofed to prevent the ingress of rainwater and will be equipped with an appropriate oil interceptor.		
MM26	Accidental Spillage of Hydrocarbons	EIAR Chapter 4, 9 CEMP Section 6	The contractor will nominate an approved, certified clean-up consultant and will be available on 24-hour notice to commence a clean-up in the event of a hydrocarbon spillage from plant or vehicles the details of whom will be included in the Emergency Response Plan to be finalised by the appointed contractor.		
MM27	Temporary water supply and onsite Sanitation	EIAR Chapter 9	Water supply for the site office and other sanitation will be brought to site and removed after use from the site to be discharged at a suitable off-site treatment location. Potable water will be supplied via water coolers located within the staff facilities, which will be restocked on a regular basis as required during the construction phase. A supply contract will be set up with a water cooler supply company with water supplies delivered to site as required on a regular basis.		
MM28	Pre-emptive site drainage management	EIAR Chapter 4, 9	The works programme for the groundworks part of the construction phase of the project will also take account of weather forecasts, and predicted rainfall in particular.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 4			
MM29	Protection of Watercourses	EIAR Chapter 9	During the near stream construction work and tree felling, double row silt fences may be emplaced immediately down-gradient of the working areas for the duration of the construction phase.		
MM30	Concrete Deliveries and Management	EIAR Chapter 9	No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place. Only ready-mixed concrete will be used during the construction phase, with all ready-mixed concrete being delivered from local batching plants in sealed concrete delivery trucks.		
MM31	Concrete Deliveries and Management	EIAR Chapter 9	No washing out of any plant used in concrete transport or concreting operations will be carried out onsite. When concrete is delivered to site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the site. Concrete trucks will be directed back to their batching plant for washout.		
MM32	Concrete Deliveries and Management	EIAR Chapter 4, 9	No concrete will be transported around the site in open trailers or dumpers so as to avoid spillage while in transport.		
MM33	Concrete Deliveries and Management	EIAR Chapter 4	Clearly visible signs in prominent locations will be placed close to concrete pour areas specifically stating washout of concrete lorries is not permitted on the site		
MM34	Concrete Deliveries and Management	EIAR Chapter 4	Main pours will be planned days or weeks in advance. Large pours will be avoided when prolonged periods of heavy rain are forecast.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM35	Concrete Deliveries and Management	EIAR Chapter 4	Concrete pumps and machine buckets will be restricted from slewing over watercourses while placing concrete.		
MM36	Concrete Deliveries and Management	EIAR Chapter 4	Excavations will be sufficiently dewatered before concreting begins. Dewatering will continue while concrete sets.		
MM37	Concrete Deliveries and Management	EIAR Chapter 4	Covers will be available for freshly placed concrete to avoid the surface washing away in heavy rain.		
MM38	Concrete Deliveries and Management	EIAR Chapter 4	Surplus concrete after completion of a pour will be returned to the concrete suppliers batching plant for recycling.		
MM39	Road Cleanliness	EIAR Chapter 4. CEMP Section 4	A road sweeper will be available if any section of the public roads were to be dirtied by trucks associated with the proposed development.		
MM40	Road Cleanliness	EIAR Chapter 4 CEMP Section 4	Where it is deemed necessary, wheel washes will be provided near all site entrances to the public road		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM41	Construction Traffic	EIAR Chapter 4	Construction traffic will be subject to standard construction health and safety requirements which will ensure traffic speeds are limited to 15 mph/25 kmph.		
MM42	Waste Materials	CEMP Section 4	All waste materials will be removed to an appropriately licenced facility		
MM43	Felling	EIAR Chapter 4,	The tree felling activities required as part of the proposed development will be the subject of a Felling Licence application to the Forest Service, as per the Forest Service's policy on granting felling licenses		
MM44	Staff Facilities	EIAR Chapter 9	› At the site compound a self-contained port-a-loo with an integrated waste holding tank will be used within the works area and at the site compound (substation), maintained by the providing contractor, and removed from site on completion of the construction works; › At the site compound the water supply for the site office (if necessary) and other sanitation will be brought to site and removed after use from the site to be discharged at a suitable off-site treatment location; and, No water will be sourced along the works area/at the site or discharged to same.		
Drainage Design and Maintenance					
MM45	Wastewater Management	EIAR Chapter 4, 9. CEMP Section 4	During the construction phase, a self-contained port-a-loo with an integrated waste holding tank will be used on site for toilet facilities. This will be maintained by the service contractor on a regular basis and will be removed from the site on completion of the construction phase. Water supply for the site office and other sanitation will be brought to site and removed after use from the site to be discharged at a suitable off-site treatment location; and, No water will be sourced on the site or discharged to the site.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM46	Watercourse Buffer	EIAR Chapter 4, 9, CEMP Section 4	It is proposed to limit any works in any areas located within 50m of any water course including the stockpiling of excavated soils and subsoils. A constraint/buffer zone will be maintained for all crossing locations where possible whereby all watercourses will be fenced off		
MM47	Drainage Swales	EIAR Chapter 4, CEMP Section 4	Swales will be used to intercept and collect run off from construction areas of the site during the construction phase, and channel it to settlement ponds for sediment attenuation as per the drainage design.		
MM48	Interceptor Drains	EIAR Chapter 4, CEMP Section 4	Interceptor drains will be installed up-gradient of any works areas to collect surface flow runoff and prevent it reaching excavations and construction areas of the site. It will then be directed to areas where it can be re-distributed over the ground as sheet flow as per the drainage design.		
MM49	Transverse drains	EIAR Chapter 9	On steep sections of access road transverse drains ('grips') will be constructed where appropriate in the surface layer of the road to divert any runoff off the road into swales/road side drains;		
MM50	Silt Fences	EIAR Chapter 4, CEMP Section 4	Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to the existing drainage network of sand and gravel-sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin and entrained in surface water runoff. Inspection and maintenance of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase.		
MM51	Check dams	EIAR Chapter 4, CEMP Section 4	Check dams will not be used in any natural watercourses, only artificial drainage channels and interceptor drains. The check dams will be installed at regular intervals along interceptor drains to restrict flow velocity, minimise channel erosion and promote sedimentation behind the dam as per the drainage design.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM52	Level Spreaders,	EIAR Chapter 4, 9. CEMP Section 4	A level spreader will be constructed at the end of each interceptor drain to convert concentrated flows in the drain into diffuse sheet flow on areas of vegetated ground. The levels spreaders will be located downgradient of any proposed works areas in locations where they are not likely to contribute further to water ingress to construction areas of the site.		
MM53	Vegetation filters	EIAR Chapter 4, 9. CEMP Section 4	Vegetation filters, that is areas of existing vegetation, accepting drainage water issuing from level spreaders as sheet flow, will remove any suspended sediment from water channelled via interceptor drains or any remaining sediment in waters channelled via swales and settlement ponds.		
MM54	Settlement ponds	EIAR Chapter 4, 9. CEMP Section 4	Settlement ponds, placed either singly or a pair in series, will buffer volumes of run-off discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to water courses as per the drainage design.		
MM55	Dewatering Silt Bag	EIAR Chapter 4. CEMP Section 4	Dewatering silt bags will be used which allow the flow of water through while trapping any silt or sediment suspended in the water. The silt bags provide a passive non-mechanical method of removing any remaining silt contained in the potentially silt-laden water collected from works areas within the site.		
MM56	Culverts	EIAR Chapter 4	Culverts will be installed at locations where interceptor drains cross the new proposed track route. All works involving culverts, whether they are new, upgraded or extended, will be carried out to follow a method statement to be agreed with Inland Fisheries Ireland.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM57	Culverts	EIAR Chapter 9	Where possible all proposed new stream crossings will be bottomless culverts and the existing banks will remain undisturbed. No in-stream excavation works are proposed and therefore there will be no impact on the stream at the proposed crossing location.		
MM58	Culverts	EIAR Chapter 9	Any guidance / mitigation measures proposed by the OPW or the Inland Fisheries Ireland will be incorporated into the design of the proposed crossings. A 10m buffer is applied to the main drain (*i.e.* drain D1) s to allow for future OPW maintenance;		
MM59	Culverts	EIAR Chapter 9 CEMP Section 4	The following mitigation is proposed for completion of the watercourse crossings: › Protection of the riparian zone watercourses by implementing a constraints zone around stream crossings, in which construction activity will be limited to. › No stock-piling of construction materials will take place within the constraints zone. No refuelling of machinery or overnight parking of machinery is permitted in this area; › The shuttered for the bridge deck to be poured over the precast concrete slabs will be sealed and water tested before concrete pouring can commence. › When pouring concrete during the construction of the clear-span crossing, concrete pumps and machine buckets will be restricted from slewing over watercourses while placing concrete. › No concrete truck chute cleaning is permitted in this area; › Works shall not take place at periods of high rainfall, and shall be scaled back or suspended if heavy rain is forecast;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Plant will travel slowly across bare ground at a maximum of 5km/hr. Bog mats will be employed to protect tracked areas as necessary; › Machinery deliveries shall be arranged using existing structures along the public road; › All machinery operations shall take place away from the stream and ditch banks, apart from where crossings occur. Although no instream works are proposed or will occur; › Any excess construction material shall be immediately removed from the area and taken to a licensed waste facility; › Spill kits shall be available in each item of plant required to complete the stream crossing; and, Silt fencing will be erected on ground sloping towards watercourses at the stream crossings if required		
MM60	Grid Connection	EIAR Chapter 4, 9	Within the wind farm site where the proposed grid connection cable route runs adjacent to a proposed access road or an existing access road proposed for upgrade, the cable will pass over the culvert (where one exists or is proposed) within the access road;		
MM61	Silt Fences,	EIAR Chapter 4, 9. CEMP Section 3	Silt fences will be installed along the routes of existing watercourses or drainage ditches where site roads pass over the watercourses, immediately downstream of the construction area.		
MM62	Sediment disposal	EIAR Chapter 4	Sediment that is removed from settlement ponds, check dams, silt bags etc. as part of routine maintenance will be carefully disposed of away from all aquatic		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 4	zones, or will be transported off-site for disposal or re-use elsewhere if deemed necessary.		
MM63	Temporary Stockpiles	EIAR Chapter 4, 9 CEMP Section 4	Material excavated to create the working area will be stored locally for later reuse in backfilling the working area around the turbine foundation. The excavated material will be covered with polythene sheets as required and surrounded by silt fences to ensure sediment-laden run-off does not occur.		
MM64	Temporary Material Storage Areas Drainage Controls	EIAR Chapter 4 CEMP Section 4	Construction and drainage controls around temporary stockpiles will be implemented prior to the development of the stockpile where temporary management of surface water run-off during stockpile filling may require pumping to a local settlement pond for sedimentation and water treatment prior to discharge;		
MM65	Grid Connection Drainage	EIAR Chapter 9	Where construction of the grid cable connection route is undertaken along sections of proposed access road or existing roads requiring upgrade, the proposed wind farm drainage infrastructure (as outlined above) will be in place to manage and control runoff from the trench excavation area. Where the cable trench is to be constructed off-road (within the development site) or along public roads surface water control measures such as silt fences will be employed when work is required within hydrological buffer zones.		
MM66	Timing of Site Construction Works	EIAR Chapter 9	Construction of the site drainage system will only be carried out during periods of low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Felling					
MM67	Felling Licence	EIAR Chapter 4	Felling will be carried out under the terms of a licence application to the Forest Service, as per the Forest Service's policy on granting felling licenses for wind farm developments		
MM68	Clear felling of Coniferous Plantation	EIAR Chapter 9. CEMP Section 4	Best practice Forestry Service Guideline mitigation measures will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses as follows: › Machine combinations will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance; › Checking and maintenance of roads and culverts will be on-going through any felling operation. No tracking of vehicle through watercourses will occur, as vehicles will use road infrastructure and existing watercourse crossing points. Where possible, existing drains will not be disturbed during felling works; › Ditches which drain from the proposed area to be felled towards existing surface watercourses will be blocked, and temporary silt traps will be constructed. No direct discharge of such ditches to watercourses will occur. Drains and sediment traps will be installed during ground preparation. Collector drains will be excavated at an acute angle to the contour (~0.3%-3% gradient), to minimise flow velocities. Main drains to take the discharge from collector drains will include water drops and rock armour, as required, where there are steep gradients, and should avoid being placed at right angles to the contour;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Sediment traps will be sited in drains downstream of felling areas. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of in the peat disposal areas. Where possible, all new silt traps will be constructed on even ground and not on sloping ground; › In areas particularly sensitive to erosion, it may be necessary to install double or triple sediment traps. This measure will be reviewed on site during construction; › All drainage channels will taper out before entering the aquatic buffer zone. This ensures that discharged water gently fans out over the buffer zone before entering the aquatic zone, with sediment filtered out from the flow by ground vegetation within the zone. On erodible soils, silt traps will be installed at the end of the drainage channels, to the outside of the buffer zone; › Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Correct drain alignment, spacing and depth will ensure that erosion and sediment build-up are minimized and controlled; › Brash mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal should take place when they become heavily used and worn. Provision should be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction should be suspended during periods of high rainfall;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Timber will be stacked in dry areas, and outside a local 50m watercourse buffer. Check dams to be emplaced on the down gradient side of timber storage/processing sites; › Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water run-off; › Checking and maintenance of roads and culverts will be on-going through the felling operation; › Any diesel or fuel oils stored at the temporary site compound will be bunded. The bund capacity will be sufficient to contain 110% of the storage tank's maximum capacity; › Refuelling or maintenance of machinery will not occur within 100m of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required; and, › Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but care will be taken to avoid removing natural debris deflectors.		
MM69	Clear Felling of Coniferous Plantation	EIAR Chapter 9	Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Correct drain alignment, spacing and depth will ensure that erosion and sediment build-up are minimised and controlled		
Peat, Subsoils and Bedrock					
MM70	Waste Material Generation and Management	EIAR Chapter 8	With the exception of peat and overburden which will be spread adjacent to the excavations of the development infrastructure, no waste materials, either from the site or introduced construction materials will be left on site but will be removed to suitable waste facilities.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM71	Erosion of Exposed Subsoils and Peat	EIAR Chapter 8	Peat removed from the turbine no. 5, 14 and 15 location will be locally placed/spread alongside the excavations for the infrastructural elements.		
MM72	Erosion of Exposed Subsoils and Peat	EIAR Chapter 8	In order to minimise runoff during the construction phase, stripping of peat should not take place during excessively dry weather (to prevent dust generation) or extremely wet periods (to prevent increased silt rich runoff).		
MM73	Erosion of Exposed Subsoils and Peat	EIAR Chapter 8	Bog mats and brash mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal should take place when they become heavily used and worn. Provision should be made for brash mats along all off-road routes, to protect the soil from compaction and rutting.		
MM74	Peat, Subsoil Excavation and Bedrock Excavation		› Placement of turbines and associated infrastructure in areas with shallower peat where possible; › Use of piled foundations in areas of deeper peat and soft mineral soils; › Use of floating roads (where geotechnically acceptable to do so) to reduce peat excavation volumes (i.e. along wind farm access tracks and the link road); › The peat and subsoil which will be removed during the construction of turbine hardstands (will be localised to the turbine locations. The peat will be placed/spread locally alongside the excavations (refer to Figure 7-1 of Appendix 4-2); › Small volumes of peat will be excavated and used for landscaping along proposed access/link roads; › No turbines or related infrastructure will be constructed in any designated sites such as NHAs or SACs;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Construction of settlement ponds will be volume neutral, and all excess material will be used locally to form pond bunds and surrounding landscaping; › Placement of internal cable trenching will also be volume neutral, and all excess material will be used locally as landscaping; › Subsoils will be reinstated back into the cable trench along the proposed grid connection route where possible; and, › Peat/mineral soil excavated along the Grid Connection Route, will only be stored in low mounds (~0.5m high) directly adjacent to the excavated trench, and will be stored for no more than 24 hours before being backfilled where possible. The soil/subsoil will be covered in the event of heavy rainfall which would suspend further construction works along the Grid Connection Route.		
MM75	Erosion of Exposed Subsoils and Peat		› Peat removed from the turbine locations and associated access roads will be used for landscaping or placed/spread locally alongside the excavation. A full Peat and Spoil Management Plan for the Proposed Development is shown as Appendix 4-2. › In order to minimise erosion of mineral subsoils, stripping of peat will not take place during extremely wet periods (to prevent increased silt-rich runoff). Temporary drainage systems will be required to limit runoff impacts during the construction phase. › In forestry areas brash mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. › Peat and subsoil removed from the cable trench will be used to reinstate the trench where possible or removed to an appropriately licenced facility. Peat and subsoil removed from the proposed		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			substation groundworks will be removed and either used for Wind Farm Site reinstatement/landscaping works or taken to an appropriately licenced facility.		
MM76	Peat Instability	EIAR Chapter 8	› Appointment of experienced and competent contractors; › The site should be supervised by experienced and qualified personnel; › Allocate sufficient time for the project (be aware that decreasing the construction time has the potential to increase the risk of initiating a peat movement); › Prevent undercutting of slopes and unsupported excavations; › Maintain a managed robust drainage system; › Prevent placement of loads/overburden on marginal ground; › Set up, maintain and report findings from monitoring systems; › Ensure construction method statements are followed or where agreed modified/ developed; and, › Revise and amend the Geotechnical Risk Register as construction progresses		
MM77	Peat Instability	EIAR Chapter 4, 8	Prior to commencing floating road construction movement monitoring posts will be installed in areas where the peat depth is greater than 4m.		
MM78	Peat Instability	CEMP Section 4	A Geotechnical Risk Register will be maintained throughout the construction phase by the Project Engineer which will provide the means to carry out a geotechnical risk assessment and recommend remedial action.		
Biodiversity					
MM79	Removal of Vegetation	EIAR Chapter 4, 6, 7	The removal of woody vegetation will be undertaken in full compliance with Section 40 of the Wildlife Act 1976 – 2018. Any required removal of vegetation will be undertaken following inspection by a suitable qualify ornithologist to ensure no nesting birds are affected.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 10	› In line with best practise, no construction works are permitted 1st of March to the 31st of August inclusive within a 350m radius of lapwing breeding territories. › In line with best practise, no construction works are permitted 1st of March to the 31st of August inclusive within a 500m radius of barn owl breeding site. › No works shall be permitted within the buffer for the given timeframe, until it can be demonstrated that the roost/nest is no longer occupied.		
MM80	Bats	EIAR Chapter 6	› Pre-construction roost surveys will be required to identify and protect any bats potentially occupying roosts in vegetation earmarked for removal. For any trees found to be occupied by roosting bats prior to construction, an exclusion zone will be implemented to prevent disturbance during times of occupancy. Table 20 of the Bat Survey and Impact Assessment Report provided in Appendix 6-2 provides optimal time periods for works at different roost types, and therefore by extension restrictive periods for construction works, during which the exclusion zone for construction work would be applicable. The extent of the exclusion zone can be up to 30m for any notably disruptive works such as pile-driving; however, the mitigation measure should be proportional to the disturbance levels emanating from the construction activity. Pre-construction surveys will inform the application to undertake		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			appropriate mitigation actions as required to ensure the conservation of bats, if found to be utilising roosts within the construction corridor. › The loss of approximately 960m of treeline and 220m of hedgerow will be replaced as part of the Proposed Development. This will take place along the access road to T15. › Treeline lost along the proposed link road will be replaced 'like for like'. › Where treeline is lost in the woodland habitat between T5 and T9 the remaining woodland will be retained. The buffer created around T5 will be maintained throughout the operation of the wind farm in order to maintain a homogenous habitat around the turbine throughout its lifespan.		
MM81	Habitat Fragmentation	EIAR Chapter 6	The welfare of Otters will be ensured primarily through the provision of continued safe access for Otters along the river corridor. Adequate provision for Otters at the River crossing is required to allow the species to retain continued access to their foraging areas. The watercourses will be crossed by a clear span structure and part of the riverbank will be retained to provide dry passage for Otter under the structure.		
MM82	Habitat Fragmentation	EIAR Chapter 6	The Proposed Development has been deliberately designed to minimise loss of bog woodland. Vegetation removal will be conducted in line with the provisions of the Wildlife Act. Tree line that is lost as part of the Proposed Development will be replaced along the proposed access road to T15.		
MM83	Invasive Species	EIAR Chapter 6 CEMP Section 4	› The outline Invasive Species Management Plan will be further developed A following a preconstruction invasive survey. This report will describe the best practice measures to be adhered to during the laying of the cable route in proximity to identified stands of invasive species. Good construction site hygiene will be employed to prevent the introduction and spread of invasive alien plant species (e.g. Himalayan Balsam, Japanese Knotweed etc.) by thoroughly washing vehicles prior to leaving any site.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) will be thoroughly cleaned down using a power washer unit prior to arrival on site to prevent the spread of invasive plant species › All washing must be undertaken in areas with no potential to result in the spread of invasive species. This process will be detailed in the contractor's method statement. › Any soil and topsoil required on the site will be sourced from a stock that has been screened for the presence of any invasive species and where it is confirmed that none are present. › All planting and landscaping associated with the proposed development shall avoid the use on invasive shrubs such as Rhododendron.		
MM84	Invasive Species	EIAR Chapter 4, 6	› All earthworks machinery will be thoroughly pressure-washed prior to arrival on site and prior to their further use elsewhere. › Care will be taken not to disturb or cause the movement of invasive species fragments, either intentionally or accidentally. › Stands of Knotweed will be clearly demarcated by temporary fencing and tracking within them will be strictly avoided. A minimum buffer of seven metres will be applied to avoid disturbance of lateral Knotweed rhizomes. › Where works occur within 7m of a Knotweed stand these will be carried out under the supervision of a suitably qualified ecologist. › Where a Knotweed stand is encountered along the road the grid connection will be laid on the opposite side of the road to avoid excavation of potential Knotweed root material insofar as possible.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Should removal of Knotweed off site be required this will be done so under the supervision of an ecologist in line with NPWS licensing. › The machinery must be thoroughly cleaned down under supervision of an ecologist prior to moving away from the Knotweed contaminated area. › All contractors and staff will be briefed about the presence, identification and significance of Knotweed before commencement of works. › Good construction site hygiene will be employed to prevent the spread of these species with vehicles thoroughly cleaned down prior to leaving any site with the potential to have supported invasive species. All plant and equipment employed on the construction site (e.g., excavator, footwear, etc.) will be thoroughly cleaned down on site to prevent the spread of invasive plant species such as Knotweed and Rhododendron. All clean down must be undertaken in areas with no potential to result in the spread of invasive species. › When working at locations in proximity to natural watercourses, a suitable barrier will be erected between the watercourse and the stand of invasive species. This will assist in preventing the spread of any invasive species into the watercourse during their removal. › Any soils or subsoils contaminated with invasive species will sent to an appropriate licenced facility.		
MM85	Aquatic Species	EIAR Chapter 6	› No watercourse will be interfered with as part of the proposed works. › During periods of heavy precipitation and run-off, works will be halted or working surfaces/pads will be provided to minimise soil disturbance.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Any requirement for temporary fills or stockpiles will be covered with polyethylene sheeting to avoid sediment release associated with heavy rainfall. › Silt fences will be used to prevent siltation of watercourses in or surrounding the study area.		
Noise and Vibration					
MM86	Construction Phase Noise, Noise from Construction Activities	EIAR Chapter 4, 11	Equipment will be sensitively located, taking account of local topography and natural screening. It is proposed that various practices be adopted during construction, including: › managing the hours according to the CEMP [Appendix 4-8 during which site activities likely to create high levels of noise or vibration are permitted; › establishing channels of communication between the contractor/developer, Local Authority and residents; › appointing a site representative responsible for matters relating to noise and vibration; › monitoring typical levels of noise and vibration during critical periods and at sensitive locations; › keeping site access roads even to mitigate the potential for vibration from lorries. › selection of plant with low inherent potential for generation of noise and/ or vibration; › placing of noisy / vibratory plant as far away from sensitive properties as permitted by site constraints, and; › regular maintenance and servicing of plant items.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM87	Construction Phase Noise,	EIAR Chapter 4, 11	The following list of measures will be implemented on site, to ensure compliance with the relevant construction noise criteria: › No plant used on site will be permitted to cause an on-going public nuisance due to noise. › The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations. › All vehicles and mechanical plant will be fitted with effective exhaust silencers if required and maintained in good working order for the duration of the contract. › Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers. › Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use. › Any plant, such as generators or pumps, which is required to operate close to NSLs outside of general construction hours will be surrounded by an acoustic enclosure or portable screen.		
MM88	Construction Phase Noise,	EIAR Chapter 4, 11	All construction work will be restricted to the specified working hours between 7:00hrs and 19:00hrs Monday to Saturday. Any construction work carried out outside of these hours shall be restricted to activities that will not generate noise of a level that may cause a nuisance.		
MM89	Construction Phase Noise,	EIAR Chapter 4, 11	Plant will be selected taking account of the characteristics of noise emissions from each item. All plant and machinery used on the site shall comply with E.U. and Irish legislation in relation to noise emissions. The timing of on- and off-site movements of plant near occupied properties will be controlled.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	Noise from Construction Activities				
MM90	Construction Phase Noise Control,	EIAR Chapter 4, 11. CEMP Section 4	Training and supervision of drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation.		
MM91	Construction Phase Noise, Noise from Construction Activities	EIAR Chapter 4, 11	All construction operations shall comply with guidelines set out in British Standard documents *'BS 5338: Code of Practice for Noise Control on Construction and Demolition Sites'* and *'BS5228: Part 1: 1997: Noise & Vibration Control on Construction and Open Sites'*.		
MM92	Noise	EIAR Chapter 4, 11	Training and supervision of drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation.		
MM93	Noise	EIAR Chapter 4, 11	Where rock breaking is employed in relation to the proposed borrow pit, the following are examples of measures that will be considered, where necessary, to mitigate noise emissions from these activities: › Fit suitably designed muffler or sound reduction equipment to the rock breaking tool to reduce noise without impairing machine efficiency. › Ensure all leaks in air lines are sealed.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Use a dampened bit to eliminated ringing. › Erect acoustic screen between compressor or generator and noise sensitive area. When possible, line of sight between top of machine and reception point needs to be obscured. › Enclose breaker or rock drill in portable or fixed acoustic enclosure with suitable ventilation.		
Air Quality/Dust					
MM94	Construction Phase Dust Control	EIAR Chapter 4. CEMP Section 4	Truck wheels will be washed to remove mud and dirt before leaving the site.		
MM95	Construction Phase Dust Control	EIAR Chapter 4. CEMP Section 4	Construction traffic will be restricted to defined routes and a speed limit of 15 kph will be implemented.		
MM96	Construction Phase Dust Control	EIAR Chapter 4. CEMP Section 4	Water misting or bowsers will operate on-site as required to mitigate dust in dry weather conditions;		
MM97	Construction Phase Air Quality	EIAR Chapter 10	All construction machinery will be maintained in good operational order while on-site, minimising any emissions that are likely to arise.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM98	Dust	EIAR Chapter 10 CEMP Section 4	The roads adjacent the site will be regularly inspected for cleanliness, and cleaned as necessary; Sporadic wetting of loose stone surface will be carried out during the construction phase to minimise movement of dust particles to the air.		
MM99	Dust	EIAR Chapter 10	The transport of soils or other material, which has significant potential to cause dust, will be undertaken in tarpaulin-covered vehicles where necessary;		
MM100	Greenhouse Gases	EIAR Chapter 10	› All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise. › Turbines and construction materials will be transported to the site on specified routes only unless otherwise agreed with the Planning Authority. › Aggregate materials for the construction of the proposed wind farm will be obtained from the proposed borrow pit. This will significantly reduce the number of delivery vehicles accessing the site from significant distances, thereby reducing the amount of emissions associated with vehicle movements.		
MM101	Waste Management	EIAR Chapter 10	The Material Recovery Facility will be local to the Proposed Development site to reduce the amount of emissions associated with waste management vehicle movements. The nearest licensed waste facility to the site is located approximately 22 km south of the Proposed Development.		
Cultural Heritage					
MM102	National Monuments or	EIAR Chapter 13	A buffer zone of 20m should be established around the unnamed bridge to the north-west of the proposed access road to T15 and maintained for the duration of the construction stage of the project.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
	recorded monuments				
Landscape and Visual					
MM103	Construction Phase: Visual Impact	EIAR Chapter 12	One main construction compound will be used for the storage of all construction materials.		
MM104	Borrow Pit	EIAR Chapter 12	Following the completion of the construction phase, the borrow pit will be reinstated. the borrow pit will be levelled, covered over with overburden and allowed to re-vegetate naturally. Overburden will also be deposited along the edge of the borrow pit, which will be allowed to re-vegetate and this will reduce visibility of the pit. Safety fencing and signage will be constructed. Following this, the gravel road will be allowed to re-vegetate		
MM105	Borrow Pit	EIAR Chapter 12	Maintain natural screening around the perimeter of proposed borrow pit.		
Material Assets and Traffic					
MM106	Management of Large Deliveries	EIAR Chapter 14	All deliveries comprising abnormally large loads will be made outside the normal peak traffic periods to avoid disruption to work and school related traffic.		
MM107	Construction Phase Traffic and Transport - Mitigation	EIAR Chapter 14. CEMP Section 4	A detailed Traffic Management Plan will be prepared by the appointed contractor and will include details of: › The appointed Traffic Management Co-oordinator › Turbine delivery programme, schedule and times › Procedure for providing information to locals to keep them informed of any upcoming traffic related matters e.g., temporary lane/road closures › Agreements with local authority and An Garda Siochana on delivery phases etc.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› Temporary alterations of road junctions › Delivery routes for construction materials › Travel plan for construction workers › Temporary traffic signs › Diversions and road closures Trench and road surface reinstatement		
MM108	Construction Phase Traffic and Transport - Mitigation	EIAR Chapter 14. CEMP Section 4	All traffic management at the required locations will comply the *"Traffic Signs Manual, Section 8 – Temporary Traffic Measures and Signs for Road Works"* (DoT now DoTT&S) and "Guidance for the Control and Management of Traffic at Roadworks" (DoTT&S). A member of construction staff (flagman) will be present at key junctions during peak delivery times.		
MM109	Construction Phase Traffic and Transport - Mitigation	EIAR Chapter 14. CEMP Section 4	The contractor will consult with the roads section of the local authority that the delivery routes traverses and An Garda Siochana during the delivery phase of the large turbine vehicles, when an escort for all convoys will be required		
MM110	Construction Phase Traffic and Transport - Mitigation	EIAR Chapter 14 CEMP Section 4	Phased development will be employed to allow for construction traffic to be managed and to minimise the volume of construction traffic using the road network at any one time.		
MM111	Construction Phase Traffic and Transport - Mitigation	EIAR Chapter 14.	The contractor will be required to provide a travel plan for construction staff, which will include the identification of routes to / from the site and an area for non-work vehicle parking.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
		CEMP Section 4			
Operational Phase					
MM112	Wastewater Management	EIAR Chapter 4	The removal and disposal of wastewater from the site will be carried out by a fully permitted waste collector holding valid Waste Collection Permits as issued under the Waste Management (Collection Permit) Regulations, 2007.		
MM113	Site Drainage	CEMP Section 4	The project hydrologist will inspect and review the drainage system after construction has been completed to provide guidance on the requirements of an operational phase drainage system. This operational phase drainage system will have been installed during the construction phase in conjunction with the road and hardstanding construction work as described below: › Runoff from individual turbine hardstanding areas will not be discharged into the existing drain network, but discharged locally at each turbine location through settlement ponds and buffered outfalls onto vegetated surfaces; › Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader; › Swales/road side drains will be used to collect runoff from access roads and turbine hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to settlement ponds for sediment settling;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› On steep sections of access road transverse drains ('grips') will be constructed where appropriate in the surface layer of the road to divert any runoff off the road into swales/road side drains; › Check dams will be used along sections of access road drains to intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock; › Settlement ponds, emplaced downstream of road swale sections and at turbine locations, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses; and, › Settlement ponds will be designed in consideration of the greenfield runoff rate.		
MM114	Site Drainage	EIAR Chapter 9	The proposed onsite substation will be located on the south west of the Wind Farm Site. It is proposed to drain the onsite substation using shallow swales, with a stilling pond at the end of the swale run. The stilling pond will remain in place following the construction period		
MM115	Site Drainage	EIAR Chapter 9	A rainwater harvesting system will be used for toilet flushing at the Substation Control Building in the Wind Farm Site. There will be a very small net loss of water to local streams but this will be imperceptible over the course of a year		
MM116	Site Drainage	EIAR Chapter 9	It is proposed to install a sealed underground holding tank for effluent (wastewater) from the onsite substation building. The tank shall be routinely emptied by a licensed contractor. A level sensor will be installed in the tank which shall be linked to the on-site SCADA system. Should the level of the tank rise to a predetermined 'high 'level a warning shall appear on the overall SCADA system for the Wind Farm Site and automatic notification shall be sent to the facility manager. A formal service agreement will be entered into with a suitably permitted waste contractor, in relation to the servicing and de-sludging of the wastewater holding tank on site. There will be no discharge of wastewater to ground at the Wind Farm Site, and therefore there is no potential to impact groundwater or surface water quality.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM117	Borrow Pit Drainage	CEMP Section 4	Appropriate operational phase drainage will be implemented to attenuate drainage water.		
MM118	Bats	EIAR Chapter 6	In order to reduce the value of the habitat for bat species in the areas surrounding the turbines, a buffer of at least 50m between the tip of the blade and any trees or other tall vegetation that could provide high quality foraging habitat for bat species will be implemented. Full details of this mitigation and how it is calculated is provided in Appendix 6-2 and summarised below: › A three-year monitoring programme is recommended for bats, with monitoring in years 1, 2, and 3 post-construction, and will include several elements, including bat activity surveys and collision monitoring, which incorporates turbine searches and scavenger removal trails.		
MM119	Noise	EIAR Chapter 11	An assessment of the operational noise levels has been undertaken in accordance with best practice guidelines and procedures as outlined in Section 11.3.2.2 in Chapter 11. The findings of the assessment identified that there are two NSLs where potential exceedances are predicted. If confirmed during post-construction monitoring, a curtailment strategy will be implemented to reduce noise levels due to the wind farm to within the criteria at all NSLs.		
MM120	Shadow Flicker	EIAR Chapter 5	Where shadow flicker occurrences are experienced at buildings, a site visit will be undertaken firstly to determine the level of occurrence, existing screening and window orientation. If annoyance is found, suitable mitigation measures such as screening and/or wind turbine control measures including turbine shutdown will be employed to limit the shadow flicker to zero at the affected property.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM121	Fuel Control	EIAR Chapter 8, 9	Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures		
MM122	Air Quality	EIAR Chapter 4	Any vehicles or plant brought onsite during the operational phase will be maintained in good operational order that comply with the Road Traffic Acts 1961 as amended, thereby minimising any emissions that arise.		
MM123	Telecoms and other service interference	EIAR Chapter 4	In the event of interference to the transmission or reception of RTÉ Transmission Network (operating as 2rn) or radio waves as a result of the operation of the proposed wind farm, the appropriate measures as set out in the 2rn Protocol Document will be carried out in order to rectify this. This Protocol Document has been prepared by 2rn and signed by the wind farm developers.		
MM124	Telecommunications	EIAR Chapter 14.	Ai Bridges approached Ripplecom with the following mitigation measures for the telecoms link that would potentially be impacted by turbine T15: › A new lattice structure be erected at the Ripplecom end of the link and the link dish at the customer end of the Ripplecom link would be relocated to the corner of the customer building. This would provide a clearance between T15 and the Ripplecom link. › Alternatively, should fibre broadband be installed in the area and be utilised by Ripplecom prior to the commissioning of the Proposed Development, the above mitigation measures would not be required and there would be no interference as the link through the development would no longer be required . These mitigation measures have been accepted by Ripplecom and are further detailed in Appendix 14-3 attached.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM125	Aviation	EIAR Chapter 14	Coole Wind Farm Ltd. will agree an acceptable aviation obstacle warning lighting scheme with the Department of Defence and the Irish Aviation Authority (IAA) ahead of turbine construction and will supply the coordinates and elevations for built turbines to the IAA, as is standard for wind farm developments.		
MM126	Construction Phase: Visual Impact	EIAR Chapter 12	The construction compound will be fully re-instated at the end of the construction phase.		
MM127	Health and Safety	EIAR Chapter 5	Access to the turbines is through a door at the base of the structure, which will be locked at all times outside maintenance visits. Signs will also be erected at suitable locations across the site as required for the ease and safety of operation of the wind farm. These signs include: › Buried cable route markers at 50m (maximum) intervals and change of cable route direction; › Directions to relevant turbines at junctions; › "No access to Unauthorised Personnel" at appropriate locations; › Speed limits signs at site entrance and junctions; › "Warning these Premises are alarmed" at appropriate locations; › "Danger HV" at appropriate locations; › "Warning – Keep clear of structures during electrical storms, high winds or ice conditions" at site entrance; › "No unauthorised vehicles beyond this point" at specific site entrances; and › Other operational signage required as per site-specific hazards.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			An operational phase Health and Safety Plan will be developed to fully address identified Health and Safety issues associated with the operation of the site and providing for access for emergency services at all times.		
MM128	Borrow Pit	EIAR Chapter 13	The operational phase of the proposed borrow pit will not impact on the immediate setting of any National Monuments, Recorded Monuments, Protected Structures or NIAH structures/gardens. Maintain natural screening around the perimeter of proposed borrow pit.		
MM129	Substation	EIAR Chapter 13	The substation site may have a slight negative impact on the surrounding archaeological and cultural heritage landscape as it will result in a change to their wider setting. Existing screening will be maintained to alleviate any potential impacts on setting.		
Decommissioning Phase					
MM130	Drainage on Decommissioning	EIAR Chapter 9	Following decommissioning of the wind farm at the end of its life restoration of the hydrological regime will take place by the blocking of all the drains associated with the wind farm development. Some additional drains may also be blocked in order to restore natural drainage conditions of adjacent bog and peat habitat.		
MM131	Decommissioning	EIAR Chapter 4 DP Section 3	The following mitigation measures are proposed to avoid release of hydrocarbons at the site: › Road-going vehicles will be refuelled off site wherever possible; › On-site refuelling will be carried out at designated refuelling areas at various locations throughout the site. Machinery will be refuelled directly by a fuel truck that will come to site as required › Only designated trained and competent operatives will be authorised to refuel plant on site. › Fuel volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately;		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			› The plant used will be regularly inspected for leaks and fitness for purpose; and, › An emergency plan for the decommissioning phase to deal with accidental spillages will be developed (refer to Section 4) Spill kits will be available to deal with and accidental spillage in and outside the refuelling area. A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the decommissioning phase.		
MM132	Decommissioning	EIAR Section 7	A Decommissioning Plan has been prepared (see Appendix 4-11 of the EIAR) The following measures are proposed for the decommissioning phase: › During the decommissioning phase, disturbance limitation measures will be as per the construction phase (see Chapter 7 of the EIAR). › Plant machinery will be turned off when not in use. › All plant and equipment for use will comply with the Construction Plant and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations 2001 (S.I. No. 632 of 2001). A project ecologist will be appointed to oversee the decommissioning phase, with similar duties to those outlined above during the construction phase.		
MM133	Decommissioning	EIAR Chapter 4 DP Section 2	On removal of turbines, soil will be spread and graded over the foundation using a tracked excavator and revegetation enhanced by spreading of an appropriate seed mix to assist in revegetation and accelerate the resumption of the natural drainage management that will have existed prior to any construction		
MM134	Site rehabilitation during decommissioning	EIAR Chapter 8	In order to reverse or at least reduce some of the potential impacts caused during construction by rehabilitating construction areas such as turbine bases, hardstanding areas and site compound, covering with peatland vegetation/scraw or		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
			poorly humified peat to encourage vegetation growth and reduce run-off and sedimentation is proposed.		
MM135	Noise	EIAR Chapter 8	The mitigation measures that will be considered in relation to any decommissioning of the site are the same as those proposed for the construction including: › managing the hours according to the CEMP [Appendix 4-8 during which site activities likely to create high levels of noise or vibration are permitted; › establishing channels of communication between the contractor/developer, Local Authority and residents; › appointing a site representative responsible for matters relating to noise and vibration; › monitoring typical levels of noise and vibration during critical periods and at sensitive locations; › keeping site access roads even to mitigate the potential for vibration from lorries. Furthermore, a variety of practicable noise control measures will be employed. These include: › selection of plant with low inherent potential for generation of noise and/ or vibration; › placing of noisy / vibratory plant as far away from sensitive properties as permitted by site constraints, and; › regular maintenance and servicing of plant items.		
MM136	Traffic	EIAR Chapter 14	In the event that the Proposed Development is decommissioned after the 30 years of operation, a decommissioning plan, including material recycling / disposal and traffic management plan will be prepared for agreement with the local authority.		

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
MM137	Ornithology	EIAR Chapter 7	› During the decommissioning phase, disturbance limitation measures will be as per the construction phase. › Plant machinery will be turned off when not in use. › All plant and equipment for use will comply with industry best practise Construction Plant and Equipment Permissible Noise Levels Regulations.		

9. MONITORING PROPOSALS

All monitoring measures relating to the pre-commencement, construction and operational phases of the proposed development were set out in the relevant chapters of the EIAR submitted as part of the planning permission application.

This section of the CEMP groups together the monitoring measures presented in the EIAR. It is intended that the CEMP would be updated where required prior to the commencement of the development, to include all monitoring measures, conditions and or alterations to the EIAR and application documents should they emerge during the course of the planning process, and would be submitted to the Planning Authority for written approval.

All mitigation measures which will be implemented during the pre-commencement, construction and operational phases of the project are outlined in Table 9-1. The monitoring proposals are presented in terms of the monitoring requirement, frequency of monitoring and the mechanism for reporting results where applicable.

By presenting the monitoring proposals in the below format, it is intended to provide a monitoring schedule that can be reviewed and tracked during all phases of the project.to ensure all the required monitoring is completed as required.

Table 9-1 Schedule of Monitoring Measures

Ref. No.	Reference Heading	Reference Location	Monitoring Measure
Pre-Commencement Phase			
MX1	Water Quality and Monitoring	EIAR Chapter 9	An inspection and maintenance plan for the on-site drainage system will be prepared in advance of commencement of any works.
MX2	Water Quality and Monitoring	CEMP Section 5	Turbidity monitors or sondes can be installed where required at locations surrounding the wind farm and will provide continuous readings for turbidity levels in the watercourse.
MX3	Water Quality and Monitoring	CEMP Section 5	Baseline sampling will be completed on at least two occasions and these should coincide with low flow and high flow stream conditions.
MX4	Water Quality and Monitoring	EIAR Chapter 9	Sampling will be completed before, during and after the felling activity. The 'before' sampling should be conducted within 4 weeks of the felling activity, preferably in medium to high water flow conditions.
MX5	Invasive Species	CEMP Section 4	A pre-commencement invasive species survey shall be completed for the site
MX6	Mammal Survey	EIAR Chapter 6	A pre-construction mammal survey will be undertaken to identify any Otter holts or Badger setts within the works areas associated with the proposed development. The survey will be undertaken to ensure that Otter or Badger have not taken up residence within or close to the development footprint
MX7	Ornithology	EIAR Chapter 7	Pre-commencement surveys will be undertaken prior to the initiation of works at the wind farm. The survey will include a thorough walkover survey to a 500m radius of the development footprint and/or all works areas, where access allows
MX8	Archaeological Testing	EIAR Chapter 13	Pre-construction archaeological testing of turbine bases and hardstands proposed for excavation will be carried out. A report will be submitted to the relevant authorities for consideration
Construction Phase			

Ref. No.	Reference Heading	Reference Location	Monitoring Measure
MX9	Water Quality and Monitoring	EIAR Chapter 9	During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs should be undertaken for each primary watercourse, and specifically following heavy rainfall events (*i.e.* weekly, monthly and event based).
MX10	Water Quality and Monitoring	EIAR Chapter 9	An inspection and maintenance plan for the on-site drainage system will be prepared in advance of commencement of any works. Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended. Inspections will also be undertaken after tree felling
MX11	Daily Monitoring	EIAR Chapter 9 CEMP Section 5	Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work should immediately be stopped and a geotechnical assessment undertaken
MX12	Water Quality and Monitoring	CEMP Section 5	The following periodic inspection regime is likely to be proposed: › Daily general visual inspections by Environmental Manager; › Weekly (existing & new drains) inspections by the Environmental Manager and/or the site Construction Manager; › Inspection to include all elements of drainage systems and all monitoring. Inspections required to ensure that drainage systems are operating correctly and to identify any maintenance that is required. Any changes, such as discolouration, odour, oily sheen or litter should be noted and corrective action should be implemented. High risk locations such as settlement ponds will be inspected daily. Daily inspections checks will be completed on plant and equipment, and whether materials such as silt fencing or oil absorbent materials need replacement; › Event based inspections by the Environmental Manager as follows: › >10 mm/hr (*i.e.* high intensity localised rainfall event); › >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or, › Rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week).

Ref. No.	Reference Heading	Reference Location	Monitoring Measure
			› Monthly site inspections by the Project Hydrologist during construction phase; and, › Quarterly site inspections by the Project Hydrologist after construction for a period of one year following the construction phase. A written record will be maintained or available on-site of all construction phase monitoring undertaken.
MX13	Check Dams	EIAR Chapter 4 CEMP Section 4	Check dams will be inspected and maintained regularly to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.
MX14	Settlement Ponds	EIAR Chapter 4 CEMP Section 5	Settlement ponds will be inspected weekly and following rainfall events. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows. Inspection and maintenance of these of these structures during construction phase is critical to their functioning to stated purpose.
MX15	Culverts	EIAR Chapter 4 CEMP Section 4	All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance.
MX16	Drainage Management	EIAR Chapter 4 CEMP Section 4	The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the environmental manager or supervising hydrologist on-site. The environmental manager or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site.

Ref. No.	Reference Heading	Reference Location	Monitoring Measure
MX17	Plant and Equipment Inspections	EIAR Chapter 7 CEMP Section 4	The plant used should be regularly inspected for fuel leaks, unnecessary noise generation and general fitness for purpose.
MX18	Drainage Inspection	EIAR Chapter 9 CEMP Section 5	Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended. Inspections will also be undertaken after tree felling.
MX19	Water Quality Monitoring	EIAR Chapter 9 CEMP Section 5	During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs should be undertaken for each watercourse (*i.e. at sample points SW1, SW2 & SW3 used in this assessment*) and specifically following heavy rainfall events (*i.e.* weekly, monthly and event based). This will be completed in consultation with the Inland Fisheries Board.
MX20	Wheel wash effectiveness	CEMP Section 4	The effectiveness of the wheel wash will be monitored as part of road cleanliness inspections. The water will be replaced in the wheel wash enclosure as required.
MX21	Archaeological Monitoring	EIAR Chapter 13	Archaeological monitoring of ground works and metal detection of spoil will be carried out during the construction phase. The archaeological monitoring will be undertaken with the benefit of a licence from the Department of Arts, Heritage and Gaeltacht (DAHG). If archaeological features or finds re encountered during site works the archaeologist will report the findings to the relevant authorities to discuss a suitable means of preservation of the features (preservation by record or *in situ* may be required). A report on the monitoring will be submitted to the Local Authority and DAHG

Ref. No.	Reference Heading	Reference Location	Monitoring Measure
			Archaeological monitoring of ground works during construction will also be carried out at the following locations with a report on the results of the monitoring compiled and submitted to the relevant authorities on completion of the project: › If the works extend immediately adjacent to ringfort WM012-088 › Where the works extend past the ecclesiastical site at Abbeyland › Where the works extend past the church and graveyard WM006-061 and WM006-061001. Where the works extend past the NIAH/Protected Structures at Farranistick.
MX22	Archaeological Monitoring	EIAR Chapter 13	The remains of a 19th-20th century stone building are extant adjacent to the eastern end of the proposed link road. The building is not a Protected Structure or listed in the NIAH. It is proposed to carry out: › Pre-construction archaeological building survey of remains accompanied by measured drawings. › Archaeological monitoring of ground works in this area and removal of stone structure if necessary. A report on the monitoring should be compiled on completion of the work and submitted to the relevant authorities. Archaeological monitoring of ground works for proposed junction accommodation works. A report on the monitoring should be compiled and the results submitted to the relevant authorities.
MX23	Archaeological Monitoring	EIAR Chapter 13	Archaeological monitoring of ground works during construction where they extend past the church and graveyard at Mayne. A report on the results of the monitoring shall be compiled and submitted to the relevant authorities on completion of the project.
MX24	Archaeological Monitoring	EIAR Chapter 13	Archaeological monitoring of ground works during construction where they extend past the church and graveyard WM006-061 and WM006-061-001. A report on the results of the monitoring shall be compiled and submitted to the relevant authorities on completion of the project.

Ref. No.	Reference Heading	Reference Location	Monitoring Measure
MX25	Archaeological Monitoring	EIAR Chapter 13	Archaeological monitoring of ground works where the grid connection route extends past the Water mill (WM006-076) and Ecclesiastical site (WM006-059). A report on the results of the monitoring shall be compiled and submitted to the relevant authorities on completion of the project
MX26	Archaeological Monitoring	EIAR Chapter 13	Archaeological monitoring of ground works where the grid connection route extends past the recorded monuments WM012-088 - 090 (ringforts) will be required during construction. A report on the results of the monitoring shall be compiled and submitted to the relevant authorities on completion of the project.
MX27	Archaeological Monitoring	EIAR Chapter 13	Archaeological monitoring of ground works during construction where they extend past the NIAH/Protected Structures at Farranistick. A report on the results of the monitoring shall be compiled and submitted to the relevant authorities on completion of the project.
MX28	Archaeological Monitoring	EIAR Chapter 13	A bridge is denoted on the proposed route on the 2nd ed. OS map at Shrubbywood/Clonva townlands where the public road crosses the River Inny. Archaeological monitoring of ground works during construction where it extends past the bridge. A report on the results of the monitoring shall be compiled and submitted to the relevant authorities on completion of the project.
MX29	Dust Monitoring	EIAR Chapter 10	Dust monitoring will also take place during the construction phase, with dust jars been placed at the same monitoring locations and left in situ for 30 days at a time. It is proposed to carry out this monitoring on a quarterly basis. The dust monitoring locations around the Proposed Development site boundary will be selected with regard to the location of these nearest sensitive receptors
Operational Phase			
MX30	Vantage Point Surveys	EIAR Chapter 7 – Appendix 7-6	Vantage point surveys will be undertaken monthly between January and December during operational years 1, 2, 3, 5, 10 and 15 of the life-time of the wind farm. The methodology for vantage point watches will follow guidelines issued by the SNH (2009) and SNH (2017). The proposed vantage point watches will adhere to a minimum of 36 hours/VP per season as per guidelines issued by SNH. Monthly visits will be undertaken throughout the year.

Ref. No.	Reference Heading	Reference Location	Monitoring Measure
			During each visit, six-hour vantage point watches will be undertaken from each fixed vantage point location that offers an un-interrupted view of the study area .
MX31	Breeding Bird Walkover Surveys	EIAR Chapter 7 – Appendix 7-6	Survey methodology will be similar to methods employed for baseline EIAR surveys which will allow a comparison of data to be made for each monitoring year in years 1, 2, 3, 5, 10 and 15 of the life-time of the wind farm.
MX32	Collision Searches (Bird Casualties)	EIAR Chapter 7 – Appendix 7-6	It is proposed to undertake a minimum of one visit per month during each survey year in years 1, 2, 3, 5, 10 and 15 of the life-time of the wind farm. During each visit, searches will be undertaken at each operating turbine location by a team of two surveyors. A plot measuring 130m x 130m from the centre of each turbine location will be the subject of target searches for bird casualties. Searches will incorporate the use of transects spaced at 10m intervals apart with the observer covering 5m on either side for each transect. Locations and coordinates of transect routes will be confirmed using a portable GPS recording device. Recording sheets will be used to document bird carcasses encountered in the field.
MX33	Reporting	EIAR Chapter 7 – Appendix 7-5	A report summarising the findings of the bird monitoring surveys will be submitted to the Planning Authority at the end of each monitoring year.
MX34	Bats	EIAR Chapter 6	Ongoing monitoring of bat activity will be undertaken for at least three years' post construction of the wind farm. This will provide data and information on the actual recorded impact of the wind turbines on the local bat populations. Details of the proposed monitoring programme are provided in Appendix 6-2 of this EIAR
MX35	Drainage Inspection	EIAR Chapter 4, 9	Monitoring the effectiveness of drainage measures installed during the construction phase will continue to be monitored into the operational phase. Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.

Ref. No.	Reference Heading	Reference Location	Monitoring Measure
MX36	Water Quality and Monitoring	CEMP Section 5	During the operational phase field testing and laboratory analysis of a range of parameters will continue for six months after construction is complete.
MX37	Drainage Inspection	EIAR Chapter 9	Monitoring the effectiveness of drainage measures installed during the construction phase will continue to be monitored into the operational phase. Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.
MX38	Operational Phase Noise	EIAR Chapter 11	The following programme of measures would be implemented in the event of an issue of aerodynamic modulation being identified and associated with the site: › A detailed noise survey conducted by an appropriately qualified acoustic consultant will be commissioned in order to confirm the presence or not of the issue, the extent of the issue (i.e. number of locations, wind speeds and environmental conditions in which it is occurring); Based on the findings of this work and where aerodynamic modulation is identified a schedule of measures will be formulated and agreed with the planning authority, which would typically be envisaged to focus on control and regulation of the operation of turbine unit(s) in certain atmospheric and meteorological conditions.
Decommissioning Phase			
MX39	Decommissioning	DP Section 3	The Site Manager in consultation with the ECoW will be responsible for employing the services of a suitably qualified ecologist and any other suitably qualified professionals as required throughout the decommissioning works.
MX40	Decommissioning	DP Section 3	Prior to decommissioning, a suitably qualified ecologist will complete an invasive species survey of any material proposed for use as part of foundation backfilling.

10. PROGRAMME OF WORKS

10.1 Construction Schedule

It is estimated that the construction phase will take approximately between 12 – 18 months from starting on site to the commissioning of the electrical system. In the interest of breeding birds, removal of woody vegetation will be conducted outside of the general breeding bird season (1st of March to 31st of August).

Works during the construction phase of the development, including delivery of construction materials will be limited to avoid unsociable hours as per Section 8.5 (d) of the code of practice for BS 5228: Part 1: 1997. Construction operations shall generally be restricted to between 07:00 hours and 19:00 hours Monday to Saturday. However, to ensure that optimal use is made of good weather period or at critical periods within the programme it could occasionally be necessary to work out with these hours. It may also be necessary to commence turbine base concrete pours earlier due to time constraints incurred by the concrete curing process. Any such out of hours working would be agreed in advance with the local planning authority.

Work on Sundays or public holidays will only be conducted in exceptional circumstances or in an emergency. Additional emergency works may also be required outside of normal working hours as quoted above. This work, if required, will be agreed through notification and consultation with the affected parties as deemed necessary.

Delivery of abnormal loads such as turbine tower sections and blades will take place at night outside of peak traffic hours.

The anticipated phasing and scheduling main construction task items are outlined in Figure 10-1 below.

ID	Task Name	Task Description
1	Site Health & Safety	
2	Site Compound	Site Compound, Site Access, Fencing, Gates
3	Site Roads	Excavate/upgrade roads, Install drainage measures, Install culvert, Install water protection measures,Open borrow pits
4	Turbine Hardstands	Excavate base; Construct hardstanding areas
5	Turbine Foundations	Fix steel; Erect shuttering; Concrete pour
6	Substation Construction and Associated Electrical Works	Construct Substation; underground cabling between Turbines;
7	Grid Connection Construction	Underground duct laying; cable pulling; Mullingar substation works
8	Backfilling and Landscaping	
9	Bolts/Cans Delivery	
10	Turbine Delivery & Erection	
11	Substation Commissioning	
12	Turbine Commissioning	

Figure 10-1 Indicative Construction Schedule

11. COMPLIANCE AND REVIEW

11.1 Site Inspections and Environmental Audits

Routine inspections of construction activities will be carried out on a daily and weekly basis by the Site Environmental Manager and the Construction Manager to ensure all controls to prevent environmental impact, relevant to the construction activities taking place at the time, are in place.

Environmental inspections will ensure that the works are undertaken in compliance with this CEMP and any subsequent updates to this document. Environmental site inspections will be carried out by suitably trained staff.

11.2 Auditing

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

11.3 Environmental Compliance

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

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

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

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

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

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

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

11.4 Corrective Action Plan Procedure

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

- Environmental Audits;
- Environmental Inspections and Reviews;
- Environmental Monitoring;
- Environmental Incidents; and,
- Environmental Complaints.

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

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

11.5 Construction Phase Plan Review

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

APPENDIX 1

PROCEDURE FOR PUBLIC COMPLAINTS

Coole Wind Farm Limited

Coole Wind Farm Limited,
Building 4200,
Cork Airport Business Park,
Cork.
Tel: +353 (0)21 2427786

PROCEDURE FOR PUBLIC COMPLAINTS FOR OPERATIONAL WIND FARMS

Communicate

Coole Wind Farm Limited - Operations Management is committed to ensuring that all our communications and interactions with the general public will be simple in its message and easy to complete.

If a member of the general public wants to communicate about any aspect of an operating wind farm they can make contact through the following channels:

Telephone & Email

Contact the 'Operational Controller':

- *Tel:* TBA
- *E mail:* TBA

This number and e-mail will be monitored on a continuous basis and will be the primary points of contact for access control to the wind farm and communications for works and emergencies on the wind farm.

The 'Operational Controller' number will be posted on the information noticeboard which will be located at the entrance to the wind farm.

Contact the Operations Manager TBA:

- Tel: TBA
- E-mail: TBA

Contact the head office directly

- Tel: TBA
- Fax: TBA
- E-mail: TBA

or

Writing

Write to:
TBA
Group Operations Manager
Head office address TBA

Coole Wind Farm Limited

Coole Wind Farm Limited,
Building 4200,
Cork Airport Business Park,
Cork.
Tel: +353 (0)21 2427786

Listen

- Irrespective of the context of the communication, we will listen to what is being said and the message being conveyed with both understanding and empathy.
- We will record all aspects of the communication to allow us have a better understanding of the conveyed message.
- We will respond to all contacts in an organised and professional manner and treat all contact seriously.
- We will deal with all contacts quickly and politely and we will aim to learn from all feedback.

Respond

- If an issue is communicated in person or over the phone, we will try to resolve the issue there and then.
- If an issue is communicated by email or in writing we will endeavour to acknowledge the communication within 7 days and do everything we can to resolve it within 28 days.
- If this is not possible to resolve an issue within these timeframes, we will explain why and provide a plan for addressing the issues in the longer term.

APPENDIX 2

WATERCOURSE CROSSING METHODOLOGIES

Crossing No.	Type and size	Cover from road level to top of bridge/ culvert	Maximum depth of trench from road level under bridge /culvert	Description	Watercourse Crossing Assumed Option	Extent of In-stream Works
1	1500 x 3000mm high stone bridge	600mm	n/a (5100mm where directional drilling required)	The structure of the existing bridge may make it difficult to achieve adequate cover over the cable ducts. It is proposed to lay the cable ducts in a flatbed formation in a shallow trench in the deck of the bridge. Alternatively if the structure of the bridge deck cannot accommodate a trench of any depth, the cable ducts will be installed under the watercourse by means of directional drilling. Either option will ensure that no contact will be made with the watercourse during the works.	Option 3 or 5	None. No in-stream works required.
2	900mm Ø concrete pipe.	1100mm.	n/a	No in-stream works required at this culvert crossing. The culvert consists of a socketed concrete pipe over which the proposed cable duct will be laid. Therefore no contact will be made with the watercourse during the works.	Option 1	None. No in-stream works required.
3	18m long X 6m high concrete bridge	900mm	n/a (8500mm where directional drilling required)	The structure of the existing bridge may make it difficult to achieve adequate cover over the cable ducts. It is proposed to place the cables in a stainless steel ducts secured to the outside deck of the bridge. Alternatively, the cable ducts will be installed under the watercourse by means of directional drilling. Either option will ensure that no contact will be made with the watercourse during the works.	Option 4 or 5	None. No in-stream works required.
4	Pipe outlet not visible	1200mm. est.	n/a	No in-stream works required at this culvert crossing. It is assumed the culvert consists of a socketed concrete pipe over which the proposed cable duct will be laid.. Therefore, no contact will be made with the watercourse during the works.	Option 1	None. No in-stream works required.

Crossing No.	Type and size	Cover from road level to top of bridge/ culvert	Maximum depth of trench from road level under bridge /culvert	Description	Watercourse Crossing Assumed Option	Extent of In-stream Works
5	900mm Ø concrete pipe.	1200mm.	n/a	No in-stream works required at this culvert crossing. The culvert consists of a socketed concrete pipe over which the proposed cable duct will be laid. Therefore, no contact will be made with the watercourse during the works.	Option 1	None. No in-stream works required.
6	600mm Ø concrete pipe.	1800mm.	n/a	No in-stream works required at this culvert crossing. The culvert consists of a socketed concrete pipe over which the proposed cable duct will be laid. Therefore, no contact will be made with the watercourse during the works.	Option 1	None. No in-stream works required.
7	600mm Ø concrete pipe.	1300mm.	n/a	No in-stream works required at this culvert crossing. The culvert consists of a socketed concrete pipe over which the proposed cable duct will be laid. Therefore, no contact will be made with the watercourse during the works.	Option 1	None. No in-stream works required.
8	2 no. 300mm Ø concrete pipes.	1200mm.	n/a	No in-stream works required at this culvert crossing. The culvert consists of a socketed concrete pipe over which the proposed cable duct will be laid. Therefore, no contact will be made with the watercourse during the works.	Option 1	None. No in-stream works required.
9	600mm Ø concrete pipe.	800mm.	1900mm	No in-stream works required at this culvert crossing. The culvert consists of a socketed concrete pipe under which the proposed cable duct will be laid. Therefore, no contact will be made with the stream during the works.	Option 2	None. No in-stream works required.
10	80m long x 5m high	900mm	n/a	The structure of the existing bridge may make it difficult to achieve adequate cover over the cable ducts. It is proposed to lay the cable ducts in a flatbed formation in a shallow	Option 3, 4 or 5	None. No in-stream works required.

Crossing No.	Type and size	Cover from road level to top of bridge/ culvert	Maximum depth of trench from road level under bridge /culvert	Description	Watercourse Crossing Assumed Option	Extent of In-stream Works
	concrete bridge		(7500mm where directional drilling required)	trench in the deck of the bridge or else place the cables in a stainless steel duct secured to the outside deck of the bridge. Alternatively, if the structure of the bridge deck cannot accommodate either option above, the cable ducts will be installed under the watercourse by means of directional drilling. All options will ensure that no contact will be made with the watercourse during the works.		
11	600mm Ø concrete pipe.	1200mm.	n/a	No in-stream works required at this culvert crossing. The culvert consists of a socketed concrete pipe over which the proposed cable duct will be laid. Therefore, no contact will be made with the watercourse during the works.	Option 1	None. No in-stream works required.
12	500mm Ø concrete pipe.	1000mm.	n/a	No in-stream works required at this culvert crossing. The culvert consists of a socketed concrete pipe over which the proposed cable duct will be laid. Therefore, no contact will be made with the watercourse during the works.	Option 1	None. No in-stream works required.
13	1000mm Ø concrete pipe.	600mm	2100mm	No in-stream works required at this culvert crossing. The culvert consists of a socketed concrete pipe under which the proposed cable duct will be laid. Therefore, no contact will be made with the stream during the works.	Option 2	None. No in-stream works required.
14	3500 x 1200mm high concrete bridge	500mm	n/a	No in-stream works required at this culvert crossing. It is proposed to construct the ducts in a flatbed formation over the culvert. Therefore, no contact will be made with the stream during the works.	Option 3	None. No in-stream works required.

Crossing No.	Type and size	Cover from road level to top of bridge/ culvert	Maximum depth of trench from road level under bridge /culvert	Description	Watercourse Crossing Assumed Option	Extent of In-stream Works
15	1000mm Ø concrete pipe.	300-500mm est.	2000mm	No in-stream works required at this culvert crossing. The culvert consists of a socketed concrete pipe under which the proposed cable duct will be laid. Therefore, no contact will be made with the stream during the works.	Option 2	None. No in-stream works required.
16	3000 x 1500mm high stone bridge	300mm	3300mm	Due to the lack of cover over the existing stone bridge and its proximity to the railway level crossing, the cable will be installed under this culvert by means of directional drilling which will ensure that no contact will be made with the stream during the works.	Option 5	None. No in-stream works required.

APPENDIX 3

METHOD STATEMENT FOR LINK ROAD, JUNCTION ACCOMMODATION AND PUBLIC ROAD WORKS

METHOD STATEMENT FOR LINK ROAD, JUNCTION ACCOMMODATION AND PUBLIC ROAD WORKS

COOLE WIND FARM DEVELOPMENT, CO. WESTMEATH

1.1 Scope of the Works

Improvements and modifications to the existing public road network to facilitate turbine delivery will be required as part of the Proposed Development works. This will include construction of a link road between the R395 and R396 Regional Roads and junction improvement works, including providing hardsurfacing at eleven locations; along the public road corridor at: the N4 junction with the L1927 in the townland of Joanstown, clearing of existing verge and vegetation to the south east of the railway line level crossing on the L1927, hardsurfacing and widening of the L1927 and L5828 junction in the townland of Boherquill, clearing of existing verge and vegetation and hardsurfacing at the gentle right turn from the L5828 onto the R395; hardsurfacing including clearance of vegetation and road verge to provide access and egress at proposed link road; hardsurfacing including clearance of vegetation and road verge at site access points off the R396, and at four points contained within the proposed wind farm site at junctions along the L5755.

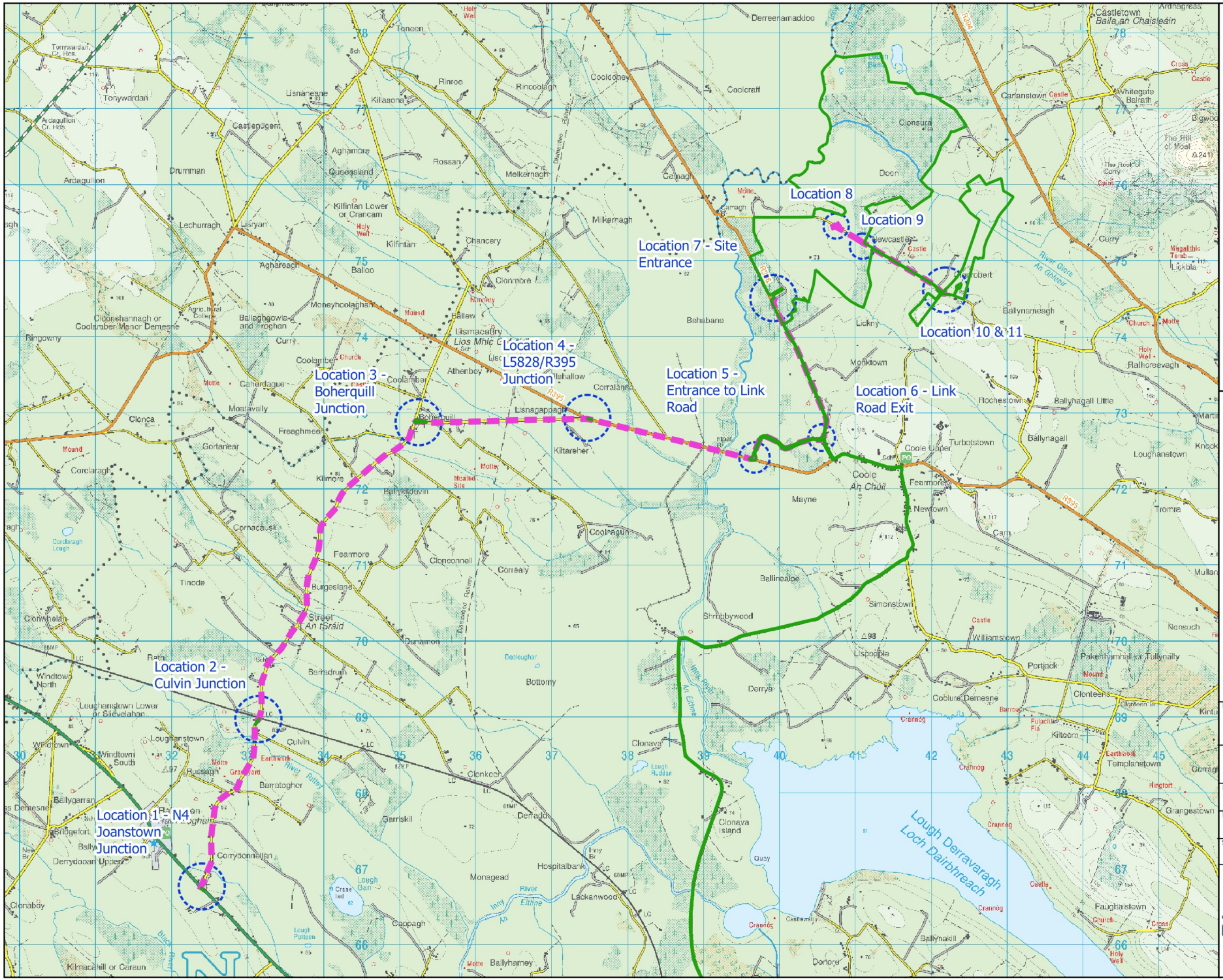
The proposed link road between the R395 and R396 measures approximately 1.2 kilometres in length with a running width of approximately 5m. The road will traverse areas of cutover peat and improved agricultural grassland.

Leaving the granular fill and final surface running layer in place within the link road will allow these to be used again in the future should it become necessary (i.e. at decommissioning stage for turbine removal, or in the unlikely event of having to swap out a blade component during the operational phase).

The minor junction improvement works will require clearing back the existing road verge and field vegetation at the junctions, and excavation of material to allow the placing of stone/hard surfacing within the proposed areas. A series of removable bollards and/or temporary fencing will be placed along the existing road edge in order to preserve the structure of the junctions outside of those periods when deliveries of turbine components are underway. Once deliveries are completed the areas and boundaries will be reinstated restoring the junctions to their original configurations except as stated otherwise.

1.2 Location

- The location of the works are outlined in Figure 1-1 below.



Map Legend

- EIAR Site Boundary
- Proposed Turbine Delivery Route
- Turbine Delivery Route Junction Works Locations

Drawing Title: Turbine Delivery Route Junction Works Locations

Project Title: Coole Wind Farm, Co. Westmeath

Drawn By	Checked By
EC	MW
Project No.	Drawing No.
200445	Figure 1-1
Scale	Date
1:65000	11.02.2021

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

1.3 Timeframe/Timescale

The construction phase of the entire wind farm will take approximately 12-18 months to complete from starting on site to the commissioning of the electrical system and export of electricity from site. The junction accommodation works will be completed in advance of the delivery of abnormal loads. The junction accommodation works at Boherquill will be complete over 4 - 5 days with the widening of the road verge at Joanstown taking 1-2 days to complete

1.4 Materials and Equipment

- 360º Excavator
- Roller
- Trucks (stone)
- Lighting tower
- 4" - 6" stone
- Cl 804 granular fill
- Geogrid
- Temporary fencing
- Permanent fencing materials
- Temporary bollards

1.5 Construction Methodology

- The works proposed at both locations will involve the same methodology and sequence of works. The existing soils and overburden at each location will be excavated and replace with granular fill material which will be finished to provide a suitable running surface. A traffic management plan for each location will be prepared in advance of the works
- The following provides a detail of the proposed works:
- On the implementation of the traffic management at each works locations, the area will be secured with temporary fencing to ensure the general public are prevented from coming in contact with the works
- The works at Joanstown will utilise 1 no. rigid truck and 1 no. 360º Excavator due to the size of the proposed works area. The Boherquill accommodation works will utilise 2-3 trucks due to the larger works area.
- The proposed accommodation works shall be to the line and level given in the design requirements with the construction carried out under the supervision of the design engineer.
- Peat and overburden will be excavated to bedrock, where practical or to a competent stratum as determined by the design engineer.
- The excavated overburden material from the accommodation works at Boherquill will be stockpiled for any future bank and verge reinstatement. The overburden from the Joanstown works will be exported off site to licenced facility.
- Well-graded granular fill 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 Construction Manager based on the characteristics of the material and the compaction plant to be used;
- A layer of geogrid/geotextile may be required at the surface of the competent stratum (to be confirmed by the designer) and at the top of each subsequent layer of granular fill.
- Geogrid will be hand rolled with no plant or equipment permitted to travel on the geogrid prior to the placement of the fill material

- A final unbound surface layer shall be placed on the, as per design requirements, to provide a road profile and graded to accommodate wind turbine construction and delivery traffic.
- The finished level of all accommodation works will be relative to the adjacent public road level
- All fill material will be compacted with the tracked excavator initially and finished with a vibrating roller.
- The junction accommodation works at Boherquill will be secured with temporary fencing to prevent public access upon completion and will only be accessible to vehicles delivering abnormally large loads. A permanent stockproof fence will be installed after all abnormal deliveries have taken place and a hedgerow will be planted outside the fencing
- The Joanstown works will not require fencing due to the scale of the area. The final arrangement will be agreed with the Westmeath County Council Roads Engineer

The construction methodology for the link road is summarised as follows:

- Overburden within the required areas for the accommodation works will be excavated and temporarily stockpiled adjacent to the works area, where possible, until a competent stratum is reached.
- A layer of geogrid/geotextile may be required at the surface of the competent stratum to provide further structural formation.
- The competent stratum will be overlain with granular fill.
- A final surface running layer will be placed over the granular fill to provide a suitable surface to accommodate the turbine delivery/abnormal load vehicles.
- The accommodation works when not in use during the construction phase will be cordoned off from the public road, using bollards/fencing as required.
- Upon completion of the turbine delivery phase of the proposed wind farm the granular fill and final surface running layer will be left in situ, within the works areas.
- A barrier/ gate will be put in place at the entrance to the link road and a gate will be installed at the exit. An existing stone wall at the exit will be reinstated either side of the gate.
- Gates/barriers will be left in situ post construction to prevent access.

1.6 Environmental Considerations

- The following measures are proposed to minimise any environmental or ecological impacts:
- The excavations at the two locations will be undertaken during a period of dry weather conditions to prevent any potential run-off the from the works areas.
- Measures will be installed to prevent surface water run discharging to the public. Measures which include suitable cambers and collector channels which will be considered during the detailed design.
- Re-fuelling will be carried out at designated locations with spill kits contained in all plant and equipment.
- If increased dust levels are encountered during the accommodation works, dust suppression will take place using water

1.7 Health and Safety Considerations

The appointed contractor will carry out a risk assessment which identifies the hazards which will be encountered during the works and the most appropriate techniques to manage the risk as well as

training requirements. General site arrangements and emergency contacts are outlined in the following section which will be further populated prior to the commencement of works.

1.7.1 Personal Protective Equipment

The following is a list of the Personal Protective Equipment (PPE) required for each operative undertaking the described works.

No.	Item
1	Hard Hat (Worn at all times)
2	Hi-Visibility Jacket/Vest (Worn at all times)
3	Steel Toe Cap Boots (Worn at all times)
4	Gloves (Worn when required)
5	Eye Protection (Worn when required)
6	Ear Protection (Worn when required)
7	Additional PPE (as required)

1.7.2 Emergency Arrangements

In the case of an emergency, all operatives are to follow the emergency procedures as detailed in the site induction for Fire, Injury or Bog slide. General arrangements are;

- Assess/Attend to casualty if one is present
- Raise the alarm and call 999/112
- Alert the other site personnel as to the emergency
- Locate at the site assembly point and do not return to work until instructed that it is safe to do so
- Substation construction assembly point located at the site entrance gate

First Aid

The appointed contractor will provide details on the location of First Aid kits at site induction

Emergency Contacts

No.	Item
1	Emergency Numbers – 999/112
2	Doctor – Coole Surgery 044 9661104
3	Hospital - Midlands Regional Hospital, Mullingar– 066 718 4000
4	Multyfarnham Garda Station – 044 9371112
5	TBC – Project Manager – TBC
6	TBC – Safety Officer – TBC

No.	Item
7	TBC – Site Engineer – TBC

APPENDIX 4

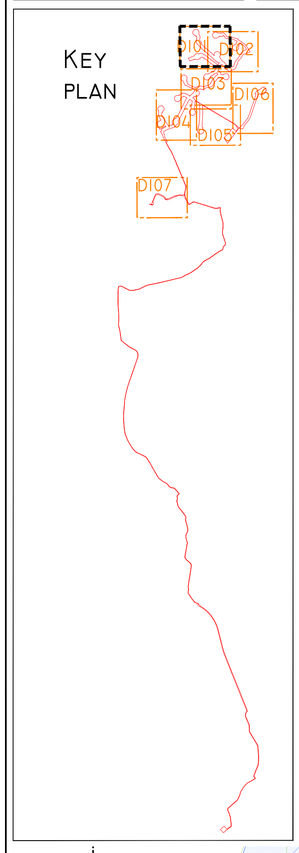
SITE DRAINAGE PLAN

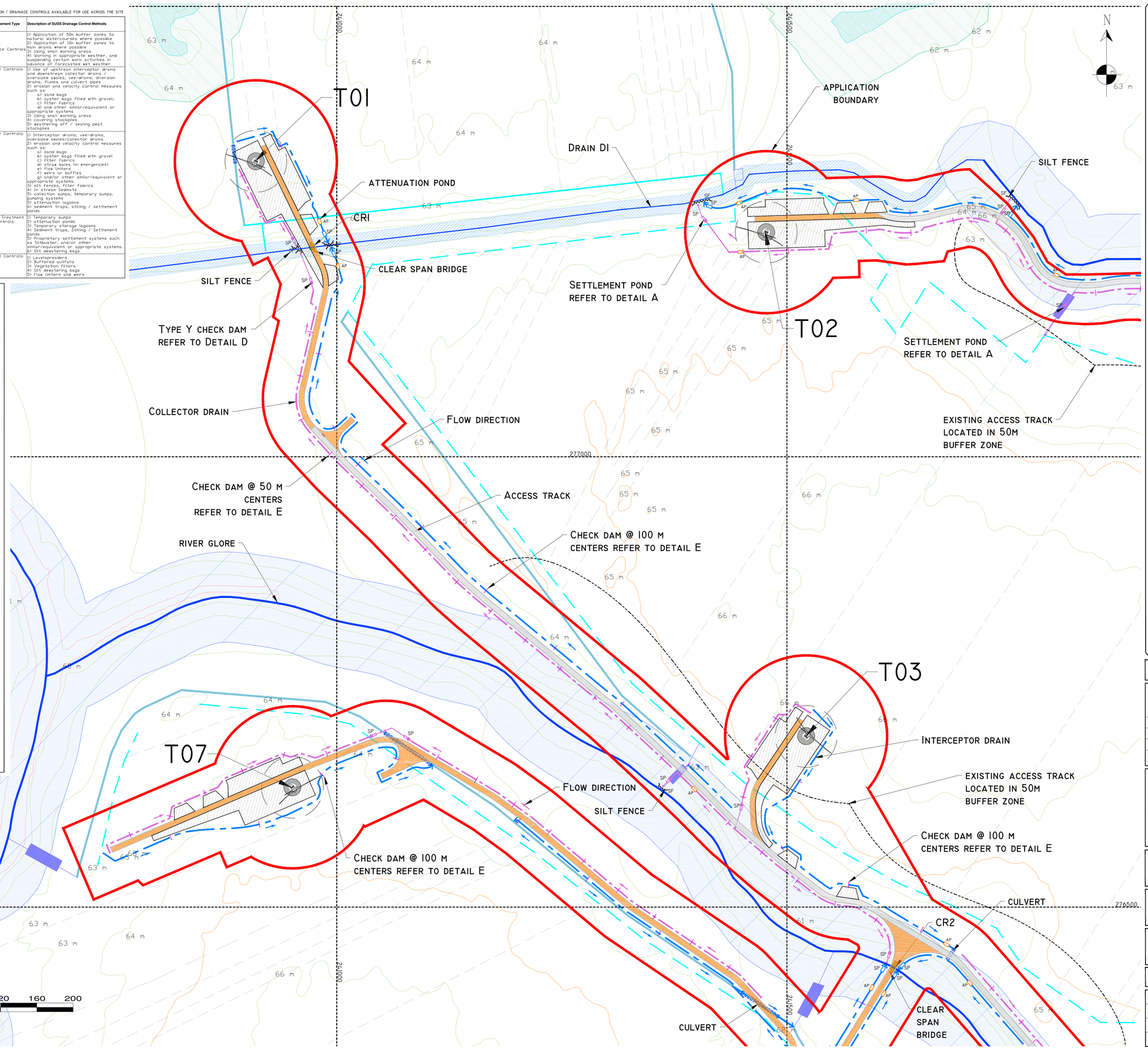
Drainage Design Notes

1. All drainage subject to micro-siting and optimisation on site.
2. The locations of the interceptor drains, check dams, culverts, swales, stilling ponds and level spreaders are shown as indicative, and may be changed to suit the requirements of the local topography.
3. Supervising hydrologist or environmental clerk of works (environmental scientist) to oversee installation of drainage features following detailed drainage design.
4. Drainage measures to be installed prior to, or at the same time as the works areas they are intended to drain.
5. Design elevation of the water surface along the route of the interceptor drains or swales will not be lower then the design elevation of the water surface in the outlet at the level spreader or stilling pond.
6. The spacing and frequency of the check dams will be dependant on the gradient of the interceptor drain or swale in which they are being installed.
7. Check dam designs to be selected best to suit particular topography and hydrological environment.
8. Down gradient slope below level spreader onto which the water will dissipate to have a grade less the 6%.
9. No direct discharge or pumping to watercourses will be permitted. All discharges from level spreaders or stilling ponds to be via vegetated filters. Selection or suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions.
10. Stilling ponds to be sized according to the area they will be receiving water from.
11. Diversion of drainage ditches will only take place when alternative drainage ditch has been installed to handle the same water.
12. Existing drains/ditches to be incorporated or removed during wind farm construction.
13. All drainage system features to be subject of inspection and maintenance plan.
14. The layout shown is slightly offset for scale purposes, and all drainage would be installed as close to the road as possible, and within the planning boundary for the development.

Mitigation / Drainage Cointrols Available for Use Across the Site

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls:	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel; c) filter fabrics d) and other similar/equivalent or appropriate systems 3) Using small working areas 4) covering stockpiles 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) straw bales (in emergencies) e) flow inters f) weirs or baffles g) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow inters and weirs





Drawing Legend :

- Upstream Interceptor Ditches
- Direction of Flow
- Downstream Collector Ditches
- Settlement Pond (SP)
- Attenuation Pond (AP)
- culvert
- silt fence (SF)
- headland drain
- field drain
- CR - new stream/river crossing location
- clear span bridge
- existing settlement pond

Proposed Drainage

- application boundary
- Existing ground surface majour contour (5 m interval)
- Existing ground surface minor contour (1 m interval)
- rivers/streams
- Lakes
- natural rivers/streams 50m buffer
- drain 10m buffer
- Lake 50m buffer
- turbine and swept area
- turbine foundation
- regional road
- local road
- proposed road
- existing road to be upgraded
- passing bay
- crane platform
- borrow pit

Project Design Drawing Notes

1. Drawings issued are for planning application purposes only.
2. Drawings not to be used for construction /contract conditions.
3. Copyright, all rights reserved. No part here with may be copied or reproduced partially or wholly in any form whatsoever without the prior notice of the copyright owner Hydro-Environmental Services.
4. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
5. All contractors, weather main or sub-contractors, must visit the site and are responsible for taking and checking any and all dimensions and levels that relate to the works.
6. The use of or reliance upon this drawing shall be deemed to be acceptance of these conditions of use unless otherwise agreed in writing, such written agreement to be sought from and issued by the copyright holder to the use or reliance upon this drawing.
7. Layout plans show typical Turbine rotor diameter as per turbine drawing.

Date	Description	Chkd	Signed
Revisions			

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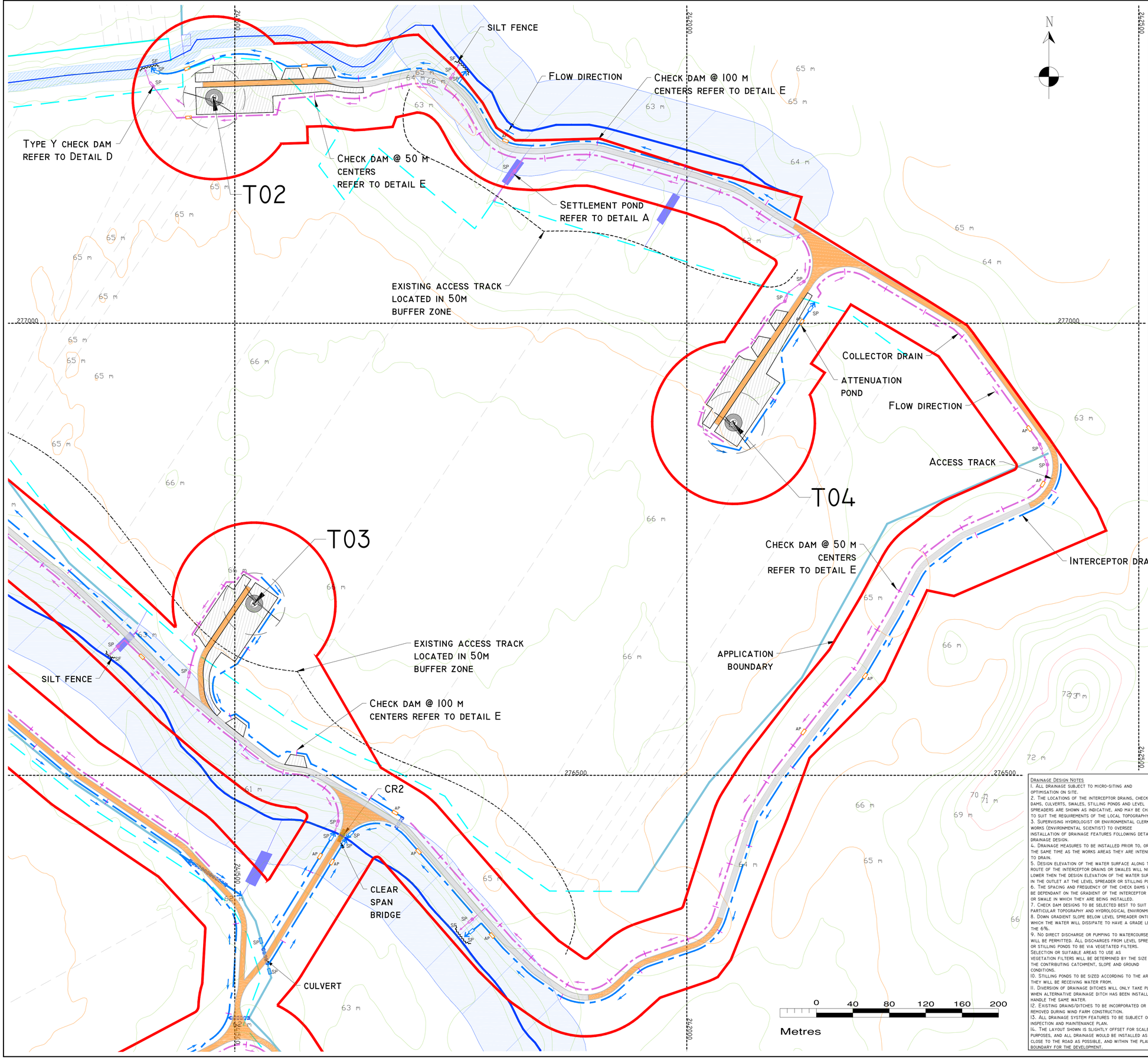
Client: MKO

Job: Coole WF, Co. Westmeath

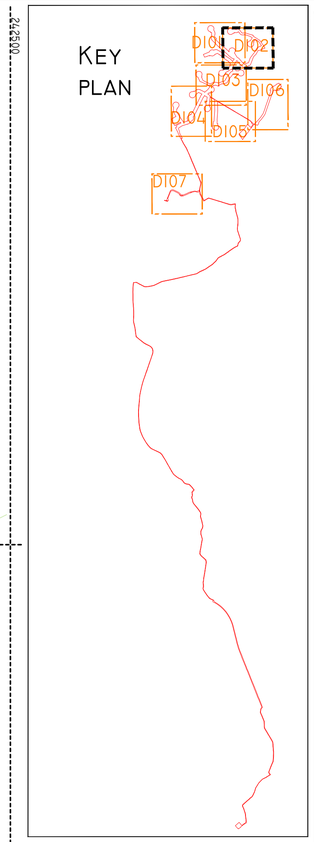
Title: Drainage Layout Sheet 1 of 7

Figure No: D101

Drawing No: P1320-2-0221-A1-D101-00A	
Sheet Size: A1	Project No.: P1320-2
Scale: 1:2,000 (A1)	Drawn By: MG/GD
Date: 17/02/2021	Checked By: MG



KEY PLAN



DRAWING LEGEND :

PROPOSED DRAINAGE

- UPSTREAM INTERCEPTOR DITCHES
- DIRECTION OF FLOW
- DOWNSTREAM COLLECTOR DITCHES
- SETTLEMENT POND (SP)
- ATTENUATION POND (AP)
- CULVERT
- SILT FENCE (SF)
- HEADLAND DRAIN
- FIELD DRAIN
- CR - NEW STREAM/RIVER CROSSING LOCATION
- CLEAR SPAN BRIDGE
- EXISTING SETTLEMENT POND

- APPLICATION BOUNDARY
- EXISTING GROUND SURFACE MAJOUR CONTOUR (5 M INTERVAL)
- EXISTING GROUND SURFACE MINOR CONTOUR (1 M INTERVAL)
- RIVERS/STREAMS
- LAKES
- NATURAL RIVERS/STREAMS 50M BUFFER
- DRAIN 10M BUFFER
- LAKE 50M BUFFER
- TURBINE AND SWEPT AREA
- TURBINE FOUNDATION
- REGIONAL ROAD
- LOCAL ROAD
- PROPOSED ROAD
- EXISTING ROAD TO BE UPGRADED
- PASSING BAY
- CRANE PLATFORM
- BORROW PIT

PROJECT DESIGN DRAWING NOTES

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2. DRAWINGS NOT TO BE USED FOR CONSTRUCTION /CONTRACT CONDITIONS.
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6. THE USE OF OR RELIANCE UPON THIS DRAWING SHALL BE DEEMED TO BE ACCEPTANCE OF THESE CONDITIONS OF USE UNLESS OTHERWISE AGREED IN WRITING, SUCH WRITTEN AGREEMENT TO BE SOUGHT FROM AND ISSUED BY THE COPYRIGHT HOLDER TO THE USE OR RELIANCE UPON THIS DRAWING.
7. LAYOUT PLANS SHOW TYPICAL TURBINE ROTOR DIAMETER AS PER TURBINE DRAWING.

Date	Description	Chkd	Signed

Revisions

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Client: MKO

Job: COOLE WF, CO. WESTMEATH

Title: DRAINAGE LAYOUT SHEET 2 OF 7

Figure No: D102

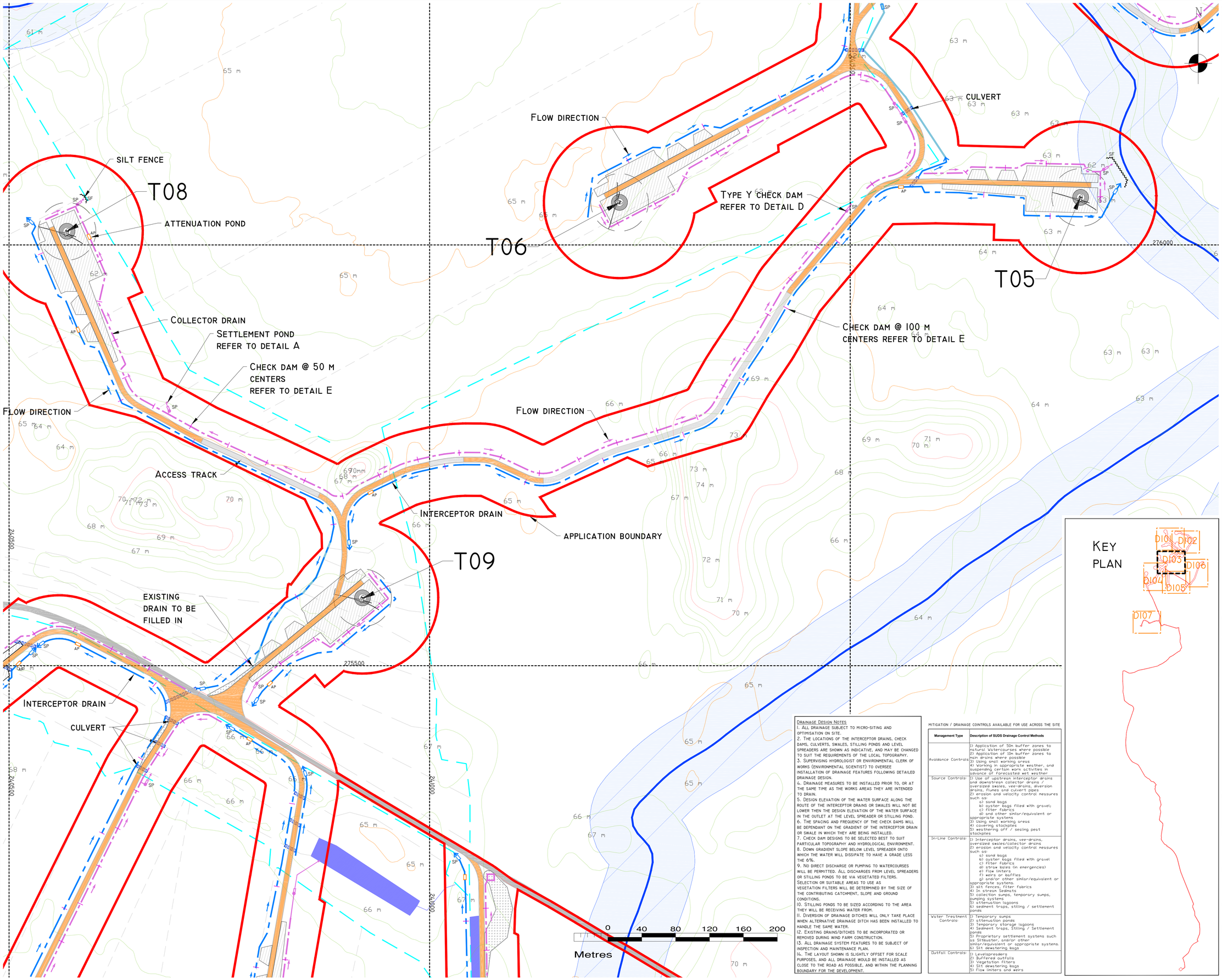
Drawing No: P1320-2-0221-A1-D102-00A	
Sheet Size: A1	Project No.: P1320-2
Scale: 1:2,000 (A1)	Drawn By: MG/GD
Date: 17/02/2021	Checked By: MG

DRAINAGE DESIGN NOTES

1. ALL DRAINAGE SUBJECT TO MICRO-SITING AND OPTIMISATION ON SITE.
2. THE LOCATIONS OF THE INTERCEPTOR DRAINS, CHECK DAMS, CULVERTS, SWALES, STILLING PONDS AND LEVEL SPREADERS ARE SHOWN AS INDICATIVE, AND MAY BE CHANGED TO SUIT THE REQUIREMENTS OF THE LOCAL TOPOGRAPHY.
3. SUPERVISING HYDROLOGIST OR ENVIRONMENTAL CLERK OF WORKS (ENVIRONMENTAL SCIENTIST) TO OVERSEE INSTALLATION OF DRAINAGE FEATURES FOLLOWING DETAILED DRAINAGE DESIGN.
4. DRAINAGE MEASURES TO BE INSTALLED PRIOR TO, OR AT THE SAME TIME AS THE WORKS AREAS THEY ARE INTENDED TO DRAIN.
5. DESIGN ELEVATION OF THE WATER SURFACE ALONG THE ROUTE OF THE INTERCEPTOR DRAINS OR SWALES WILL NOT BE LOWER THEN THE DESIGN ELEVATION OF THE WATER SURFACE IN THE OUTLET AT THE LEVEL SPREADER OR STILLING POND.
6. THE SPACING AND FREQUENCY OF THE CHECK DAMS WILL BE DEPENDANT ON THE GRADIENT OF THE INTERCEPTOR DRAIN OR SWALE IN WHICH THEY ARE BEING INSTALLED.
7. CHECK DAM DESIGNS TO BE SELECTED BEST TO SUIT PARTICULAR TOPOGRAPHY AND HYDROLOGICAL ENVIRONMENT.
8. DOWN GRADIENT SLOPE BELOW LEVEL SPREADER ONTO WHICH THE WATER WILL DISSIPATE TO HAVE A GRADE LESS THE 6%.
9. NO DIRECT DISCHARGE OR PUMPING TO WATERCOURSES WILL BE PERMITTED. ALL DISCHARGES FROM LEVEL SPREADERS OR STILLING PONDS TO BE VIA VEGETATED FILTERS. SELECTION OR SUITABLE AREAS TO USE AS VEGETATION FILTERS WILL BE DETERMINED BY THE SIZE OF THE CONTRIBUTING CATCHMENT, SLOPE AND GROUND CONDITIONS.
10. STILLING PONDS TO BE SIZED ACCORDING TO THE AREA THEY WILL BE RECEIVING WATER FROM.
11. DIVERSION OF DRAINAGE DITCHES WILL ONLY TAKE PLACE WHEN ALTERNATIVE DRAINAGE DITCH HAS BEEN INSTALLED TO HANDLE THE SAME WATER.
12. EXISTING DRAINS/DITCHES TO BE INCORPORATED OR REMOVED DURING WIND FARM CONSTRUCTION.
13. ALL DRAINAGE SYSTEM FEATURES TO BE SUBJECT OF INSPECTION AND MAINTENANCE PLAN.
14. THE LAYOUT SHOWN IS SLIGHTLY OFFSET FOR SCALE PURPOSES, AND ALL DRAINAGE WOLD BE INSTALLED AS CLOSE TO THE ROAD AS POSSIBLE, AND WITHIN THE PLANNING BOUNDARY FOR THE DEVELOPMENT.

MITIGATION / DRAINAGE CONTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls:	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes. 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) and other similar/equivalent or appropriate systems 3) Using small working areas 4) covering stockpiles 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) straw bales (in emergencies) e) flow limiters f) weirs or baffles g) and/or other similar/equivalent or appropriate systems 3) silt fences, filter fabrics 4) In stream Sedmats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs



Drawing Legend :

- Upstream Interceptor Ditches
- Direction of Flow
- Downstream Collector Ditches
- Settlement Pond (SP)
- Attenuation Pond (AP)
- culvert
- silt fence (SF)
- headland drain
- field drain
- CR - new stream/river crossing location
- clear span bridge
- existing settlement pond

Proposed Drainage

- application boundary
- Existing ground surface majour contour (5 m interval)
- Existing ground surface minor contour (1 m interval)
- rivers/streams
- Lakes
- natural rivers/streams 50m buffer
- drain 10m buffer
- Lake 50m buffer
- turbine and swept area
- turbine foundation
- regional road
- local road
- proposed road
- existing road to be upgraded
- passing bay
- crane platform
- borrow pit

Project Design Drawing Notes

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4. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
5. All contractors, weather main or sub-contractors, must visit the site and are responsible for taking and checking any and all dimensions and levels that relate to the works.
6. The use of or reliance upon this drawing shall be deemed to be acceptance of these conditions of use unless otherwise agreed in writing, such written agreement to be sought from and issued by the copyright holder to the use or reliance upon this drawing.
7. Layout plans show typical Turbine rotor diameter as per turbine drawing.

Drainage Design Notes

1. All drainage subject to micro-siting and optimisation on site.
2. The locations of the interceptor drains, check dams, culverts, swales, stilling ponds and level spreaders are shown as indicative, and may be changed to suit the requirements of the local topography.
3. Supervising hydrologist or environmental clerk of works (environmental scientist) to oversee installation of drainage features following detailed drainage design.
4. Drainage measures to be installed prior to, or at the same time as the works areas they are intended to drain.
5. Design elevation of the water surface along the route of the interceptor drains or swales will not be lower then the design elevation of the water surface in the outlet at the level spreader or stilling pond.
6. The spacing and frequency of the check dams will be dependant on the gradient of the interceptor drain or swale in which they are being installed.
7. Check dam designs to be selected best to suit particular topography and hydrological environment.
8. Down gradient slope below level spreader onto which the water will dissipate to have a grade less the 6%.
9. No direct discharge or pumping to watercourses will be permitted. All discharges from level spreaders or stilling ponds to be via vegetated filters. Selection or suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions.
10. Stilling ponds to be sized according to the area they will be receiving water from.
11. Diversion of drainage ditches will only take place when alternative drainage ditch has been installed to handle the same water.
12. Existing drains/ditches to be incorporated or removed during wind farm construction.
13. All drainage system features to be subject of inspection and maintenance plan.
14. The layout shown is slightly offset for scale purposes, and all drainage would be installed as close to the road as possible, and within the planning boundary for the development.

Mitigation / Drainage Cointrols available for use across the site

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls:	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel; c) filter fabrics d) and other similar/equivalent or appropriate systems. 3) Using small working areas 4) covering stockpiles 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) straw bales (in emergencies) e) flow imters f) weirs or baffles g) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow imters and weirs

Key Plan

Date	Description	Chkd	Signed
Revisions			

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Client: MKO

Job: Coole WF, Co. Westmeath

Title: Drainage Layout Sheet 3 of 7

Figure No: DI03

Drawing No: P1320-2-0221-A1-D103-00A	
Sheet Size: A1	Project No.: P1320-2
Scale: 1:2,000 (A1)	Drawn By: MG/GD
Date: 17/02/2021	Checked By: MG

Drainage Design Notes

1. All drainage subject to micro-siting and optimisation on site.
2. The locations of the interceptor drains, check dams, culverts, swales, stilling ponds and level spreaders are shown as indicative, and may be changed to suit the requirements of the local topography.
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5. Design elevation of the water surface along the route of the interceptor drains or swales will not be lower then the design elevation of the water surface in the outlet at the level spreader or stilling pond.
6. The spacing and frequency of the check dams will be dependant on the gradient of the interceptor drain or swale in which they are being installed.
7. Check dam designs to be selected best to suit particular topography and hydrological environment.
8. Down gradient slope below level spreader onto which the water will dissipate to have a grade less the 6%.
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Mitigation / Drainage Cointrols available for use across the site

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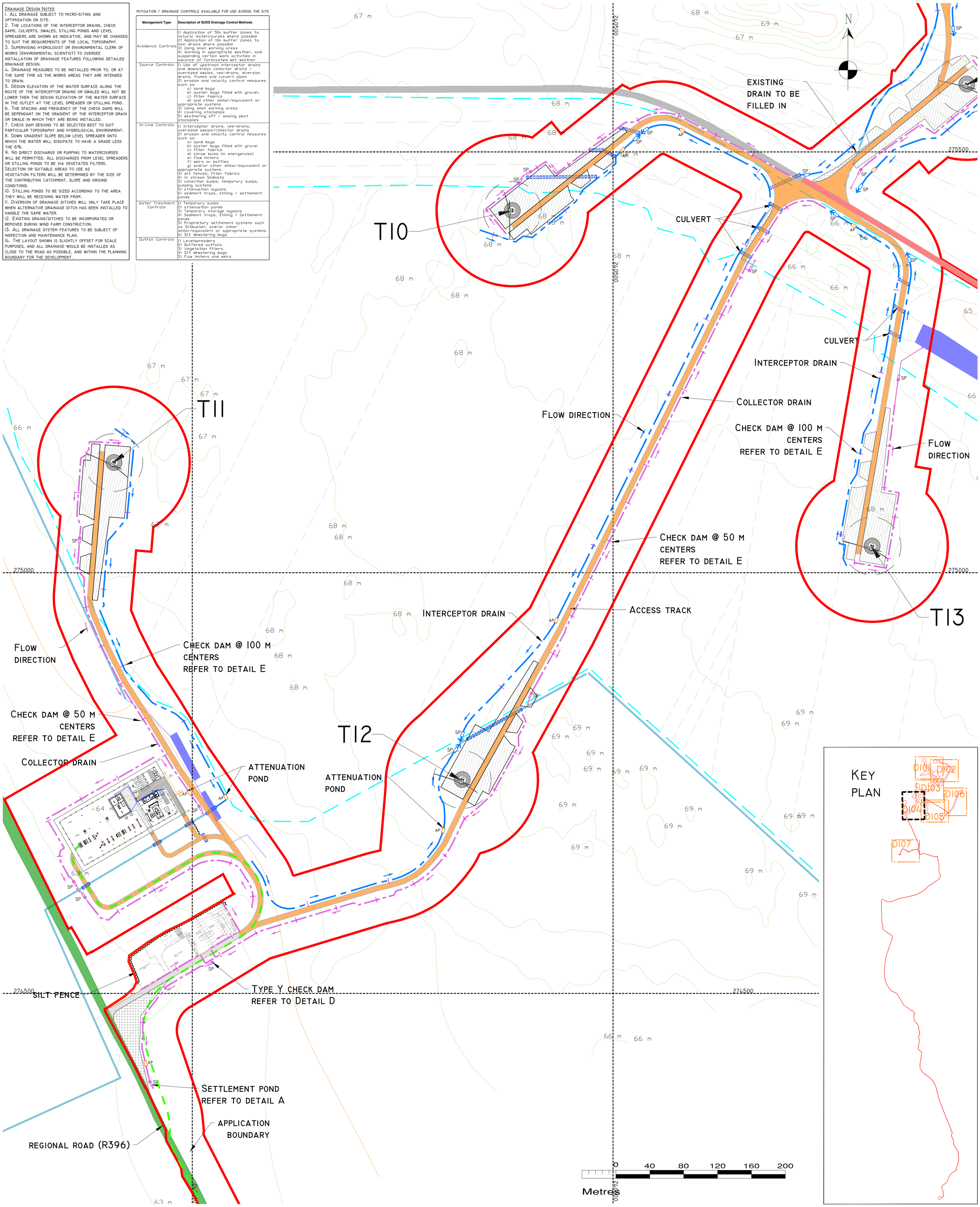
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs



Drawing Legend :

Proposed Drainage
- Upstream Interceptor Ditches
- Direction of Flow
- Downstream Collector Ditches
- Settlement Pond (SP)
- Attenuation Pond (AP)
- Culvert
- Silt Fence (SF)
- Headland Drain
- Field Drain
- CR - New Stream/River Crossing Location
- Clear Span Bridge
- Existing Settlement Pond

- Application Boundary
- Existing ground surface majour contour (5 m interval)
- Existing ground surface minor contour (1 m interval)
- Rivers/Streams
- Lakes
- Natural Rivers/Streams 50m buffer
- Drain 10m buffer
- Lake 50m buffer
- Turbine and swept area
- Turbine foundation

- Regional Road
- Local Road
- Proposed Road
- Internal existing road to be upgraded
- External existing road to be upgraded
- Passing Bay
- Crane Platform
- Borrow Pit

Drawing Notes

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4. All dimensions are in metres.

Date	Description	Chkd	Signed

Revisions

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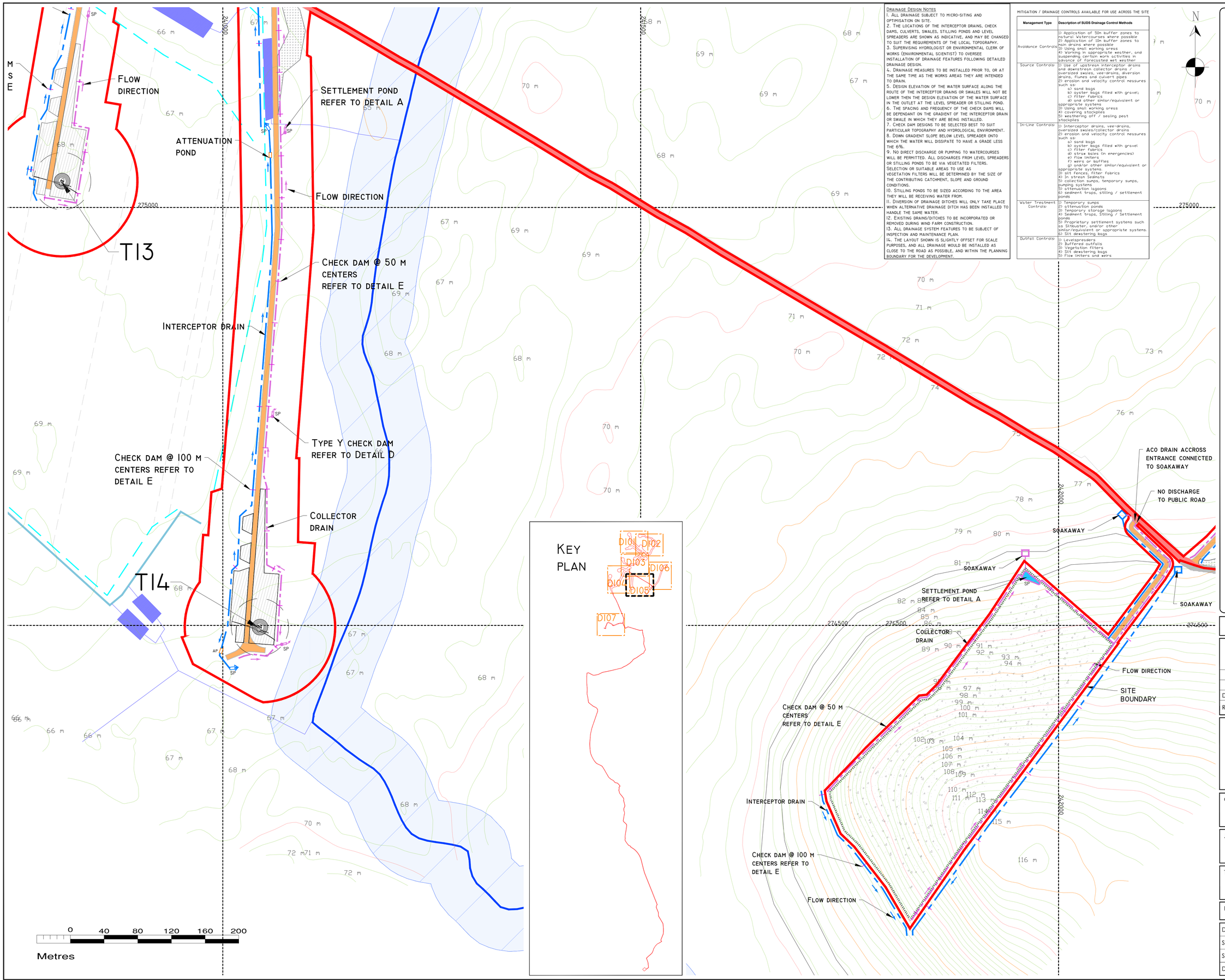
Client: MKO

Job: Coole WF, Co. Westmeath

Title: Drainage Layout Sheet 4 of 7

Figure No: D104

Drawing No: P1320-2-0221-A1-D104-00A	
Sheet Size: A1	Project No.: P1320-2
Scale: 1:2,000 (A1)	Drawn By: MG/GD
Date: 17/02/2021	Checked By: MG



Drainage Design Notes

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Mitigation / Drainage Cointrols available for use across the site

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls:	1) Application of 50m buffer zones to natural watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
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Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs

Drawing Legend :

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- Direction of Flow
- Downstream Collector Ditches
- Settlement Pond (SP)
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- Culvert
- Silt Fence (SF)
- Headland Drain
- Field Drain
- CR - New Stream/River Crossing Location
- Clear Span Bridge
- Existing Settlement Pond

Proposed Drainage

- Application Boundary
- Existing Ground Surface Majour Contour (5 m Interval)
- Existing Ground Surface Minor Contour (1 m Interval)
- Rivers/Streams
- Lakes
- Natural Rivers/Streams 50m Buffer
- Drain 10m Buffer
- Lake 50m Buffer
- Turbine and Swept Area
- Turbine Foundation
- Regional Road
- Local Road
- Proposed Road
- Internal Existing Road to be Upgraded
- External Existing Road to be Upgraded
- Passing Bay
- Crane Platform
- Borrow Pit

Project Design Drawing Notes

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7. Layout plans show typical Turbine rotor diameter as per turbine drawing.

Date	Description	Chkd	Signed

Revisions

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Client: MKO

Job: Coole WF, Co. Westmeath

Title: Drainage Layout Sheet 5 of 7

Figure No: DI05

Drawing No: P1320-2-0221-A1-D105-00A	
Sheet Size: A1	Project No.: P1320-2
Scale: 1:2,000 (A1)	Drawn By: MG/GD
Date: 17/02/2021	Checked By: MG

Drainage Design Notes

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Mitigation / drainage cointrols available for use across the site

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Avoidance Controls:	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
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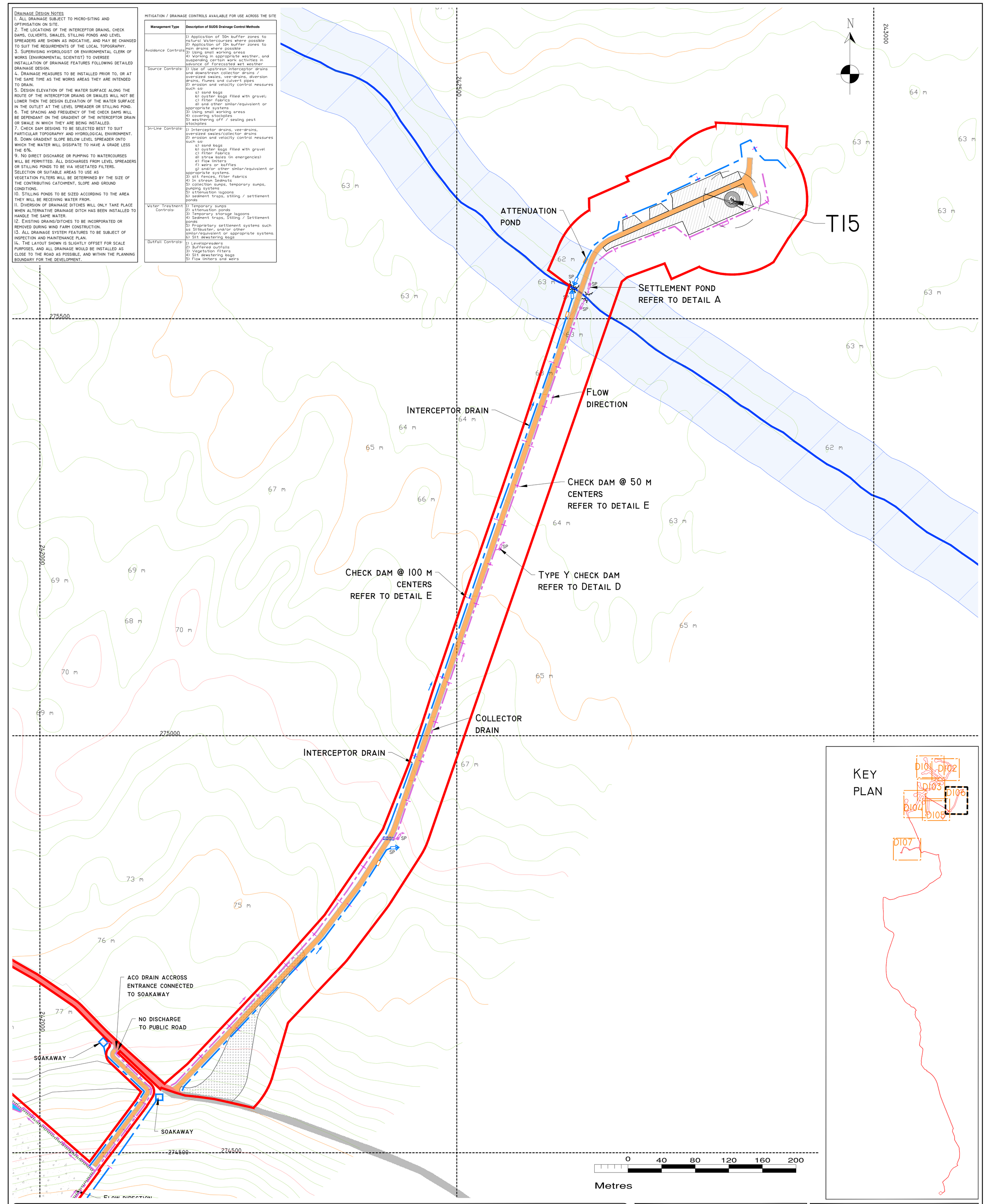
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) straw bales (in emergencies) e) flow limiters f) weirs or baffles g) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sediments 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs



Key plan

0 40 80 120 160 200

Metres

Drawing Legend :

- Upstream Interceptor Ditches
- Direction of Flow
- Downstream Collector Ditches
- Settlement Pond (SP)
- Attenuation Pond (AP)
- culvert
- silt fence (SF)
- headland drain
- field drain
- CR - new stream/river crossing location
- clear span bridge
- existing settlement pond

Proposed Drainage

- application boundary
- Existing ground surface majour contour (5 m interval)
- Existing ground surface minor contour (1 m interval)
- rivers/streams
- Lakes
- natural rivers/streams 50m buffer
- drain 10m buffer
- Lake 50m buffer
- turbine and swept area
- turbine foundation
- regional road
- local road
- proposed road
- internal existing road to be upgraded
- external existing road to be upgraded
- passing bay
- crane platform
- borrow pit

Drawing Notes

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4. All dimensions are in metres.

Date	Description	Chkd	Signed

Revisions

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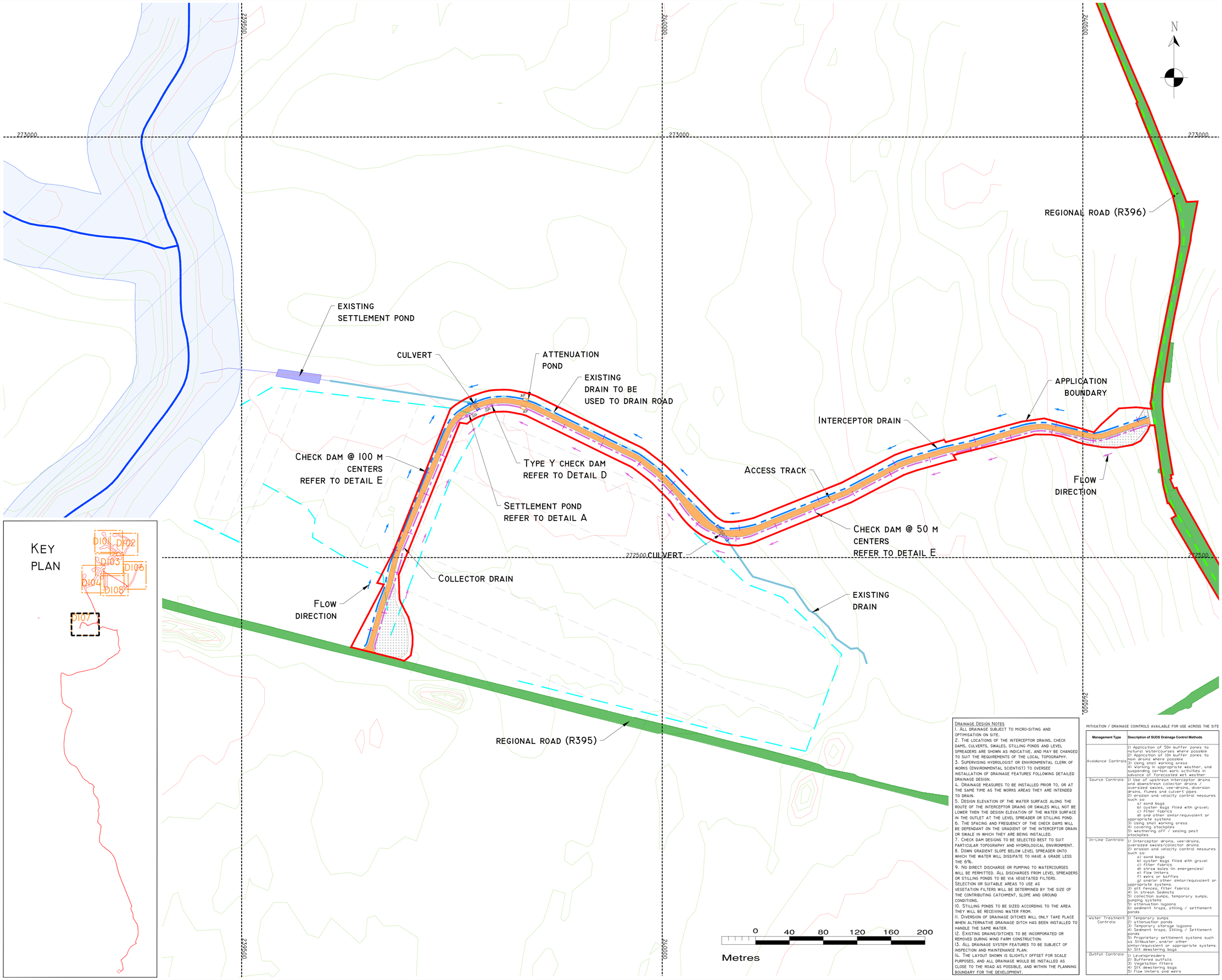
Client: MKO

Job: Coole WF, Co. Westmeath

Title: Drainage Layout Sheet 6 of 7

Figure No: D106

Drawing No: P1320-2-0221-A1-D106-00A	
Sheet Size: A1	Project No.: P1320-2
Scale: 1:2,000 (A1)	Drawn By: MG/GD
Date: 17/02/2021	Checked By: MG



KEY PLAN

DRAWING LEGEND :

PROPOSED DRAINAGE
- UPSTREAM INTERCEPTOR DITCHES
- DIRECTION OF FLOW
- DOWNSTREAM COLLECTOR DITCHES
- SETTLEMENT POND (SP)
- ATTENUATION POND (AP)
- CULVERT
- SILT FENCE (SF)
- HEADLAND DRAIN
- FIELD DRAIN
- CR - NEW STREAM/RIVER CROSSING LOCATION
- CLEAR SPAN BRIDGE
- EXISTING SETTLEMENT POND

- APPLICATION BOUNDARY
- EXISTING GROUND SURFACE MAJOUR CONTOUR (5 M INTERVAL)
- EXISTING GROUND SURFACE MINOR CONTOUR (1 M INTERVAL)
- RIVERS/STREAMS
- LAKES
- NATURAL RIVERS/STREAMS 50M BUFFER
- DRAIN 10M BUFFER
- LAKE 50M BUFFER
- TURBINE AND SWEPT AREA
- TURBINE FOUNDATION
- REGIONAL ROAD
- LOCAL ROAD
- PROPOSED ROAD
- INTERNAL EXISTING ROAD TO BE UPGRADED
- EXTERNAL EXISTING ROAD TO BE UPGRADED
- PASSING BAY
- CRANE PLATFORM
- BORROW PIT

PROJECT DESIGN DRAWING NOTES

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7. LAYOUT PLANS SHOW TYPICAL TURBINE ROTOR DIAMETER AS PER TURBINE DRAWING.

Date	Description	Chkd	Signed

Revisions

DRAINAGE DESIGN NOTES

1. ALL DRAINAGE SUBJECT TO MICRO-SITING AND OPTIMISATION ON SITE.
2. THE LOCATIONS OF THE INTERCEPTOR DRAINS, CHECK DAMS, CULVERTS, SWALES, STILLING PONDS AND LEVEL SPREADERS ARE SHOWN AS INDICATIVE, AND MAY BE CHANGED TO SUIT THE REQUIREMENTS OF THE LOCAL TOPOGRAPHY.
3. SUPERVISING HYDROLOGIST OR ENVIRONMENTAL CLERK OF WORKS (ENVIRONMENTAL SCIENTIST) TO OVERSEE INSTALLATION OF DRAINAGE FEATURES FOLLOWING DETAILED DRAINAGE DESIGN.
4. DRAINAGE MEASURES TO BE INSTALLED PRIOR TO, OR AT THE SAME TIME AS THE WORKS AREAS THEY ARE INTENDED TO DRAIN.
5. DESIGN ELEVATION OF THE WATER SURFACE ALONG THE ROUTE OF THE INTERCEPTOR DRAINS OR SWALES WILL NOT BE LOWER THEN THE DESIGN ELEVATION OF THE WATER SURFACE IN THE OUTLET AT THE LEVEL SPREADER OR STILLING POND.
6. THE SPACING AND FREQUENCY OF THE CHECK DAMS WILL BE DEPENDANT ON THE GRADIENT OF THE INTERCEPTOR DRAIN OR SWALE IN WHICH THEY ARE BEING INSTALLED.
7. CHECK DAM DESIGNS TO BE SELECTED BEST TO SUIT PARTICULAR TOPOGRAPHY AND HYDROLOGICAL ENVIRONMENT.
8. DOWN GRADIENT SLOPE BELOW LEVEL SPREADER ONTO WHICH THE WATER WILL DISSIPATE TO HAVE A GRADE LESS THE 6%.
9. NO DIRECT DISCHARGE OR PUMPING TO WATERCOURSES WILL BE PERMITTED. ALL DISCHARGES FROM LEVEL SPREADERS OR STILLING PONDS TO BE VIA VEGETATED FILTERS. SELECTION OR SUITABLE AREAS TO USE AS VEGETATION FILTERS WILL BE DETERMINED BY THE SIZE OF THE CONTRIBUTING CATCHMENT, SLOPE AND GROUND CONDITIONS.
10. STILLING PONDS TO BE SIZED ACCORDING TO THE AREA THEY WILL BE RECEIVING WATER FROM.
11. DIVERSION OF DRAINAGE DITCHES WILL ONLY TAKE PLACE WHEN ALTERNATIVE DRAINAGE DITCH HAS BEEN INSTALLED TO HANDLE THE SAME WATER.
12. EXISTING DRAINS/DITCHES TO BE INCORPORATED OR REMOVED DURING WIND FARM CONSTRUCTION.
13. ALL DRAINAGE SYSTEM FEATURES TO BE SUBJECT OF INSPECTION AND MAINTENANCE PLAN.
14. THE LAYOUT SHOWN IS SLIGHTLY OFFSET FOR SCALE PURPOSES, AND ALL DRAINAGE WOULD BE INSTALLED AS CLOSE TO THE ROAD AS POSSIBLE, AND WITHIN THE PLANNING BOUNDARY FOR THE DEVELOPMENT.

MITIGATION / DRAINAGE CONTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as a) sand bags b) oyster bags filled with gravel; c) filter fabrics d) and other similar/equivalent or appropriate systems 3) Using small working areas 4) covering stockpiles 5) weathering off / sealing peat stockpiles
In-Line Controls	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as a) sand bags b) oyster bags filled with gravel c) filter fabrics d) straw bales (in emergencies) e) flow inters f) weirs or baffles g) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedmats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs

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web: www.hydroenvironmental.ie

Client: MKO

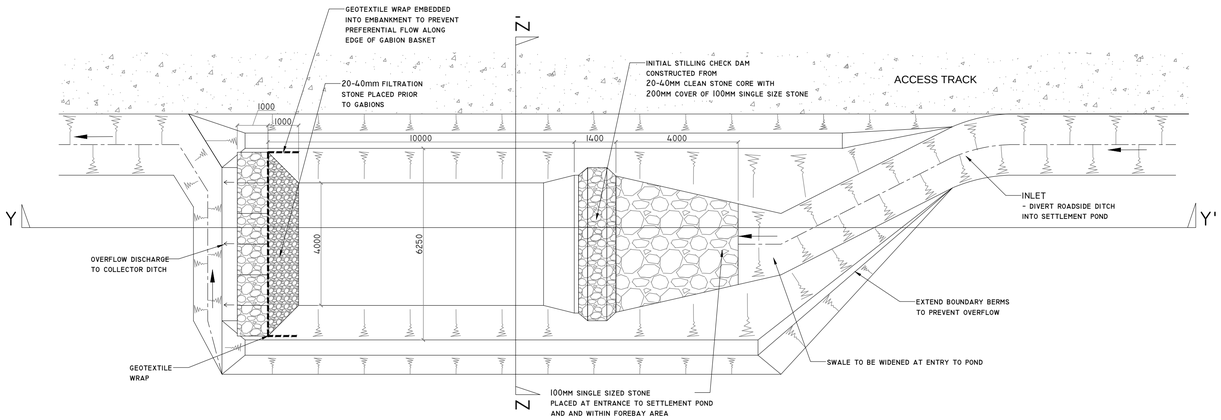
Job: COOLE WF, CO. WESTMEATH

Title: DRAINAGE LAYOUT SHEET 7 OF 7

Figure No: DI07

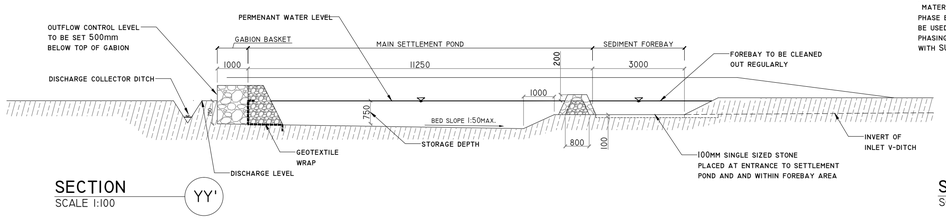
Drawing No: P1320-2-0221-A1-D107-00A	
Sheet Size: A1	Project No.: P1320-2
Scale: 1:2,000 (A1)	Drawn By: MG/GD
Date: 17/02/2021	Checked By: MG

DETAIL A



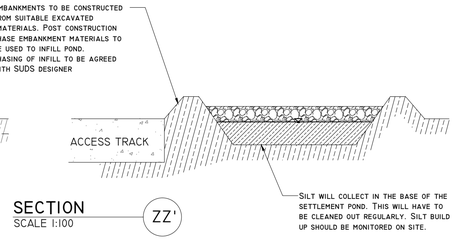
TYPICAL ROAD SIDE SETTLEMENT POND DETAIL

SCALE 1:200 (NOTE DIMENSIONS VARY DEPENDING ON CATCHMENT SIZE)



SECTION YY'

SCALE 1:100



SECTION ZZ'

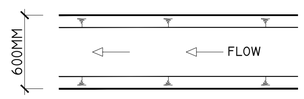
SCALE 1:100

DETAIL B

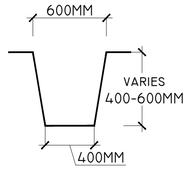
PEAT DITCH SILT TRAP

SCALE 1:25

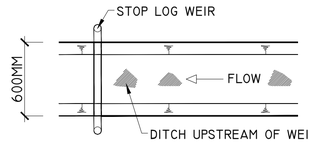
PLAN - EXISTING PEAT DITCH



CROSS SECTION



PLAN - PEAT DITCH SILT TRAP



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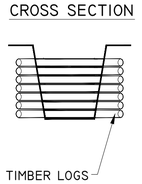
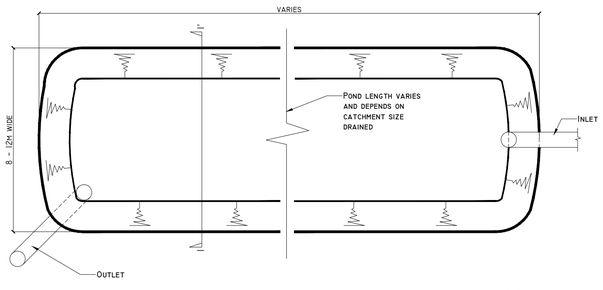


DETAIL C

TYPICAL PEATLAND SITE SETTLEMENT POND DETAIL

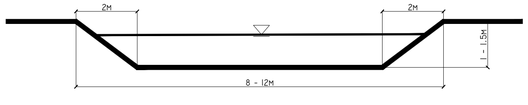
SCALE 1:200

PLAN



SECTION II'

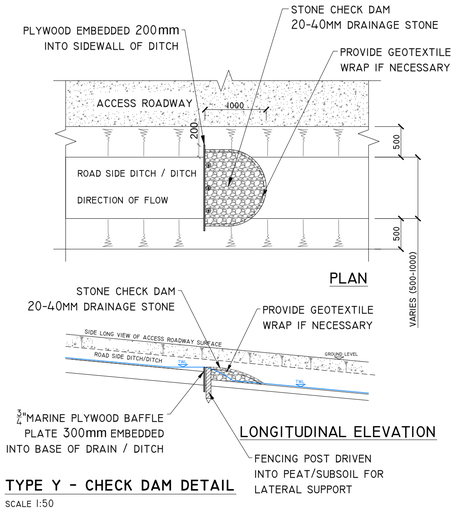
SCALE 1:100



NOTES-

- ALL SETTLEMENT PONDS OPERATE TO LICENCE REQUIREMENTS OF IPPC LICENCE REG No. P0914-01 AND P0974-01.
- SIZING LIKELY BASED ON ACCUMULATION OF 100 M^3/HA/YEAR SILT
- PONDS TYPICALLY CLEANED MINIMUM TWICE A YEAR (I.E. SILT DESIGN CAPACITY OF LAGOONS, MIN 50 M^3 PER NET HA OF BOG SERVICED), ONCE BEFORE DITCHING AND ONCE BEFORE HARVESTING, OR AS INSPECTIONS MAY DICTATE
- GENERALLY - 8 - 12 M WIDE, AND 1 - 1.5 M DEEP
- LIKELY VELOCITY THRESHOLD OF 0.1 M/SEC

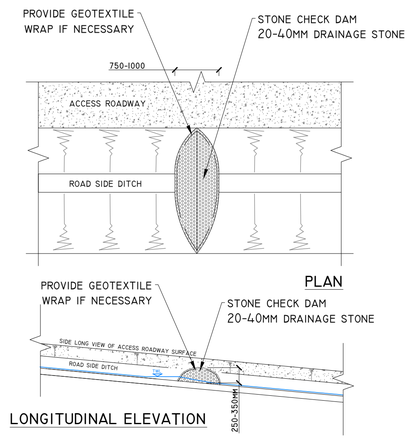
DETAIL D



TYPE Y - CHECK DAM DETAIL

SCALE 1:50

DETAIL E



TYPE X - CHECK DAM DETAIL

SCALE 1:50

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7. DRAINAGE SYSTEMS ARE OFFSET AT A DISTANCE APPROPRIATE TO THE SCALE OF THIS DRAWING. ALL DRAINAGE WILL BE LOCATED ADJACENT TO INFRASTRUCTURE, AS APPROPRIATE ACROSS THE SITE.

DRAINAGE DESIGN NOTES

1. ALL DRAINAGE SUBJECT TO MICRO-SITING AND OPTIMISATION ON SITE.
2. THE LOCATIONS OF THE INTERCEPTOR DRAINS, CHECK DAMS, CULVERTS, SWALES, SETTLEMENT PONDS AND LEVEL SPREADERS ARE SHOWN AS INDICATIVE, AND MAY BE CHANGED TO SUIT THE REQUIREMENTS OF THE LOCAL TOPOGRAPHY.
3. SUPERVISING HYDROLOGIST OR ENVIRONMENTAL CLERK OF WORKS (ENVIRONMENTAL SCIENTIST) TO OVERSEE INSTALLATION OF DRAINAGE FEATURES FOLLOWING DETAILED DRAINAGE DESIGN.
4. DRAINAGE MEASURES TO BE INSTALLED PRIOR TO, OR AT THE SAME TIME AS THE WORKS AREAS THEY ARE INTENDED TO DRAIN.
5. DESIGN ELEVATION OF THE WATER SURFACE ALONG THE ROUTE OF THE INTERCEPTOR DRAINS OR SWALES WILL NOT BE LOWER THEN THE DESIGN ELEVATION OF THE WATER SURFACE IN THE OUTLET AT THE LEVEL SPREADER OR SETTLEMENT POND.
6. THE SPACING AND FREQUENCY OF THE CHECK DAMS WILL BE DEPENDANT ON THE GRADIENT OF THE INTERCEPTOR DRAIN OR SWALE IN WHICH THEY ARE BEING INSTALLED.
7. CHECK DAM DESIGNS TO BE SELECTED BEST TO SUIT PARTICULAR TOPOGRAPHY AND HYDROLOGICAL ENVIRONMENT.
8. DOWN GRADIENT SLOPE BELOW LEVEL SPREADER ONTO WHICH THE WATER WILL DISSIPATE TO HAVE A GRADE <6%.
9. NO DIRECT DISCHARGE OR PUMPING TO WATERCOURSES WILL BE PERMITTED. ALL DISCHARGES FROM LEVEL SPREADERS OR STILLING PONDS TO BE VIA VEGETATED FILTERS. SELECTION OF SUITABLE AREAS TO USE AS VEGETATION FILTERS WILL BE DETERMINED BY THE SIZE OF THE CONTRIBUTING CATCHMENT, SLOPE AND GROUND CONDITIONS.
10. SETTLEMENT PONDS TO BE SIZED ACCORDING TO THE CATCHMENT AREA THEY WILL BE RECEIVING WATER FROM.
11. DIVERSION OF DRAINAGE DITCHES WILL ONLY TAKE PLACE WHEN ALTERNATIVE DRAINAGE DITCH HAS BEEN INSTALLED TO HANDLE THE SAME WATER.
12. EXISTING DRAINS/DITCHES TO BE INCONPORATED OR REMOVED DURING WIND FARM CONSTRUCTION.
13. ALL DRAINAGE SYSTEM FEATURES TO BE SUBJECT OF INSPECTION AND MAINTENANCE PLAN.
14. THE LAYOUT SHOWN IS SLIGHTLY OFFSET FOR SCALE PURPOSES, AND ALL DRAINAGE WILL BE INSTALLED AS CLOSE TO ACCESS TRACKS/ROADS AS POSSIBLE.

Date	Description	Chkd	Signed
08.02.21	Planning - Rev A	M.G.	M.Gill

Revisions

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Client: MKO

Job: COOLE WF, CO. WESTMEATH

Title: DRAINAGE DETAILS I

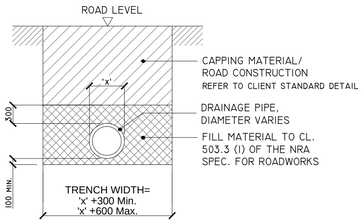
Figure No: 501

Drawing No: P1320--2-0221-A1-501-00A	
Sheet Size: A1	Project No.: P1320-2
Scale: as shown (A1)	Drawn By: M.Gill
Date: 17/02/2021	Checked By: M.G.

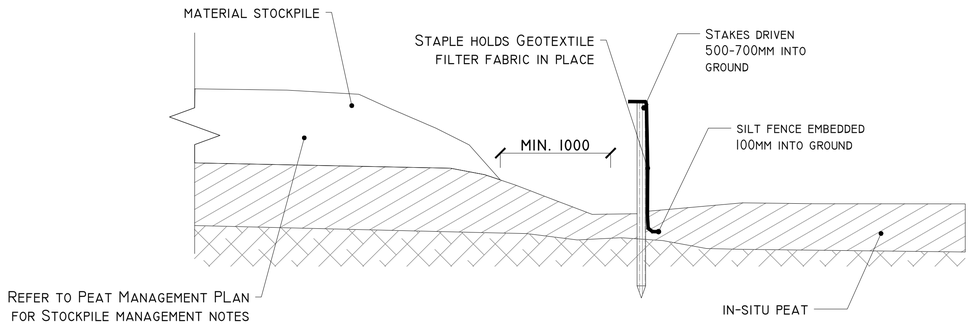
DETAIL F

'TYPE B' CULVERT - DRAINAGE CROSSING BENEATH EXCAVATED ROAD

SCALE 1:50



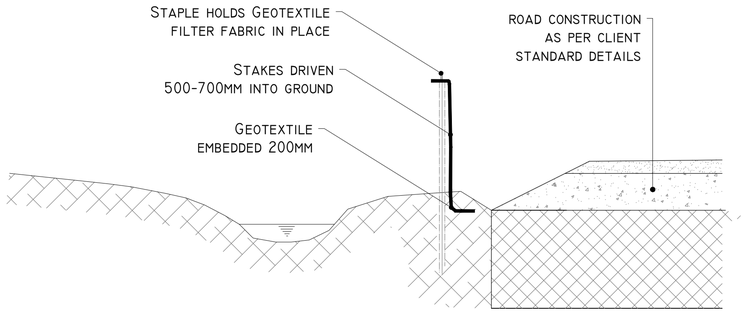
DETAIL G-I



SILT FENCE

SCALE 1:25

DETAIL G-II



SILT FENCE FOR WATERCOURSE PROTECTION

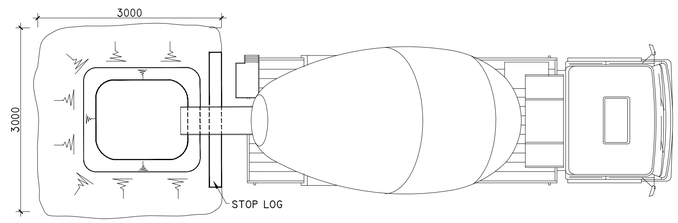
SCALE 1:25

DETAIL I

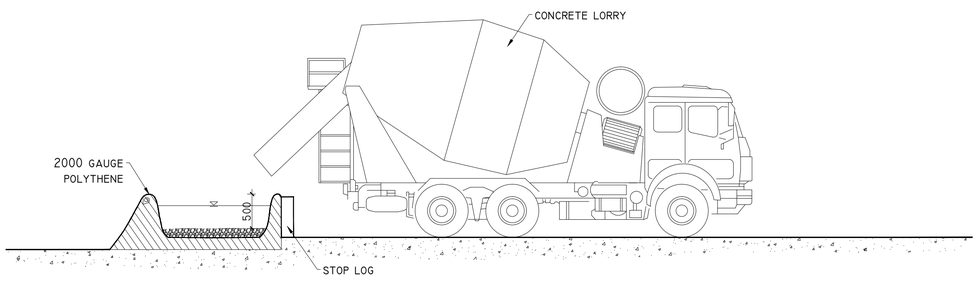
TEMPORARY CONCRETE WASH OUT PIT

SCALE 1:25

PLAN



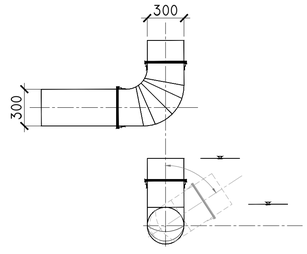
ELEVATION



DETAIL H

90° U BEND AND WATER LEVEL CONTROL MECHANISM

SCALE 1:25



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6. The use of or reliance upon this drawing shall be deemed to be acceptance of these conditions of use unless otherwise agreed in writing, such written agreement to be sought from and issued by the copyright holder to the use or reliance upon this drawing.
7. Drainage systems are offset at a distance appropriate to the scale of this drawing. All drainage will be located adjacent to infrastructure, as appropriate across the site.

Drainage Design Notes

1. All drainage subject to micro-siting and optimisation on site.
2. The locations of the interceptor drains, check dams, culverts, swales, settlement ponds and level spreaders are shown as indicative, and may be changed to suit the requirements of the local topography.
3. Supervising hydrologist or environmental clerk of works (environmental scientist) to oversee installation of drainage features following detailed drainage design.
4. Drainage measures to be installed prior to, or at the same time as the works areas they are intended to drain.
5. Design elevation of the water surface along the route of the interceptor drains or swales will not be lower then the design elevation of the water surface in the outlet at the level spreader or settlement pond.
6. The spacing and frequency of the check dams will be dependant on the gradient of the interceptor drain or swale in which they are being installed.
7. Check dam designs to be selected best to suit particular topography and hydrological environment.
8. Down gradient slope below level spreader onto which the water will dissipate to have a grade <6%.
9. No direct discharge or pumping to watercourses will be permitted. All discharges from level spreaders or stilling ponds to be via vegetated filters. Selection or suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions.
10. Settlement ponds to be sized according to the catchment area they will be receiving water from.
11. Diversion of drainage ditches will only take place when alternative drainage ditch has been installed to handle the same water.
12. Existing drains/ditches to be incorporated or removed during wind farm construction.
13. All drainage system features to be subject of inspection and maintenance plan.
14. The layout shown is slightly offset for scale purposes, and all drainage will be installed as close to access tracks/roads as possible.

Date	Description	Chkd	Signed
08.02.21	Planning - Rev A	M.G.	M.Gill

Revisions

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Client: MKO

Job: Colle WF, Co. Westmeath

Title: Drainage Details 2

Figure No: 502

Drawing No: P1320--2-0221-A1-502-00A	
Sheet Size: A1	Project No.: P1320-2
Scale: as shown (A1)	Drawn By: M.Gill
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APPENDIX 5

BEST PRACTICE GUIDELINES FOR THE CONTROL OF INVASIVE SPECIES

invasivespecies Ireland

Best Practice Management Guidelines

Rhododendron (*Rhododendron ponticum*)

and

Cherry Laurel (*Prunus laurocerasus*)

1. Aim of this advice

This document provides best practice management guidelines on the control of *Rhododendron ponticum* and Cherry Laurel (*Prunus laurocerus*) on the island of Ireland.

2. Introduction

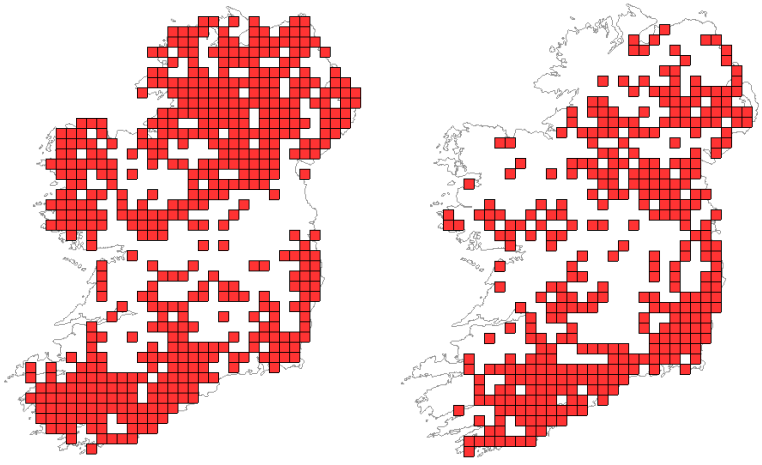
2.1. *Rhododendron*

Rhododendron is a large evergreen shrub (growing up to 8m tall) that was introduced to Ireland as an ornamental plant in the 18th Century from Asia and north-west China. There are more than 900 species of *Rhododendron*, but only one type, *Rhododendron ponticum* is invasive in Ireland. It has dark green waxy, oblong leaves and conspicuous pinkish purple or lilac flowers on 2-4cm stalks although hybrids and cultivated varieties can vary in colour. Flowering occurs in spring and summer with plants capable of producing large quantities of viable seed, which can persist to create a seed-bank in the soil. *Rhododendron* can also propagate itself by vegetative means, both by suckering from roots and by layering wherever branches touch the ground.

Rhododendron thrives on peaty, sandy and acidic soils and is extremely hardy. It is a very popular garden ornamental plant and has been extensively planted as game cover along the edges of fields and within woodlands. Its popularity, adaptability to Irish climate and soils along with its highly successful and multiple methods of reproduction and dispersal means that it has become naturalised and widespread. As *Rhododendron* is very shade tolerant, it has become widely established in several habitats, notably heathlands and woodlands from adjacent gardens.

2.2. Cherry Laurel

Cherry Laurel is a dense thicket forming invasive ever-green shrub of gardens, parks and woodlands from South West Asia. The leaves are thick and laurel-like, poisonous with cyanide, the white flowers are produced on upright spikes and are succeeded in autumn by blackish cherry-like fruits which should not be eaten.



Distribution of *Rhododendron ponticum* in Ireland (right) and Cherry Laurel (left). Source of data: National Biodiversity Network; accessed 07 April 2008.

2. Impacts

Rhododendron and Cherry Laurel are extremely invasive plant species, particularly in the more humid western parts of Ireland forming dense impenetrable thickets. Both species are unpalatable and likely toxic to mammals and probably invertebrates due to the presence of 'free' phenols and diterpenes in *Rhododendron* and cyanide in Cherry Laurel. They are both avoided by grazing animals, thus giving them significant advantages over native species. The deep shadow cast by the plants and toxic leaf litter accumulating underneath *Rhododendron* produces a dark sterile environment, which suppresses regeneration of native species and supports little wildlife. Changes in soil chemistry induced by *Rhododendron* have also been reported. Animal populations can also be negatively influenced by *Rhododendron* e.g. bird numbers are lower in mature oak woodlands dominated by *Rhododendron*.

In Ireland, *Rhododendron* has invaded three habitats of international importance under the EC Habitats Directive: upland oak woods, bogs and heath. For example, it is now a widespread invasive species in Killarney, where >650 acres of the Killarney National Park are completely infested.

Rhododendron in Ireland hosts a serious plant health pathogen *Phytophthora ramorum.* This is a fungus that has the potential to attack a wide variety of native woody plants and is the causative agent of 'Sudden Oak Death'. On *Rhododendron*, the first indication of the disease is wilting of shoots. These develop a brown/black colour that spreads along the twig and can move onto the leaves, where the leaf bases and tips blacken. The fungus has been recorded in Northern Ireland and DARD has identified this species as likely to cause significant damage to trees and landscapes if it establishes widely. Consequently, *Rhododendron* is one of the biggest conservation issues facing Irish woodlands today.

There are reported cases of human poisoning by 'toxic' honey from *Rhododendron*. The severity of the reaction probably relates to the amount of affected honey digested and the health and susceptibility of the individual concerned.

3. Legal status

There are no specific legal provisions associated with growing of *Rhododendron* or Cherry Laurel on the island of Ireland. However, all management methods described here should be carried out with due care and attention, with particular consideration to health and safety requirements and, where necessary, by trained and competent personnel. All waste not dealt with on site should be taken to a licensed landfill site.

Under the EU Plant Health Directive, emergency legislation was introduced in 2002 to prevent the introduction and spread of *Phytophthora ramorum* within the EU. If suspicious symptoms are observed on *Rhododendron* or any other tree species, the Forest Service (ROI) / DARD (NI) should be informed.

4. Managing *Rhododendron* and Cherry Laurel

The management and eradication of *Rhododendron* and Cherry Laurel is challenging. Understanding the ecology of the species and carefully planning clearance work will ensure success. Clearance can be expensive and time consuming, and should be well planned before any action is taken.

5. Control and eradication

Three main issues must be considered when planning management/control. These are:

• *Rhododendron* in Ireland is a prolific seed producer. However, a naturally seeded plant does not flower and produce seed until at least 10-12 years old. This provides a window of opportunity to prevent serious infestation, through the immediate removal of young plants.

• *Rhododendron* regrows vigorously when cut. As a result, some method of stump killing or removal is always necessary. Any untreated cut stump will regrow and in most cases flower within 3-4 years.

• The scale and nature of the site infestation. Adjacent garden/land owners should be encouraged to control *Rhododendron* at the same time as clearance on your site.

6. *Rhododendron* and Cherry Laurel on adjacent sites

It is important to consider populations in the wider environment around the site. If *Rhododendron* is growing profusely on adjacent land, or upstream, then recolonisation of recently cleared sites is possible. Discussion with neighbouring land owners on the issues involved and your intended actions, may help encourage them to remove or not plant *Rhododendron* and Cherry Laurel as ornamental or hedging species.

For all sites, the following six steps may be usefull to ensure success:

1. Find out how much *Rhododendron* and/or Cherry Laurel there is on the property and map it if possible.

2. Note the age, condition and previous treatments at your site. Use this information to guide your control programme.

3. Areas should be prioritised. It may be easier to clear less heavily infested areas to begin with or sites where seed production has not yet occurred. Also, ideally work with prevailing wind direction, rather than against it, to help minimise seed dispersal into recently cleared areas.

4. Create suitable conditions for the recovery of native ground flora. This will reduce open areas for recolonisation.

5. Write a Management Plan to guide your work. Including timeframes for planned clearance and repeated treatments.

6. Follow-up work will be necessary to ensure that any small plants and seedlings have not been missed.

7. Treatment options

Treatment programmes can be divided into 3 main stages: initial removal, control of stems and roots, and follow up. The following treatment options have been widely tested and measured for effectiveness across Ireland. In almost all cases, failures can be accredited to poor application of a particular technique and/or logistical difficulties, rather than the control method itself. Care should be taken when embarking on a control programme and resources should be identified and allocated for repeated treatments.

8. Successfully managing *Rhododendron*

Cut and remove stems by hand or chainsaw, cutting as close to the ground as possible to remove above ground growth. Chip or remove the cut material from the area to allow for effective follow-up work and prevent regrowth. Chipped material can provide good weed barrier around ornamental garden areas. Flailing has also been effectively used in Ireland to treat young or immature growth. Although not suitable on all sites and locations, especially steeply sloping or wet sites, it is very effective as it breaks up woody stems upon contact.

The removal of above ground growth will not prevent regrowth as *Rhododendron* will regrow from cut stems and stumps. There are four recommended methods to achieve successful management after the initial cut and removal:

1. Digging the stumps out. The effectiveness of this technique is increased by removing all viable roots. This can be done manually or with a tractor and plough. To avoid regrowth, stumps should be turned upside down and soil should be brushed off roots.

2. Direct stump treatment by painting or spot spraying freshly cut low stumps with a herbicide immediately after been cut. Glyphosate (20% solution), tryclopyr (8% solution) or ammonium sulphate (40% solution) are known to be effective during suitable weather conditions i.e. dry weather. The herbicide concentrations used and timings of applications vary according to which chemical is used. Use of a vegetable dye is recommended to mark treated stumps and all stumps should be targeted. A handheld applicator will help avoid spray drift onto surrounding non-target species. Always read the label and follow the manufacturers guidelines when using herbicides. Remember that using

3. A variation on the stump treatment method is stem injection, using a ‘drill and drop’ methodology, whereby, if the main stem is cut and is large enough for a hole to be drilled into it, the hole can be used to facilitate the targeted application of glyphosate (25% solution). The main drawback is that the dead *Rhododendron* may persist in situ for 10-15 years.

4. Stump regrowth and seedlings can be effectively killed by spraying regrowth with a suitable herbicide, usually glyphosate. Best practice spraying protocols should be carefully followed. General broadcast spraying is not as effective as stump spot treatment and has the potential to impact on surrounding non-target species. Rhododendron leaves are thick and waxy. For herbicide treatment to be effective **each individual leaf needs be thoroughly wetted with herbicide to kill the plant**.

Remember: If the initial infestation was of flowering age or a seed source is nearby, then follow-up seedling removal work will be necessary. The intensity of this work will vary according to the severity and duration of infestation.

See also: Higgins, G.T. (2006) *Rhododendron ponticum*: A guide to management on nature conservation sites. Irish Wildlife Manuals, No. XX. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

9. Rhododendron/Cherry Laurel Management Plan Template

Use this template to help formulate your own management plan outlining how you are going to proceed and what you will need.

Site Name: _____
Site Manager/Owner: _____

Site details

Address:	
Telephone:	
Email:	
Agencies/persons involved:	
Date:	

Date of introduction:	
Total site area:	
Total area colonised:	
Previous site management:	

Designation	**On site**	**Near site**	**None present**
Details: Establish if there is a requirement to apply for a license/notify before proceeding with plan.			

Actions and resources

Management options	**Responsibility**	**Date to undertake**

Resources needed	**Responsibility**	**Date to undertake**

Monitoring and evaluation

Name of person/s	**Date to undertake**	**Report to**	**Additional treatments date (if required)**

10. Summary of actions needed for effective management

1. Confirm *Rhododendron*/Cherry laurel identification.

2. Carry out a survey and produce a distribution map indicating the location across the site.

3. Consider surrounding properties and potential for reintroduction. Talk to adjacent land owners. Identify potential contamination routes to your site and mitigate against these.

4. Decide should the programme aim for continuous control on a yearly basis or eradication from the site. Base your decision on an understanding of the biology, size of infestation, potential for reintroduction and other relevant sensitivities in the area. Once management has begun, do not allow any plant to flower and set seed within areas that have undergone initial clearance.

5. Consider if you can successfully and safely carry out the work or if professional practitioners, with relevant training and certificates should undertake the work.

6. Identify if sufficient resources are/will be available to complete the work within the planned timescale. If work will take more than 1 year to complete, ensure you have sufficient funds to complete the work.

7. Ensure disposal options for plant material are in place prior to work commencing.

8. Develop and produce a site specific control/management plan. Use the template provided in this document to guide you.

9. Monitor for regrowth and/or reintroduction during site visits. If applicable, ensure new members of staff are aware of your *Rhododendron*/Cherry Laurel plan and report sightings.

12. *Rhododendron* and Cherry Laurel treatment times

Cutting	J	F	M	A	M	J	J	A	S	O	N	D
Glyphosate	J	F	M	A	M	J	J	A	S	O	N	D
Tryclopyr*	J*	F*	M*	A*	M*	J*	J*	A*	S*	O*	N*	D*
Ammonium sulphate	J	F	M	A	M	J	J	A	S	O	N	D

Optimum treatment time. Remember to consider breeding birds before embarking on a programme.

Suboptimum treatment time but can be effective. In the case of glyphosate based herbicides consider higher concentrations 25--100% during this time period.

* Suitable for treatment any time after cutting and appearance of new growth.

Please consider sharing your experience undertaking a management plan with others. The Invasive Species Ireland website will feature case studies to help guide others under taking similar work.

invasivespecies Ireland
www.invasivespeciesireland.com

The Invasive Species Ireland Project is undertaken, in partnership, by EnviroCentre and Quercus.

www.envirocentre.co.uk

www.quercus.ac.uk

and is funded by the National Parks and Wildlife Service and the Northern Ireland Environment Agency.

Northern Ireland Environment Agency
www.ni-environment.gov.uk
An Agency within the Department of the Environment
www.doeni.gov.uk

www.ni-environment.gov.uk

Comhshaol, Oidhreacht agus Rialtas Áitiúil
Environment, Heritage and Local Government

www.npws.ie

For more information on the Invasive Species Ireland Project please see the website at www.invasivespeciesireland.com

Recommended citation: Maguire, C.M., Kelly, J. and Cosgrove, P.J. (2008). Best Practice Management Guidelines Rhododendron *Rhododendron ponticum* and Cherry Laurel *Prunus laurocerasus.* Prepared for NIEA and NPWS as part of Invasive Species Ireland.

APPENDIX 6

INLAND FISHERIES IRELAND BIOSECURITY PROTOCOL FOR FIELD SURVEY WORK

IFI Biosecurity Protocol for Field Survey Work

December 2010

Iascach Intíre Éireann
Inland Fisheries Ireland

Biosecurity Protocol for Field Survey Work

Invasive species are an ever present threat in our aquatic and riparian systems and it is imperative that none of our field operations exacerbate the risks to the environment and to the economy that are posed by these species. Fish parasites, pathogens and diseases also represent a significant threat to the health status of our watercourses. The introduction or transfer of such pathogens or diseases has the potential to wipe out large populations of fish in affected waters or catchments. Vigilance is required if we are to stop the spread of invasive species and fish diseases, and it is imperative that we in IFI lead by example in the ongoing struggle against these significant threats to our fishery watercourses.

The need for basic biosecurity in our fisheries operations must become ingrained in the psyche of our staff if we are to do our part to stop the spread of hazardous invasive species and fish pathogens. Much to do with biosecurity involves awareness, common sense and agreed procedures. Listed below are some basic procedures that must be implemented when conducting field survey work.

Each field vehicle must carry a 'disinfection box'. This should contain Virkon Aquatic or another proprietary disinfectant, a spray bottle, cloths or sponges, a scrubbing brush and protective gloves.

On completion of any field operation, all equipment used must be treated according to the procedures listed below. Equipment in this respect includes the following:
boats, trailers, outboard motors, anchors and rope, weights, tanks, buckets and bins, all PPE (including boots, wellingtons, waders, wetsuits, dry suits, waterproof clothing, life jackets, diving apparatus, etc.) and any technical or sampling apparatus used as part of the survey. Protective gloves must be worn when using any disinfectant solution in any of the procedures listed below.

- Visually inspect all equipment that has come into contact with the water for evidence of attached plant or animal material, or adherent mud or debris. This should be done before leaving the site.

- Remove any attached or adherent material (fish, fish scales, vegetation and debris) before leaving the site of operation.

- Ensure that all water is drained from boats, live wells and other water retaining compartments, outboard motors, tanks and other equipment before transportation elsewhere.

- High-pressure steam cleaning, with water > 40 degrees C, is recommended for boats (including oars, row locks, attachment ropes, anchors and buoys), trailers and outboard motors that are being moved from one watercourse to another. 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 visually inspect the equipment to ensure that all adherent material and debris has been removed.

- It is recommended to apply disinfectant, using the spray bottle from the 'disinfection box', to the undercarriage and wheels of the vehicle and trailer after steam cleaning or power hosing.

- Wet or live wells and other water retaining compartments in survey boats must be cleaned, rinsed or flushed with a 1% solution of Virkon Aquatic or another proprietary disinfection product. Alternatively, a 5% solution (100 ml / 20 litre solution) of chlorine bleach should be used. Rinse thoroughly with clean water.

- Tanks that are used to stock or transfer live fish should be thoroughly washed with a 1% solution of Virkon Aquatic or another proprietary disinfection product. Alternatively, a 5% solution (100 ml / 20 litre solution) of chlorine bleach should be used. All disinfected equipment must be thoroughly rinsed with clean water.

- Outboard motors should be flushed with a 1% solution of Virkon Aquatic or another proprietary disinfection product, or with water > 40 degrees C. Alternatively, a 5% solution (100 ml / 20 litre solution) of chlorine bleach should be used. Facilities will be provided at IFI stores countrywide to accommodate this operation.

- Nets (to include monofilament and braided gill nets, fyke nets and seine nets) must be cleaned of all vegetation and debris before returning to base. The clean nets must then be placed in a freezer for a period of four days (3 days will suffice for monofilament nets). Following this treatment the nets must be soaked in a 1% solution of Virkon Aquatic or a proprietary disinfectant for a period of not less than 15 minutes and thoroughly rinsed thereafter. Where these proprietary disinfectants are not available the nets must be soaked in a 5% solution (100 ml / 20 litre solution) of chlorine bleach for 1 hour and thoroughly rinsed after.
  An SOP on 'Management and Disinfection of Survey Nets' is available on request from IFI Swords.

- Footwear should be dipped in or scrubbed with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and thoroughly dried afterwards.

- All PPE should be visually inspected and any attached vegetation or debris removed. Where appropriate, the gear should be wiped down with a cloth soaked in 1% solution of Virkon Aquatic or another proprietary disinfection product. Alternatively, a 5% solution (100 ml / 20 litre solution) of chlorine bleach should be used. Rubber gloves must be worn when undertaking this procedure.

- Sampling equipment (e.g. electrofishing electrodes and cable, grab samplers, meter sticks, buckets and bins, etc.) must be cleaned, rinsed or wiped down with or dipped in a suitable disinfectant solution.

- Landing nets and hand nets must be dipped in disinfectant solution and rinsed in clean water.

- All field equipment must be suitably disinfected before being returned to the IFI Swords warehouse for storage. Staff will be requested to sign a prepared form detailing the nature of the disinfection process carried out and the date on which this was conducted.

Note
Disinfectants must be used with care and in strict accordance with the manufacturer's instructions. They must be disposed of safely and never in close proximity to open waters,

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