Graffy Wind Park

GRAFFY WIND PARK

Construction Environmental Management Plan (CEMP)

Proposed Graffy Wind Farm
Glenties,
County Donegal

Construction Environmental Management Plan

Prepared for:
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1 INTRODUCTION

Cuilfeach Teoranta retained Keohane Geological & Environmental Consultancy (KGEC) to prepare the Construction Environmental Management Plan (CEMP) for submission with the planning application for the Graffy Wind Farm. The CEMP is prepared to satisfy the 2019 draft wind farm guidelines[1]. Section 4.11 of the draft Guidelines state:

Construction Environment Management Plans (CEMPs) are recommended to be prepared in advance of the construction projects and implemented throughout. Such plans are recommended to incorporate relevant mitigation measures which have been integrated into the project and an Environmental Impact Assessment Report or Appropriate Assessment. CEMPs typically provide details of intended construction practice for the proposed development, including:

a) *location of the sites and materials compound(s) including area(s) identified for the storage of construction refuse,*
b) *location of areas for construction site offices and staff facilities,*
c) *details of site security fencing and hoardings,*
d) *details of on-site car parking facilities for site workers during the course of construction,*
e) *details of the timing and routing of construction traffic to and from the construction site and associated directional signage,*
f) *measures to obviate queuing of construction traffic on the adjoining road network,*
g) *measures to control noise during construction, in particular noise associated with the transportation of wind turbine components from staging areas at night.*
h) *measures to prevent the spillage or deposit of clay, rubble or other debris,*
i) *alternative arrangements to be put in place for pedestrians and vehicles in the case of the closure of any public right of way during the course of site development works,*
j) *details of appropriate mitigation measures for noise, dust and vibration, and monitoring of such levels,*
k) *containment of all construction-related fuel and oil within specially constructed bunds to ensure that fuel spillages are fully contained; such bunds shall be roofed to exclude rainwater,*
l) *disposal of construction/demolition waste (in line with higher level waste management policies) and details of how it is proposed to manage excavated soil,*
m) *a water and sediment management plan, providing for means to ensure that surface water runoff is controlled such that no silt or other pollutants enter local water courses or drains,*
n) *details of a water quality monitoring and sampling plan,*
o) *if peat is encountered - a peat storage, handling and reinstatement management plan,*
p) *measures adopted during construction to prevent the spread of invasive species (such as Japanese Knotweed),*
q) *appointment of an ecological clerk of works at site investigation, preparation and construction phases,*
r) *details of appropriate mitigation measures for lighting specifically designed to minimise impacts to biodiversity including bats*

Section 3.1 of Technical Appendix 2 recommends that '*A draft Construction and Environmental Management Plan (CEMP) shall be submitted with the planning application*'.

[1] Department of Housing, Planning and Local Government, December 2019. *Draft Revised Wind Energy Development Guidelines.*

The objective of the CEMP is to set out the construction approaches to protect the receiving environment. With the siting of the Graffy Wind Farm within the catchment of two sensitive rivers, the protection of the surface water environment is of particular importance and focus.

1.1 Development Background

In February 2011 An Bord Pleanala upheld Donegal County Council's decision to grant planning permission for a 105MW wind farm in Graffy, Meenagrubby and surrounding townlands, Glenties County Donegal; planning numbers 09/30520 and PL05B.237656 refer. That proposed development consisted of 35 No. turbines (revised down to 19), control building, ESB substation and compound and associated site roads. The permission granted by An Bord Pleanala reduced the number of turbines to thirteen. Ten of these were located to the north of the public road where the current proposal is located. The proposed development will replace the permission for the 13 No. turbines.

The proposed turbine model has not been finalised, but wind energy resource assessments indicate that the optimal sizes for the site should have a tip height of approximately 150m. For the purposes of the assessment, two turbine models are considered; rotor diameter of 126m with 86m hub height; and 133m rotor diameter with 81m hub height. These are the typical dimensions as the various manufactures have slightly different rotor diameters and hub heights for the capacity of turbine proposed (4MW range). This will be determined by competitive tender after planning permission is secured.

The wind farm will be connected to the National Grid at the ESB Tievebrack 110kV substation via approximately 7.3km of underground cable which will mostly follow public and forestry roads. The grid connection forms part of the permission for the wind farm.

1.2 Planning Permission

INSERT DETAILS OF PLANNING PERMISSION
- PLANNING PERMISSION REFERENCE NUMBER(S)
- DATE OF GRANT
- VALIDITY PERIOD OF PERMISSION.
- CONDITIONS.

A copy of the planning permission is provided in Attachment 1.

1.3 Scope of CEMP

The CEMP defines the responsibilities and procedures for the management of potential impacts on the surrounding environment and habitats arising from site construction works. It sets out the avoidance, reduction and mitigation measures detailed in the Environmental Impact Assessment Report (EIAR) and the Natura Impact Statement (NIS) submitted in support of the application. Allowance will be made for implementation of alternative measures by the contractor where these alternatives demonstrate improved environmental protection and are approved by the Environmental/Ecological Clerk of Works (ECoW).

The CEMP sets out the following:

1. Details of the contractual arrangements, roles and responsibilities.
2. General working hours and flexibility in these hours for specific works.
3. Buffer zones for environmental protection and pollution prevention.
4. Liaison arrangements.
5. Mitigation procedures to reduce and avoid environment and ecological impact.
6. An Environmental Emergency Response Plan.
7. Monitoring and auditing of environmental performance during the construction period.
8. A Waste Management Plan.

The CEMP should be read in conjunction with the following documents prepared for the proposed development:

1. Environmental Impact Assessment Report for the Graffy Wind Farm dated August 2021 and prepared by Harley Planning Consultants.
2. Natura Impact Statement for the Graffy Wind Farm, dated August 2021 and prepared by RPS Ltd.
3. Planning Conditions for the proposed development, dated [INSERT DATE].
4. Traffic Management Plan dated October 2020 and prepared by KH Chartered Engineers.
5. Emergency Response Plan included as Chapter 8 of this CEMP.
6. Method Statements for the development, namely:
    a. Road Construction – Attachment 2.
    b. Peat Management – Attachment 3.
    c. Concrete Pours & Concrete Truck Washout – Attachment 4.
    d. Biosecurity Attachment 5.
    e. Horizontal Directional Drilling – Attachment 6.
7. Construction Methodology – Graffy Wind Farm – 110kV Underground Cable, prepared by tli Group – Attachment 7. This includes an outline of the HDD frac-out mitigation plan.
8. Employers Requirements to be prepared by the Client's Engineer.
9. Site Specific Health & Safety Plan to be prepared by the Client's Engineer.

The CEMP should be seen as a live document open to refinement and improvements as situations change on site, as lessons are learnt and technologies advance. Any changes must result in an improved environmental outcome.

2 SITE DESCRIPTION

The wind park is in a rural upland area in the upper catchments of the Stracashel and Stranagoppoge rivers and along the foothills of Aghla Mountain. The turbines are located to the north of local road L-6743 at elevations of between 200m and 292m.

The nearest settlement is Fintown, approximately 4km to the north of the wind farm, but separated from it by the Aghla Mountain, which rises to almost 600m. Glenties is the largest town, approximately 8km to the west-southwest of the wind farm. Letterkenny is approximately 28km to the northeast. Housing is sparse in the immediate area, consisting of a few farmhouses along the local road, most of which are now derelict. Figure 2-1 shows the regional site location map (Discovery Series Map No. 11). Figure 2-2 shows the site layout.

The land use is primarily rough grazing for sheep. Conifer plantations are widespread in the area, with forestry within the central part of the site, and adjacent to the eastern site boundary. There is evidence of small-scale historic turf cutting at the site; active turf cutting is occurring in the general area, particularly at the low-lying elevations to the southwest of the wind farm site. The site substation is located to the south of local road L-6743 in improved wet grassland, used for sheep grazing.

The grid connection to the Tievebrack substation follows local roads L-6743 and L-2593 to the east towards the R250. Housing density increases to the east with farmhouses and ribbon development occurring. Land use consists primarily of low intensity agriculture and forestry. The eastern-most 2km of the grid connection follows a forestry road, passing a mink farm.

Access route improvements needed for local road L-6733 to the northeast of the wind farm and a turbine road between turbines T04 and T05/T06, are within commercial forestry. Agreement has been reached with Coillte to develop these roads. The transport route upgrade (construction of a new forestry road) is also in commercial forestry.

The turbines will be delivered to Killybegs and over-sized loads will be delivered to site via regional road R263 to the N56. The route will follow the N56 Donegal Town. From Donegal Town, it will follow the N15 through Ballybofey, turning northwest onto the R252 towards Fintown. Approximately 4km from Fintown, the route follows local road L-2023-1 to the location of the transport route upgrade / Coillte road (L-6733-1) to local roads L-6743-2 and L-6743-3 to the site entrances. The transport route is shown in Figure 2-3.

The streams draining the site flow to the Stracashel and Stranagoppoge rivers. The western side of the site is drained by the Stracashel River and its tributaries, which form part of the Owenea River catchment. Downstream of Graffy Bridge, the Stracashel River is designated as part of West of Ardara/Maas Road Special Area of Conservation (SAC). This is a large SAC selected for a wide range of habitats and/or species listed on Annex I / II of the E.U. Habitats Directive. The Owenea River catchment is one of six freshwater pearl mussel catchments in County Donegal. Turbines T05 to T08, the substation and the grid connection route are within the catchment of the Stracashel River. The eastern side of the site is drained by the Stranagoppoge River. The Stranagoppoge River forms part of the River Finn SAC, which extends downstream from local road L-6743 near the wind farm site. Turbines T01 to T04 and the transport route upgrade are located in the catchment of the Stranagoppoge River.

The site is underlain by the Termon Formation and Slieve Tooey Quartzite Formation. These are Precambrian-aged rocks, showing a high degree of metamorphism and complex relationships due their long history of folding, faulting, igneous intrusions and other tectonic activities. The bedrock is covered by a thin layer of peat, generally <1.0m but up to 5.4m deep is small peat basins developed between bedrock ridges. Bedrock outcrop is frequent across the site. The bedrock is classified as a poor aquifer. Water supplies in the locality are sourced from streams and wells (dug and bored); the area is not serviced by mains water.

There are no recorded monuments or statutorily protected archaeological remains within the footprint of the proposed wind farm, substation, transport route upgrade or grid connection. As a result, it is considered there will be no direct or indirect construction phase effect on the recorded archaeological resource. Similarly, there are no protected structures, architectural conservation areas, NIAH structures or any additional statutorily protected architectural features within the construction footprint. The wind farm development crosses eight townland boundaries.

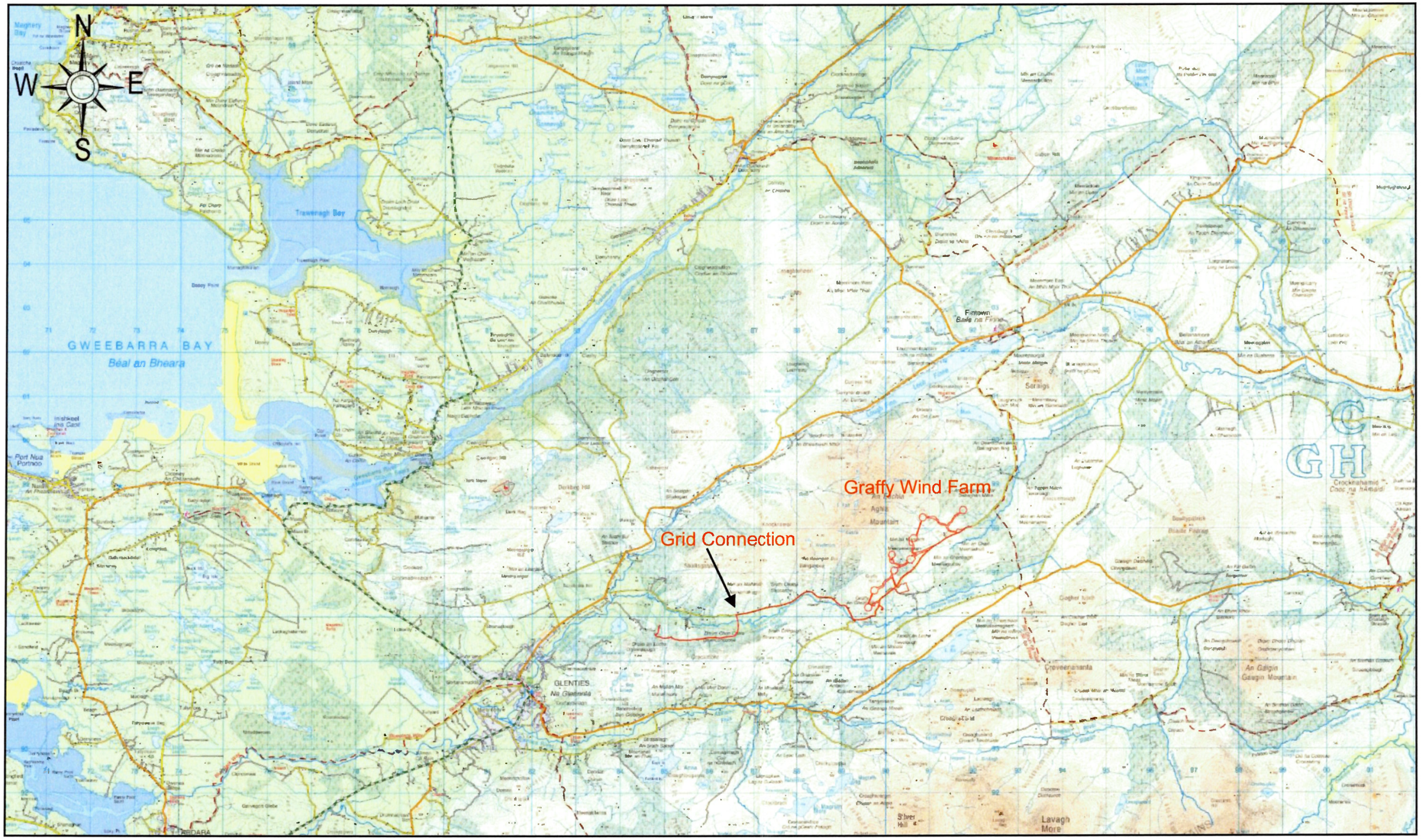


Figure 2-1: Site Location Map

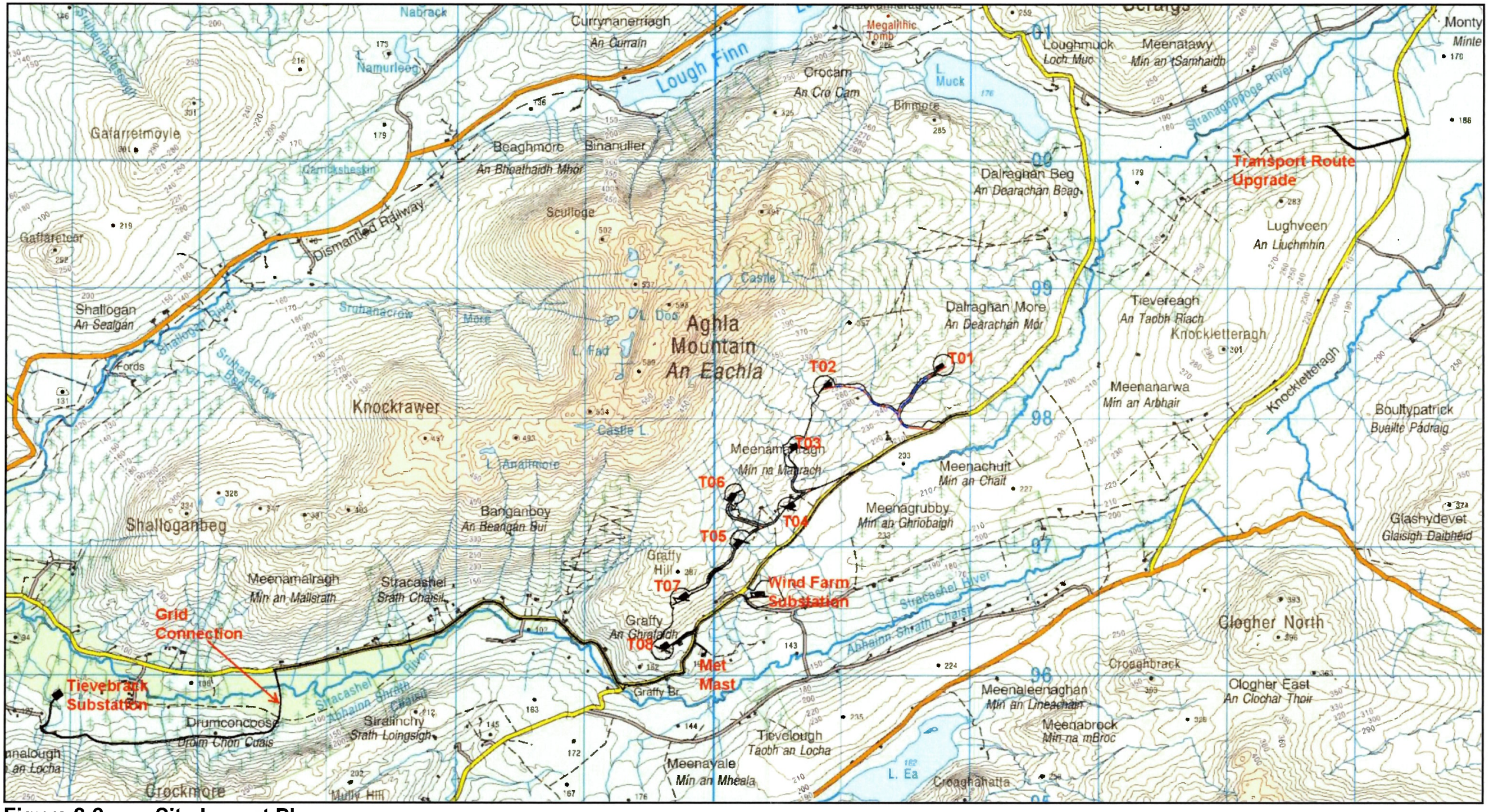


Figure 2-2: Site Layout Plan

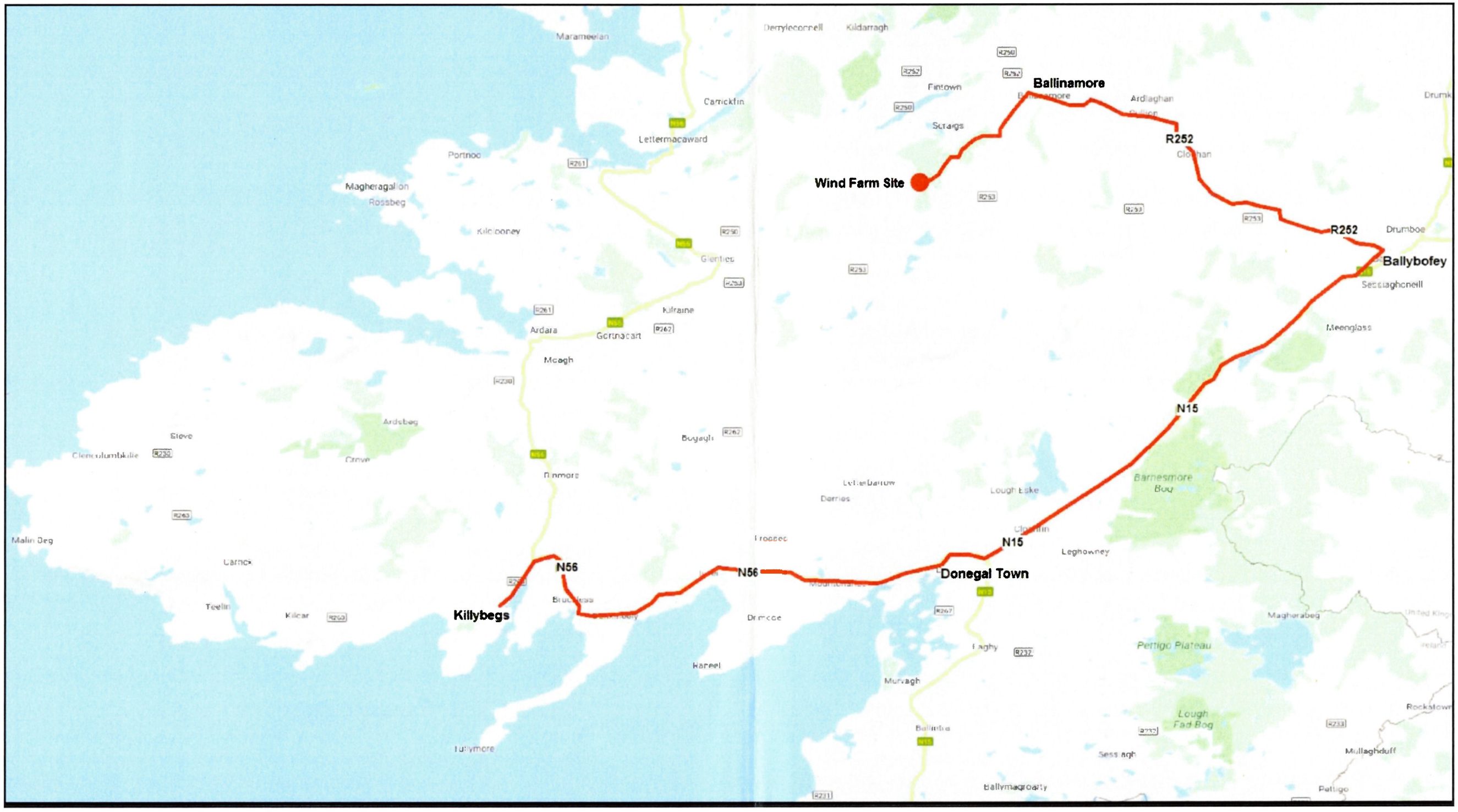


Figure 2-3: Turbine Delivery Route

3 PROPOSED DEVELOPMENT

The principal components of the proposed development include 8 No. turbines, hardstand areas, internal access roads, internal cabling, substation compound, temporary construction compound, permanent met mast, grid connection and transport route upgrade as described below.

3.1 Wind Farm Infrastructure

The main elements of the wind farm infrastructure are described in the subsections below.

3.1.1 Construction Site Compound

The temporary construction site compound will be located centrally on the site near the proposed substation. It will be approximately 38m x 18m and will provide site offices, secure storage cabins, canteen, workers welfare facilities, parking, waste/recyclables bins and open storage area. The compound will be surrounded by a 2.3m-high security fence.

Electricity will be provided by an on-site diesel-powered generator, mounted over a drip tray. Fuel will be stored in a self-bunded tank adjacent to the generator. The generator will be positioned so the cabins provide a noise shield to the nearest houses.

Wireless telecommunication will be provided.

Bottled water will be used. Rainwater harvesting will be used as the water supply for toilets. If needed, potable water will be brought to site in bowsers.

Wastewater from the welfare facilities will be collected in a sealed tank and emptied by an appropriately licenced contractor.

Skips will be provided for various waste streams, including domestic waste and recyclables (cardboard, wood, plastic).

An area will be used for open storage of larger bulkier materials such as ducting, cable reels, rolls of geotextile etc. The layout of the site compound is shown on Figure 3-1.

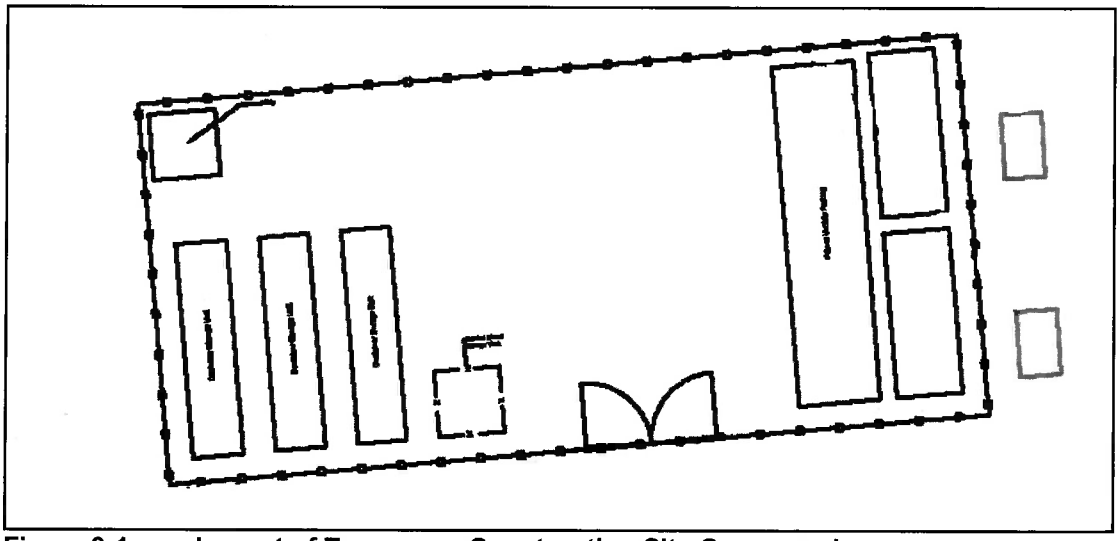


Figure 3-1: Layout of Temporary Construction Site Compound

3.1.2 Substation Compound

The substation compound will have a footprint area of approximately 40m x 56m and surrounded by a 2.3m high palisade fence. It will be divided into the customer and ESB areas by a 2.3m-high palisade fence. It will have a building divided into switch room, control room, ESB room and welfare facilities. Wastewater will be collected in a sealed underground tank and emptied periodically by a licensed waste contractor.

The compound will house the grid transformer, bus bars and other electrical equipment mounted on concrete plinths. The grid transformer sits on a concrete bund. The transformer is surrounded by a reinforced concrete blast wall.

A back-up diesel-powered generator will be installed so there is power to the substation lights during outages. The diesel will be stored in a 1,300 litre self-bunded tank. The generator will be installed on a concrete plinth, which will drain to the transformer bund.

The layout of the substation compound is shown on Figure 3-2.

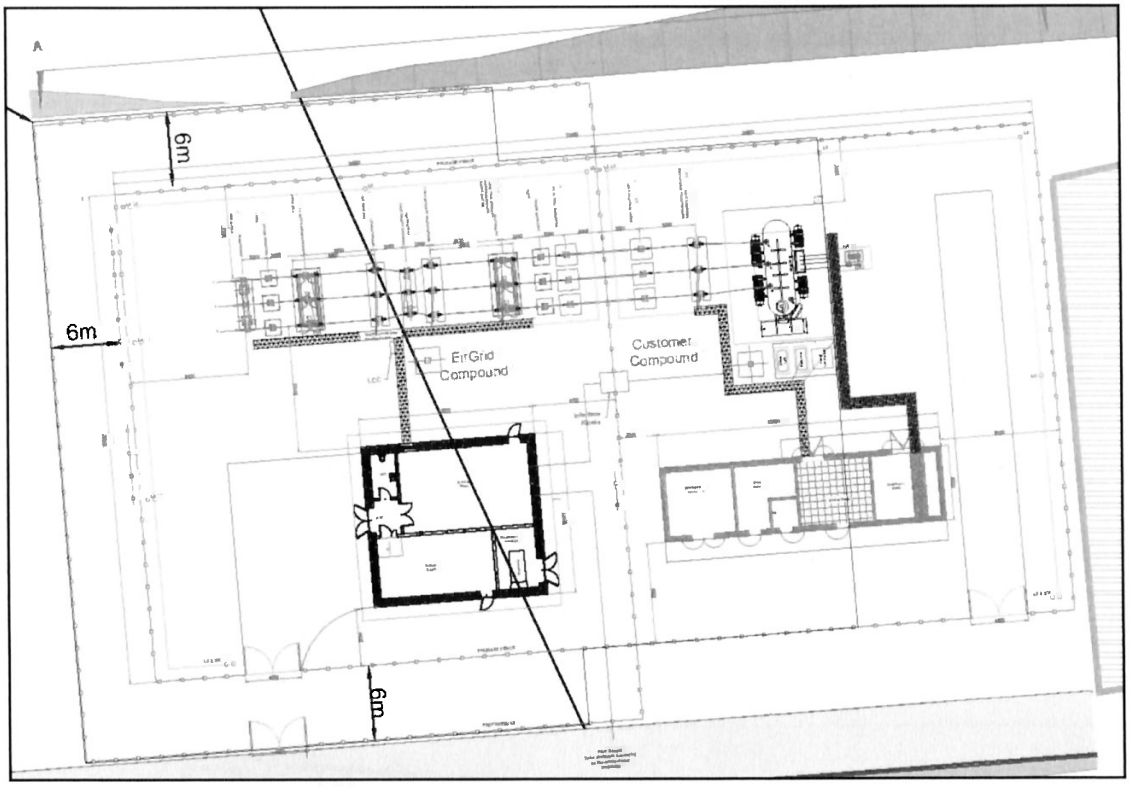
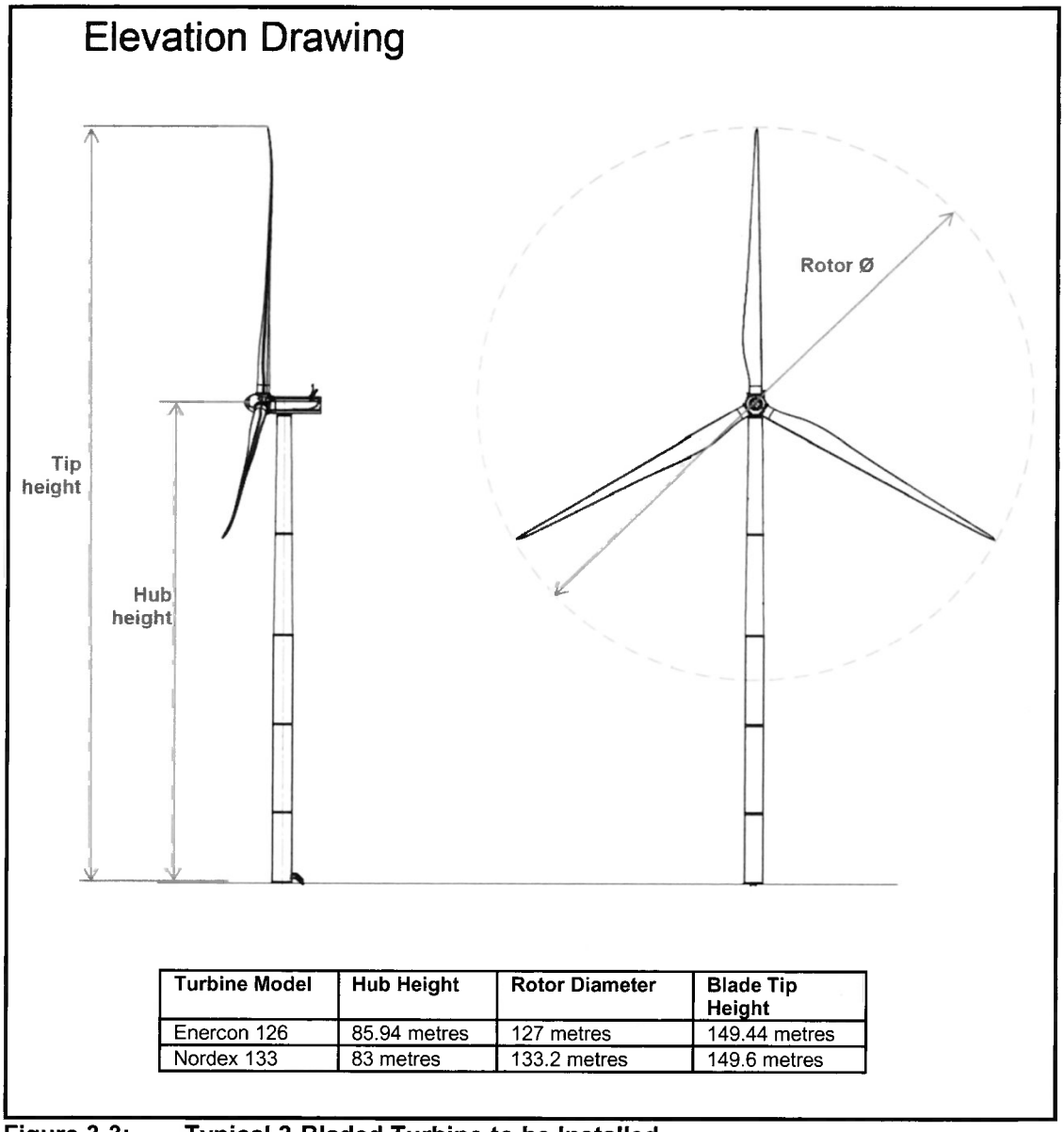


Figure 3-2: Layout of Site Substation

3.1.3 Turbines

There are 8 No. turbines to be installed at the site. The turbines to be installed will be selected based on competitive tender following the planning process. The turbines will be in the 4MW range and have a tip height of up to ~150m; For the purposes of the assessment, two turbine models are considered; rotor diameter of ~127m with ~86m hub height; and ~133m rotor diameter with ~83m hub height. Figure 3-3 shows the main features of a generic 3-bladed turbine for illustration purposes.



Turbine Model	Hub Height	Rotor Diameter	Blade Tip Height
Enercon 126	85.94 metres	127 metres	149.44 metres
Nordex 133	83 metres	133.2 metres	149.6 metres

Figure 3-3: Typical 3-Bladed Turbine to be Installed

3.1.4 Turbine Foundation

The turbine foundations will be shallow and likely without the effects of buoyancy with loads of approximately 300kN/m^2. For the Graffy site, bedrock is found at shallow depths and will be the bearing stratum. The foundations will be subject to detail design, but will likely be up to 22.5m in diameter, 3.2m high and requiring 600m^3 of concrete and approximately 82 tonnes of reinforcing steel. This size of shallow foundation would account for the effects of buoyancy. Piled foundations will not be required.

Based on the observations on site and experience in this area, a shallow foundation without the effects of buoyancy will be used for each of the turbines. Figure 3-4 shows the general arrangements for the turbine foundations.

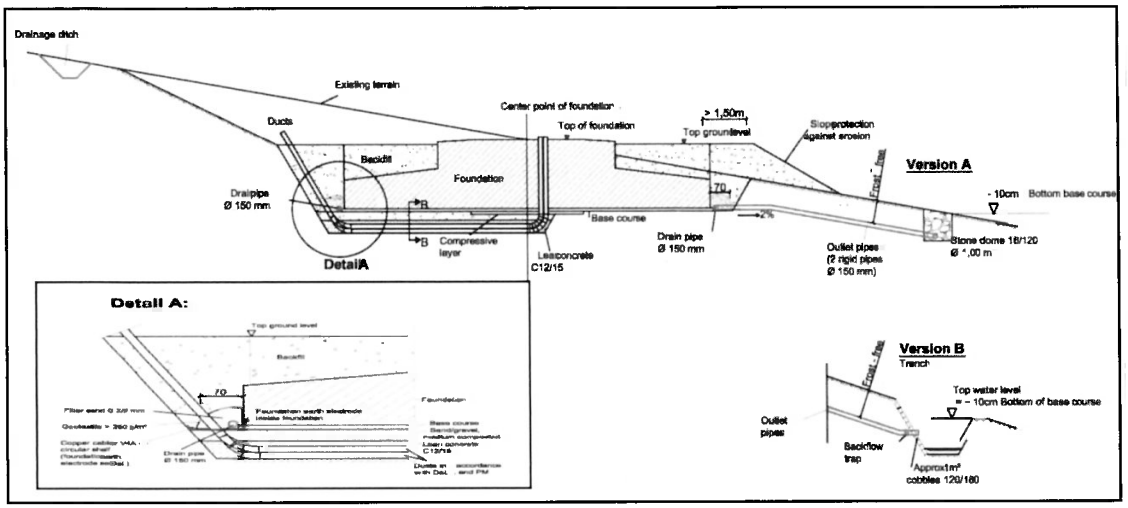


Figure 3-4: General Details of Turbine Foundations

3.1.5 Cranage Areas

A level hardstanding area is required at the turbine location for the assembly and installation of the turbine. The cranage area required for the 4MW range turbines are 40m long and 23m wide. They are required to have a minimum bearing of 200kN/m^2 to support cranes during lifts. Level areas adjacent to the cranage area are required for the storage of turbine components prior to assembly. Areas adjacent are to be free from obstacles. Figure 3-5 shows the layout of the standard cranage platform. Variations to this layout can be accommodated if dictated by site topography or other constraints.

The cranage platforms are finished proud of adjacent ground level to allow free, over-the-edge drainage of surface water. It is also finished to a level that is a maximum of 200mm below the foundation's upper edge. The surface should be finished with aggregate of maximum diameter 32mm and be of the same rock type found at the wind farm.

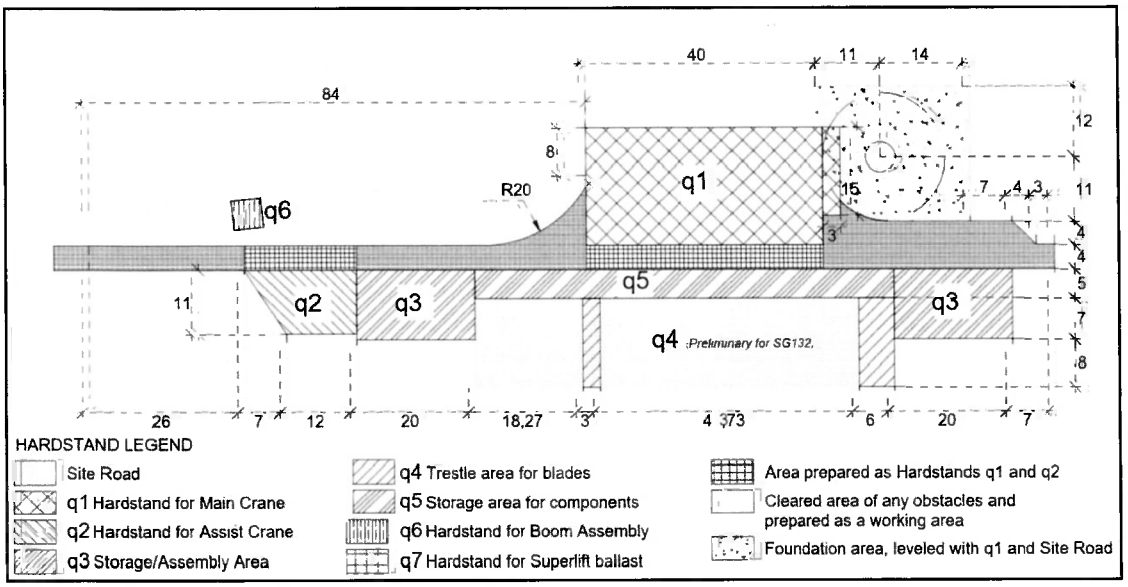


Figure 3-5: Standard Cranage Platform Layout

3.1.6 Site Roads

Approximately 4.5km of access road will be required to service the wind farm. An additional section (734m) of transport route upgrade will be required for the local road L-6733-1. Wind farm site roads will use conventional road construction (founded on tills and rock). Site access roads have the following minimum requirements:

- A useable roadway width of at least 4m.
- A useable road width for jib assembly of 6.0m (i.e. the road width within 80m of the cranage area is to be 6.0m wide).
- The clearance width for over-sized loads must be 6.0m.
- The clearance height for over-sized loads must be 4.6m.
- Radius of curve is a minimum of 28.0m.
- The maximum incline for unpaved roads is 7%.
- The maximum incline for paved roads is 12%.
- Capable of withstanding axle loads of up to 12 tonnes.
- Capable of withstanding overall weights of up to 165 tonnes.
- The E_{v2} values required for the road construction are:
    - Substructure: ≥ 80MN/m^2.
    - Base/wearing course: ≥ 100MN/m^2.

The internal site access road construction details are shown on Figure 3-6.

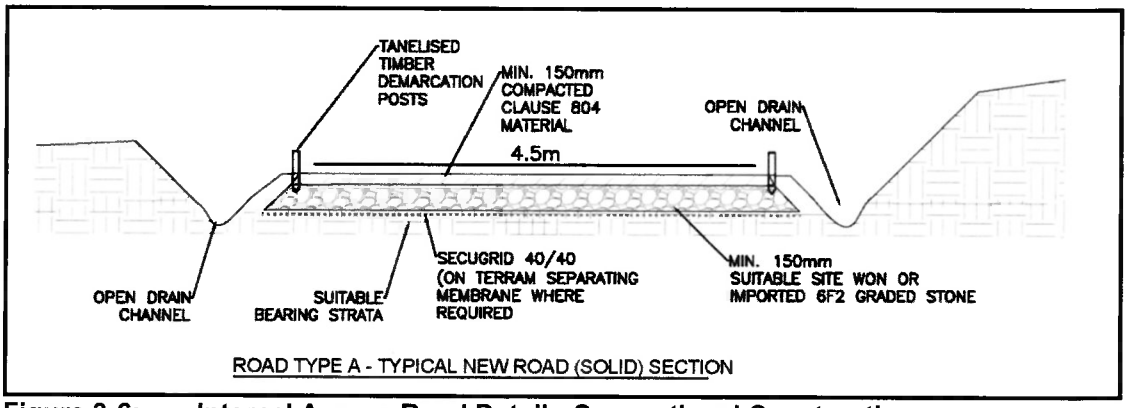


Figure 3-6: Internal Access Road Details-Conventional Construction

3.1.7 Internal Cabling

An underground 20kV cable will link each turbine with the proposed wind farm substation. The on-site cabling will generally follow site roads and offset approximately 1m, but some cable routes will go 'cross-county'. Cables can either be laid directly and surrounded with sand or pulled through PVC ducting. The use of ducting is proposed for the Graffy Wind Farm. For this single circuit, the cable trench will typically be 600mm wide and 1,300mm deep. The material excavated from the trench will be reused as backfill. For sections crossing site roads, the ducting is surrounded in lean-mix concrete for added strength. The backfill is engineered fill to return the road surface to its original condition. Figure 3-7 shows a typical trench detail.

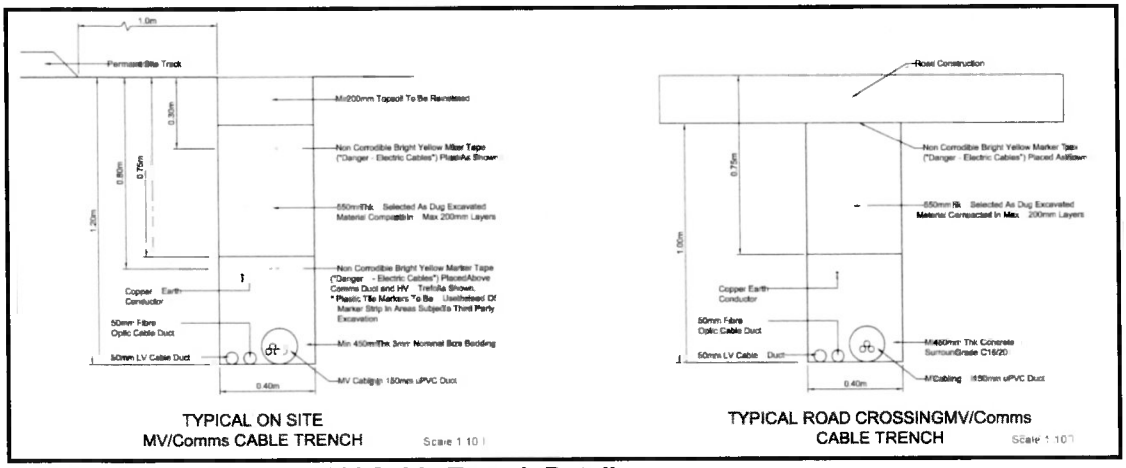


Figure 3-7: Typical 20kV Cable Trench Details

3.2 Grid Connection Infrastructure

The grid connection route largely follows public roads and existing forestry roads to the ESB Tievebrack substation at Drumnalough – a distance of approximately 7.3km. A short section at the eastern end (near the substation) cuts across a field for a distance of approximately 50m. The main elements of the grid connection infrastructure are described in the subsections below.

3.2.1 Cabling

The grid connection will be an underground 110kV cable. This will be installed in ducting with a trench approximately 1.25m deep and 0.6m wide. A typical detail is shown in Figure 3-8.

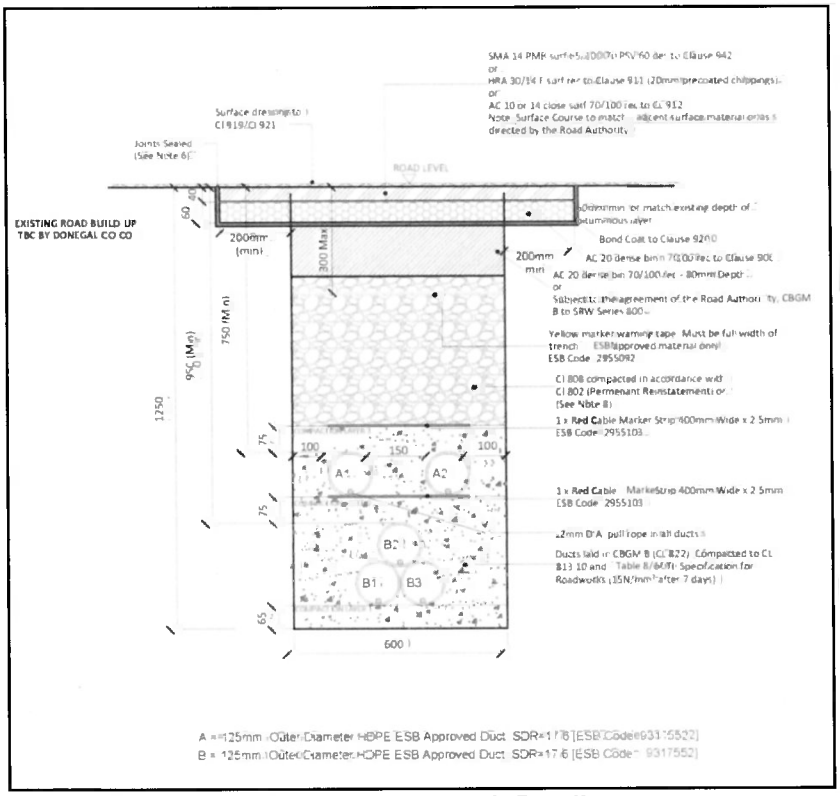


Figure 3-8: Grid Connection Trench Detail

3.2.2 Pulling Pits

Jointing bays / pulling pits will be installed at predetermined locations along the grid route. Their locations will be determined by the cable lengths and bends in the route where pulling would be difficult. Cables sections are pulled from one pulling pit to the next and the cables then joined. The pulling pits are then backfilled and covered. A typical jointing bay is shown in Figure 3-9.

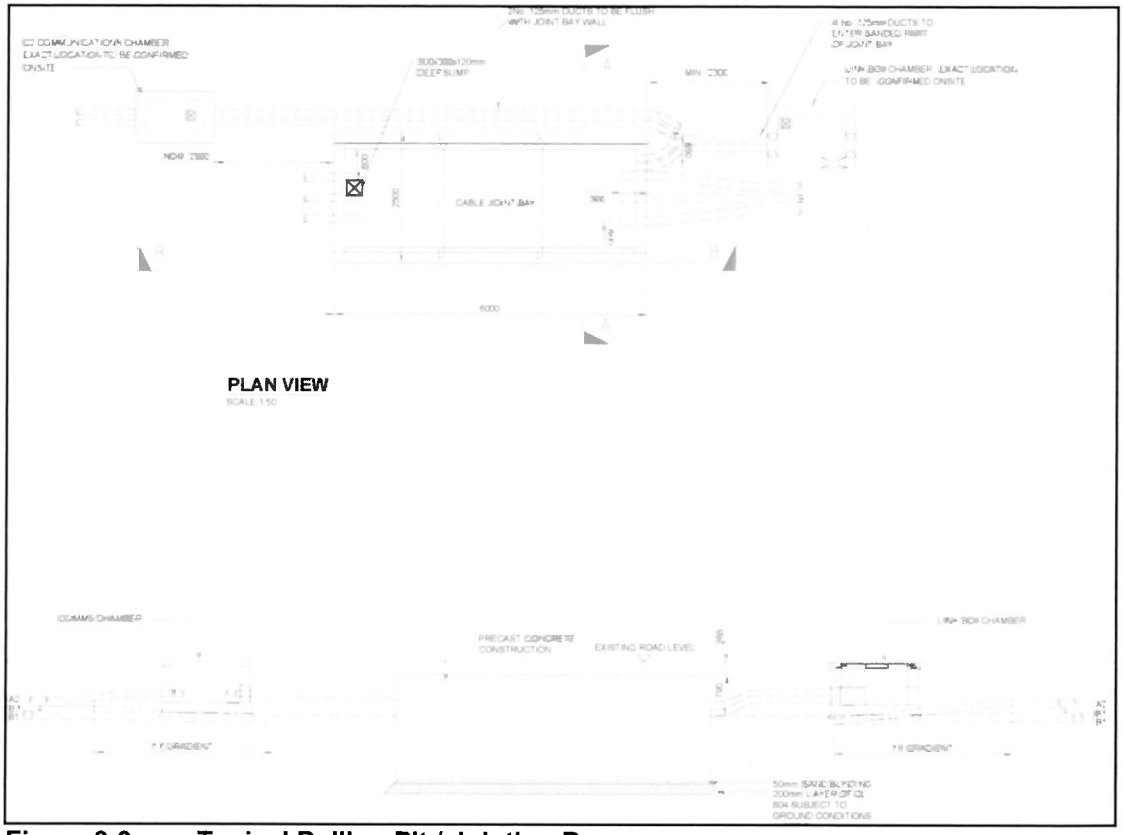


Figure 3-9: Typical Pulling Pit / Jointing Bay

3.3 Met Mast

One permanent meteorological mast will be erected within the wind farm. Its location is shown on Figure 2-2. The mast will be equipped with wind monitoring equipment mounted at various heights. A lattice galvanised steel mast is proposed which will have a triangular footprint with sides approximately 3m wide at the base and tapering towards the top of the mast. The mast will be anchored with a large reinforced concrete foundation approximately 10m in diameter and 2m high. The typical design of a meteorological mast is shown in Figure 3-10.

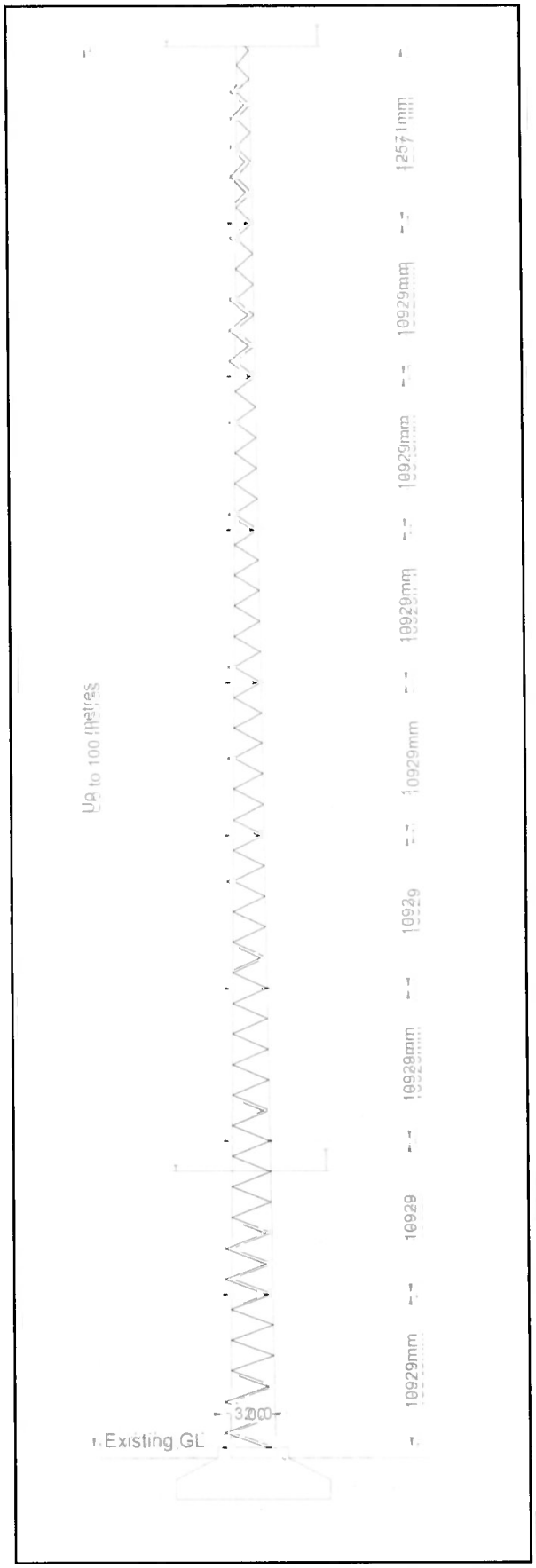


Figure 3-10: Met Mast – Steel Lattice Type

4 CONTRACTUAL ARRANGEMENTS

4.1 Project Organisation

The organisation structure for the project is provided in Figure 4-1. The developer / Employer for this project is INSERT DEVELOPER NAME. The Employer contact is INSERT NAME.
Contact Details:

Name:	INSERT NAME
Mobile:	INSERT NUMBER
Address:	INSERT ADDRESS

The client's representative / engineer is INSERT NAME OF COMPANY. INSERT NAME OF COMPANY will be responsible for the following items:

1. COMPANY NAME has appointed ENGINEERING COMPANY NAME as Project Supervisor Design Process (PSDP) for the project.
2. ENGINEERING COMPANY NAME will be responsible for project management during the construction phase and coordinating the various stakeholders and contractors.
3. ENGINEERING COMPANY NAME will be responsible for coordinating the external stakeholders / contractors including the ESB, Local Authority, Inland Fisheries Ireland and the landowners.
4. Compliance with certain planning conditions and liaising with the planning authority and Inland Fisheries Ireland.
5. Preparation and submission of the Section 50 applications to the OPW watercourse crossings, as required.
6. Licenses and authorisations from the statutory authorities for the construction and operation of the power generating plant.

Environmental/Ecological Clerk of Works (ECoW)
COMPANY NAME has also appointed INSERT ECoW NAME of INSERT COMPANY NAME as the Environmental/Ecological clerk of works (ECoW) for the duration of the construction project. The ECoW has an ecological and environmental management background with more than INSERT EXPERIENCE OF ECoW. ECoW NAME CV is provided in Attachment 7. The ECoW has the following responsibilities:

1. Undertaking regular compliance audits to establish if requirements of the CEMP are being implemented.
2. Ensuring that the environmental constraints are properly marked and sign-posted on site.
3. Providing site inductions / toolbox talks to construction workers detailing the environmental constraints and work practices to be followed to protect water quality, sensitive habitats and the environment.
4. Ensuring compliance with certain planning conditions, in particular those relating to protection of water quality and the environment.
5. Ensuring that all environmental monitoring and surveying is carried out and documented. This will include inspection of mitigation measures.

The ECoW will have the authority to instruct the client's representative and/or the contractor to implement additional mitigation measures if he deems appropriate. This includes the authority to stop works (on part or all of the site, as appropriate). The ECoW will report directly to the client's representative. The ECoW will maintain a written record of all environmental issues on site, including incidents and monitoring results. This file will be made available to the relevant Authorities upon request. The ECoW will be responsible for notifying the relevant Authorities of any environmental incident.

The ECoW will be on site fulltime for the initial site set up and commencement of works (first week) to ensure work practices are understood and carried out correctly by the contractors. The ECoW will maintain a site office permanently based on site. During works its anticipated that the ECoW will visit site a minimum of once per week and will be permanently available should he/she be required.

Civils
The Civil Works Contract (CWC) was awarded to INSERT COMPANY NAME. INSERT COMPANY NAME will have the following responsibilities:

1. To provide a qualified and experienced site foreman.
2. Perform the role of Project Supervisor Construction Stage (PSCS).
3. Provision and maintenance in a neat and sanitary fashion a temporary, secure site compound for all workers anticipated to be on the site. This will include office, canteen, welfare facilities, storage, parking for all workers and visitors and utilities required for the safe execution of the works.
4. Provision of all plant, tools, equipment and signage deemed necessary for the safe completion of the works within the programme schedule. Site signage shall include all safety signage as required by the Health, Safety & Welfare at Work (construction) regulations, site notice board, speed limit signage (max site speed shall be 15km/hr), direction signage, warning signage at excavations etc.
5. Setting out of the site to the details shown on the planning drawings, including internal roads, turbine location and cranage area, site compound, internal cable trenches and grid connection trenches.
6. Construction of site roads, cranage areas, excavation of turbine foundations, excavation of the cable trenches and installation of the PVC ducting, construction of the substation, excavation of the grid connection trench and installation of ducting, drainage, environmental controls etc.
7. Securing road opening licences for the installation of cables along the public road.
8. Control of potential pollution arising from the works. These will include:
    a. Washout of concrete trucks.
    b. Refuelling of machinery.
    c. Silt-laden runoff.

Turbine Supply
The turbine (WTG) supplier will be INSERT SUPPLIER NAME. The Employer will have a separate contract with the turbine manufacturer for the supply, erection and commissioning of the turbines. The turbine manufacturer's scope of supply includes the construction of the turbine foundations. The client's representative will be required to co-ordinate certain works with the turbine manufacturer to ensure smooth interface with turbine foundation construction and turbine installation.

Electrical Contract
INSERT SUPPLIER NAME has been appointed the electrical balance of plant contractor. INSERT SUPPLIER NAME will be responsible for:

1. Provision of all plant, tools, equipment necessary for the pulling and termination of 20kV cables and fibre optic cables.
2. Fit-out of the substation of all electrical equipment.
3. Commissioning of the substation equipment.
4. Pulling and jointing of the grid connection cables.

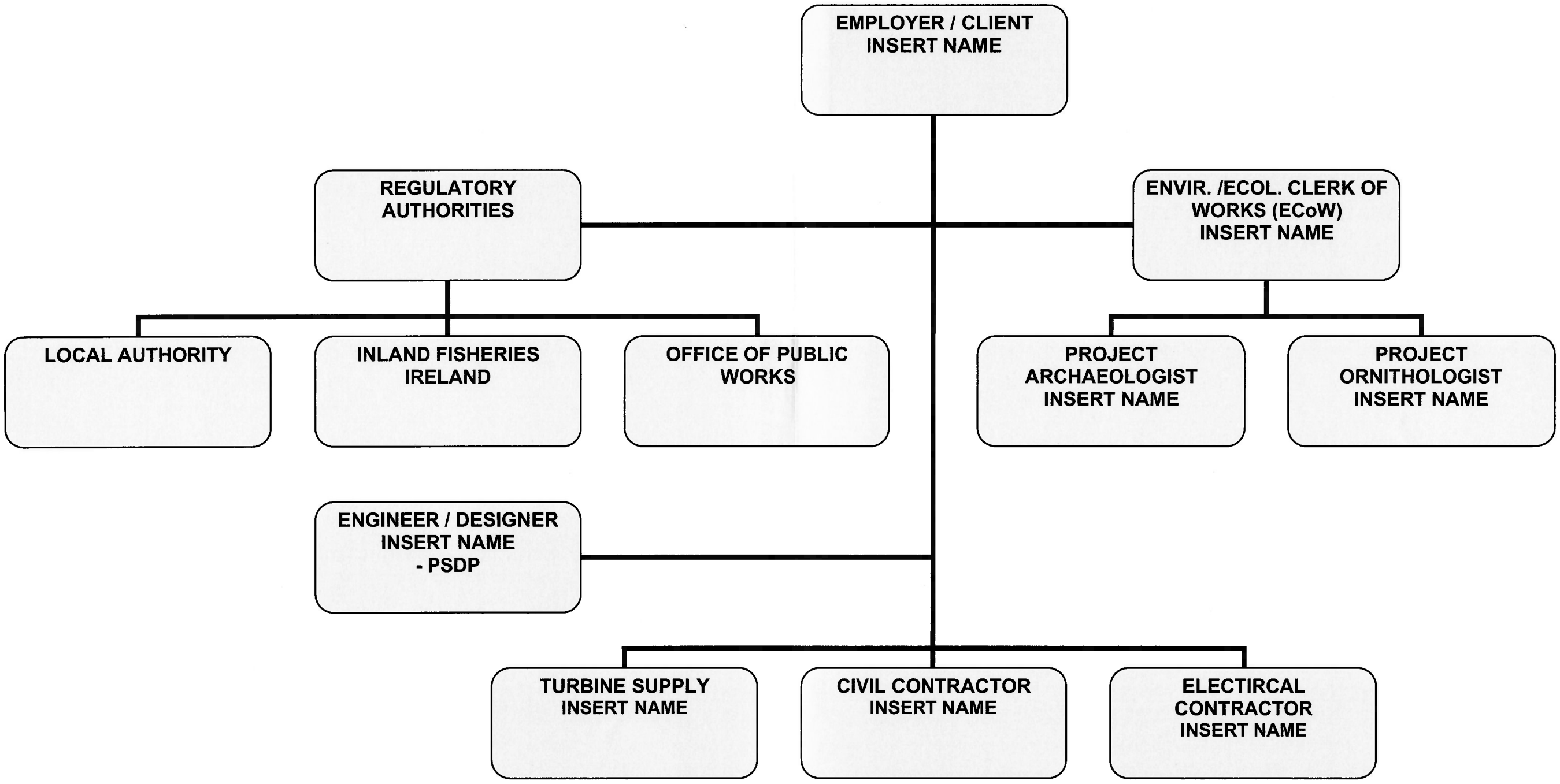
4.2 Construction Programme

The construction programme will last approximately 12 months. The earthworks element of the project is expected to be completed within the first six months.

An outline of the project programme is as follows:

1. February 2022: Mowing of construction area footprint to discourage birds nesting in the works areas and trimming of tress on access roads.
2. Month 1: Mobilisation to site and commence construction of access roads, cranage areas, installation of cable ducting and transport route upgrade. Estimated duration = 6 months.
3. Month 4: Commence construction of turbine foundations. Estimated duration = 3 months.
4. Month 6: Commence pulling internal wind farm cabling. Estimated duration = 1 month.
5. Month 7: Commence installation of turbines. Estimated duration = 4 months.
6. Month 12. Wind farm commissioning complete.

Figure 4-1: Organisation Structure



5 ENVIRONMENTAL CONTROLS

The avoidance, reduction and mitigation measures provided below reflect those provided in the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) submitted with the planning application. The civil works contractor may, with agreement of the Employer and ECoW, propose alternative measures that provide equal or greater protection to water quality and the environment.

5.1 Amenity Protection

The protection of the amenity in the vicinity of the site relates largely to the control of noise emissions from the site. Management of construction traffic to minimise impact on local road users is also an important consideration.

Noise surveys were carried out as part of the environmental impact assessment for Graffy Wind Farm to establish existing background noise levels. Noise surveys were conducted at two locations over 15 days. Data collected from one of the monitoring stations were considered erroneous, so the data from the second monitoring station is relied upon to establish baseline noise levels. These baseline noise measurements are considered to represent background noise levels in the wider area. The main sources of noise were typical countryside sounds predominantly controlled by the noise generated from wind effects on vegetation, low-intensity farming activities, water flowing in the on-site streams and traffic on the local road network.

It is not possible to specify the precise noise level emissions from the construction equipment until such time as the construction plant has been selected. However, Table 5-1 indicates typical construction related noise levels.

Table 5-1: Typical Noise Levels from Construction Works (ref: BS 5228)

Activity	Plant	LAeq @ 10m
Site clearance/excavation	Lorries (drive by)	70 dB
Removal of waste/rubble	Dozers	87 dB
	HGV and tippers	84 dB
Foundations	Concrete Pour	to 80 dB
	Place and vibrate	to 86 dB
	concrete cycle Cement	80 dB
	Mixers	74 dB
Concrete Frame	Large crane operations	86 dB
	Place and vibrate	80 dB
Road works/landscaping	Surfacing/rolling	76 – 86 dB
Infilling/Levelling	Dump truck	82 dB
	Wheeled excavator/Loader	76 dB
	Dozer	81 – 89 dB

The construction of turbines will typically be at least 725m from the nearest dwellings. Attenuation by distance, ground absorption and air attenuation will result in typical noise levels at the nearest dwellings of approximately 33dB(A). As a pre-caution, a 5dB(A) penalty is applied for possible tonal effects, bringing the noise level to 52dB(A). These levels indicate a minor/negligible impact with all the machines listed in Table 5-1 in operation, based on background noise levels recorded in 2019.

The construction equipment likely to be used for the grid construction works is listed in Table 5-2.

Table 5-2: T ypical Noise Levels during Construction

Equ ipment	BS 5228referen ce	LAeq at 10m
Excavator	Table C5 No.11	73
Tractor	Table C4 No.74	80
Stihl Saw	Table C4 No.70	91
Small Excavator	Table C4 No.10	66
Com pactor	Table D3 No.118	89

The construction work associated with the grid connection will be closer to houses than the works on the wind farm. Noise levels associated with the equipment listed in Table 5-2 at 30m, all operating at the same time, will be 66.3 L_{Aeq}, below the noise level limit of 70dB L_{Aeq}. Where construction occurs less than 30m from a property, the noise limit is expected to be exceeded, however, at a cable-laying rate of 100m per day, the equipment would only be expected to be within 30m for a short period.

To mitigate against the impacts of noise on the local community, the following mitigation measures are proposed for the construction phase:

- Working hours at the site during the construction phase will generally be limited from 07:00 to 19:00 Monday to Saturday inclusive. Work on Sundays or Bank Holidays will only be conducted in exceptional circumstances or emergency or where heavy (i.e. noisy) machinery is not required. Exceptional circumstances would include lifting of turbine components in calm weather periods outside normal working hours. Concrete pours for turbine foundations will need to start earlier (typically 05:00). This will only occur for the pouring of the foundations (8 No. turbines and substation) during the construction period.
- All construction will be carried out in accordance with BS 5228: 2014 (Noise and Vibration Control on Construction and Open Sites - Part 1[2]. Accordingly, all construction traffic to be used on site will have effective well-maintained silencers.
- Operators of all mobile equipment will be instructed to avoid unnecessary revving of machinery. Machines that may be in intermittent use will be shut down between work periods or will be throttled down to a minimum.
- The contractor will be instructed to use the least noisy equipment. With efficient use of well-maintained mobile equipment considerably lower noise levels than those predicted can be attained.
- The Client's Representative will closely supervise all construction activity. Construction activity due to its nature is a temporary activity and thus any impacts will be short term. The majority of construction works will be carried out during the day-time period.
- Plant known to emit noise strongly in one direction will, where possible, be orientated so that the noise is directed away from the nearest noise sensitive locations.
- Speed limits of 15km/hr will be enforced on internal site roads. This will reduce noise emissions from the HGV traffic.

5.2 Groundwater Protection

The bedrock aquifer underlying the site is classified as a poor aquifer (Pl). The thin overburden cover means that the aquifer has an extreme vulnerability to contamination, such as fuel spills during the construction phase. There are two groundwater wells within the vicinity of the site – a shallow dug well / spring and a bored well.

The following measures will be implemented during construction to minimise the risk to the groundwater resource:

[2] British Standards Institute, February 2014. *Code of Practice for Noise and Vibration Control on Construction and Open Sites. Noise: BS 5228-1: 2009+A1:2014.*

1. Any storage of oils and diesel on site will be in steel or plastic tanks of good integrity and bunded to 110% of tank capacity. All fuel and hydraulic fluids will be stored in the site COSHH store located in the site compound.
2. Refuelling will be carried out directly from delivery vehicles. Refuelling of mobile plant will not take place within 50m of any sensitive receptor – e.g. streams, wells, etc. Refuelling by mobile bowser may be used for small generators etc. Toolbox talks on refuelling will be given to delivery drivers in addition to plant operatives. The refuelling toolbox talk information sheet is provided in Attachment 8.
3. Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice.
4. Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of.
5. Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
6. Appropriate spill control equipment, such as oil soakage pads, will be kept within the construction site to deal with any accidental spillage.
7. Concrete will be poured in excavations and / or in formwork. Washing out of concrete trucks will not be permitted on site. Washout will take place at the batching plant where suitable facilities should be in place. Chute only washing will be permitted on site. This will occur at a dedicated, lined and contained area(s) on site.
8. Wastewater from the welfare facilities will be collected in sealed tanks for both the construction and operational phases.

There are no groundwater wells near the works areas, so specific measures for wellhead protection are not required.

5.3 Surface Water Protection

Surface water assessments are addressed in Chapter 8 (Water) and Chapter 11 (Fisheries & Aquatic Ecology) of the EIAR. Figure 5-1 shows the main surface water drainage features on the site relative to the proposed turbines. As outlined in Chapter 2 above, the site is in mountain peatland, in the upper catchments of the Stracashel and Stranagoppoge rivers and along the foothills of Aghla Mountain.

The river water quality in the Stracashel catchment is unpolluted with good water quality rating – Q4 or Q5. The river water quality in the Stranagoppoge catchment is slightly polluted to unpolluted with moderate to good water quality rating – Q3/4 or Q4. There are several crossings to be made of the streams draining the site. This work may be subject to Section 50 approval from the OPW. Consultation with IFI and OPW will be conducted by the Project Engineer in this regard. Drainage from the site is largely overland sheet flow to man-made drains – field boundary drains, forestry drains, herring-bone field drainage and roadside drains – and streams. The main risks associated with potential impacts on water quality are working in proximity to the watercourses, siltation, fuel spillage and use of concrete.

The mitigation measures to be employed during the construction phase to protect water quality follow the hierarchal principle of minimise-settle-treat. These are:

- A minimum buffer of 50m from watercourses will be used for the storage of peat and soils, storage of fuels / chemicals, the refuelling of mobile plant, and the placement of the washout area for concrete trucks.
- All buffer zones adjoining the works area will be delineated using post and rope fencing and marked as an exclusion zone. These will be maintained for the duration of the construction works.
- In-stream works required for the construction of culverts will be conducted during low flow conditions. Method statements for culvert construction will be developed by the civils contractor and approved by the ECoW. The Method Statement will include the minimum requirements set out in the EIAR for the construction of culverts.

- During the construction phase, best practices will be employed to minimise the release of sediment laden storm water runoff, details of which are set out herein.
- Following mobilisation to site, surface water management infrastructure will be the first works carried out. Additional controls will be installed as needed as construction progresses through the site, and/or as identified during site inspections of surface water management infrastructure.
- To reduce the volume of water to be treated and to reduce the erosion potential of exposed peat and soils, clean surface water runoff will be diverted around earthworks areas at the turbine locations and through earthworks areas along road alignments. This will be done with the use of diversion drains or barriers.
- Areas stripped of vegetation will be kept to a minimum. Areas along roads and around hardstands will be reinstated on an on-going basis as this infrastructure is constructed. This will reduce areas of soil exposed to erosion.
- Roadside drainage will be provided to collect runoff from new site roads. Check dams will be installed at intervals within the channels to slow flows and settle silt. Distances between check dams will be such that the level at the crest of one dam will be the same as that of the toe of the upstream dam. Therefore, dams will be closer together on steeper parts of the site. The drainage channels will tie into existing drains where they intercept.
- In addition, roadside drainage channels on steep sections of the site will be lined with geotextile or jute to reduce erosion.
- Where the roads cross existing drainage paths, pipework will be installed to transfer water beneath the road. There are a number of existing roadside and field boundary drains to be crossed. To retain the hydraulic balance across the site, cross drains will be installed through the roads at regular distances where they cut through existing preferential flow paths.
- Settlement ponds will be provided at the locations shown on the site layout drawing. They will be used to treat surface water runoff from the earthwork areas. Each will be sized for the catchment area contributing to that pond and to treat water, in combination with the polishing in the vegetative buffer zone, to 20mg/l prior to reaching any watercourse. The limit at the inlet to each pond will be 1,000mg/l TSS. The rational for 1,000mg/l is set out below in Section 5.3.1. The design, location and sizing of these ponds are included on the pond location drawing prepared by [INSERT NAME OF PROJECT ENGINEER].
- The roads and hardstand areas will be constructed with aggregate – there will not be a hard-paved surface. This will reduce runoff volumes in practice from the estimated increases.
- The public road serving the site will be kept clean of mud and debris so that silt is not washed to watercourses downstream of the site and outside the control of the wind farm development. If mud or debris is tracked onto the public road from vehicles leaving the wind farm site, the road will be swept.
- Stockpiled soils will be kept a minimum distance of 50m from any watercourse. Silt fences will be placed downgradient of stockpiles to treat any polluted runoff.
- Check dams and / or straw bales will be installed along the alignment of roadside drainage to slow flows and remove silt. Check dams will be constructed using clean stone and geotextile spanning across the drainage channel.
- If required, dewatering of the foundation excavations will be to the temporary settlement ponds. Flow from the settlement ponds will be diffuse, distributed from the ponds by level spreaders. On release, the discharge water would travel over a minimum of 50m of peatland thus ensuring that there is no direct discharge to watercourses and that all flows are buffered prior to entering existing drainage systems. However, it is not expected that groundwater will be encountered during foundation construction.
- Works on stream crossings will be carried out in dry weather as far as practical when low flows occur in the streams / drains. Although fish were absent during surveys at all new crossing locations, bridging of the larger streams will be achieved by clear-span structures – refer to crossings X1, X5 and X6. In-stream works will be kept to a minimum and will be avoided between 01 October and 30 April as per IFI and Loughs Agency guidelines. The IFI will be consulted for crossings wider than 600mm.

Stream crossing design will have regard to the Fishery Board's guidance documents for road construction.

- The release of cement to water courses will be prohibited. Concrete pours will occur in contained areas. Chute only washout of concrete trucks will be done at a dedicated location on site (minimum of 50m from any watercourse) where a skip, lined with plastic will be provided to collect washout water. The skip will be placed in a contained lined pond with a shutoff valve. Water will be decanted from the skip into the lined pond. Signage will be erected at the site directing drivers to the washout area. This washout area will be removed at the end of the construction phase. The pH of the washout water will be monitored and will only be released from the pond when pH falls below 9. The hardened concrete will be taken off site for disposal or for beneficial reused on site.
- Suitably qualified persons will carry out monitoring of construction activities to ensure surface water quality is not impacted and where necessary instruct the contractor to implement remedial works. This will include a surface water quality monitoring programme to be implemented at the site during the construction phase. Reference should be made to the Method Statements prepared for the development which outline the monitoring requirements for each construction phase. As noted, the ECoW will carry out this monitoring. See Section 5.7 below for further details on the site monitoring measures.
- Earthworks will be temporality suspended during prolonged periods of heavy rainfall – i.e. during a Met Eireann Orange Warning for Rainfall[3]. In this regard, weather forecasts will be monitored by the Client's Representative.
- Hydrocarbons (oils, diesel and chemicals) will be stored and managed in an appropriate manner to ensure no negative impacts. Specific measures will include:
    - Any storage of oils and diesel on site will be in steel or plastic tanks of good integrity and bunded to 110% of tank capacity. All fuel and hydraulic fluids will be stored in the site COSHH store located in the site compound.
    - Refuelling will be carried out directly from delivery vehicles. Refuelling of mobile plant will not take place within 50m of any sensitive receptor. Refuelling by mobile bowser may be used for small generators etc. Toolbox talks on refuelling will be given to delivery drivers in addition to plant operatives.
    - Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice.
    - Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of.
    - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
    - Appropriate spill control equipment, such as oil soakage pads, will be kept in the site plant to deal with any accidental spillage. Spare spill kits will be kept at the construction site compound.
- Silt fences will be erected on the downslope side of any earthworks areas to intercept any overland flows that could potentially be carrying silt / fines. They will also be erected downslope of the pond discharge points to assist with polishing of surface water in the buffer zones. These are constructed with geotextile embedded in the peat and supported with wooden pegs. See example in Plate 5-1.

[3] USEPA National Pollutant Discharge Elimination System, 2014. National Menu of Best Management Practices (BMPs) for Stormwater.

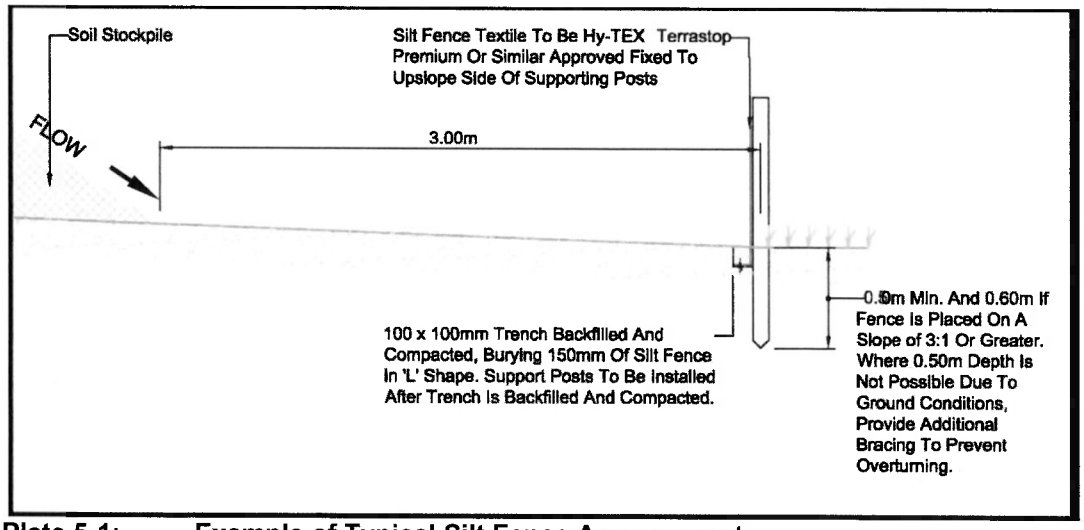


Plate 5-1: Example of Typical Silt Fence Arrangement

- An Emergency Response Plan (EMP) has been developed to set out procedures to be followed in the event of a pollution incident – refer to Chapter 8. The ECoW will explain the EMP to all workers during site induction.

Mitigation measures to be employed during the trenching for the grid connection include:

- The trenching for the grid connection will be done in short sections minimising the amount of disturbed ground and soil exposed to runoff. Each section of trench opened will be completed (ducting installed and backfilled) by the end of each working day.
- The section of trenching to be completed each day will be inspected and surface water protection measures put in place prior to excavation works commencing. This will include placement of sandbags to protect existing roadside drains, placement of sandbags to direct road runoff from the works area, erecting silt fencing where appropriate, locating culverts to be crossed that day, etc.
- Surplus excavated material will be loaded directly into trucks and taken off site to an authorised waste recovery facility. Where the material encountered is suitable for reuse as backfill, it will be placed on the upgradient side of the trench so that any rainfall runoff (carrying silt) will be into the trench.
- Concrete truck rinse down will not be carried out along the grid route. This will be done at the batching plant.
- In the unlikely event that trenches need to be dewatered, a vacuum tanker will be used. The water will be taken to the wind farm site and discharged into an on-site settlement pond. The water will be released into a drain leading to the pond at a rate that doesn't exceed the design parameters of the pond, to ensure the water is sufficiently treated to remove silt. Due to the extremely high value of the receiving surface water environment, water will not be pumped from trenches to the roadside drains.
- Where replacement of existing stone culverts is required, the following mitigation will be used:
    - Works will be supervised by the ECoW and / or the project aquatic ecologist who will liaise with IFI and National Parks and Wildlife Service (NPWS) prior to works commencing. The ECoW will also monitor surface water quality downstream of the works in accordance with the surface water monitoring programme and will have the authority to cease any works should the monitoring identify unacceptable water quality conditions.
    - Any works within watercourses that have the potential to support fish (indicated in Chapter 11 of the EIAR as being at least of "Medium" sensitivity), will be avoided between 01 October and 30 April as per IFI and Loughs Agency guidelines.

- All plant and equipment will be serviced and cleaned before entry to site to limit risk of oil spillage and for biosecurity.
- Where temporary fluming or flow diversion is proposed in a watercourse with salmon or trout present (at least Medium sensitivity) all fish within the designated area will be subject to fish rescue and translocation downstream by a fisheries biologist. Fish rescue will be conducted under Section 14 authorisation (DCCAE/ IFI) or Section 69 authorisation (Loughs Agency) where appropriate.
- Works will be carried out in dry weather with low flows in the streams with forecast for dry weather for the duration of the works – approximately 2 days.
- Machinery used will stay on the public road; machinery will not be permitted to enter the stream channel.
- The road edge adjacent to the watercourse will be lined with sandbags and silt fences (multiple fences recommended) as appropriate to prevent runoff from the trenching works reaching the stream. The design of these multiple features shall also allow for the safe removal of accumulated silt away from the channel, particularly through staged removal of the most contaminated upper fence before the lower ones, and the removal of the final fence only when it is clear of any silt
- Clean sandbags will be used to dam flows on the upstream side of the culvert. Sandbags will be placed by hand at a suitable location to take advantage of any natural pool but set back from the works to permit unhindered excavation of the existing culvert.
- A second sandbag dam will be placed on the downstream side of the culvert to prevent backflow into the works and contain any groundwater seepage that is likely to be turbid.
- Sandbagging requires careful attention to detail if it is to be effective. All bags must be laid neck uppermost and seams aligned. Bags must not be overfilled or they will not tamp together or will burst with ease. Additional bags will be filled ready to raise freeboard of dams.
- Flume placement for temporary flow diversion or permanent replacement of culverts will follow guidelines issued by IFI and CIRIA to ensure that fish passage is not impeded.
- If topography permits, the water will be piped over the road by gravity flow, otherwise, it will be pumped. Discharge will be via break tank or similar approved storage onto a splash-plate or rip-rap (gabion basket) to dissipate energy and avoid scour or erosion of the stream bend or banks. The pump will be filled with a screen, so fish aren't drawn into the pump intake.
- The use of pump sumps will be considered within the dammed area. These will be lined to prevent scouring. The intention is to intercept clean groundwater ingress and pump it out rather than allowing it to get silted in the works area by segregating off areas.
- Any spoil generated will be removed to designated safe area clear of the flood plain. Some of this spoil will be saturated and will require bunding and sheeting over.
- If bank material needs to be removed it will be stored separately and reinstated according.
- The ducting will be advanced passed the culvert and the existing culvert will be excavated 'in the dry' and a new culvert, sized for a 100-year rainstorm event, will be installed with appropriate gradient, headworks and outfall. A precast concrete culvert, concrete pipe or HPDE pipe will be used. Culverts will be embedded to at least 300mm below the existing stream bed to ensure backwatering. Culverts will avoid a significant change in gradient (i.e. >3%). After embedding, replacement culverts will be filled with clean washed gravels and cobbles to replace lost habitat and facilitate fish movement.
- Dry stone headworks will be placed at the culvert intake and discharge and the stream bed adjacent to the works will be reinstated at the direction of the project aquatic ecologist.
- The ECoW will determine the quality of any water trapped between the two dams – visual inspection and turbidity meter. If this water is clean, it will be

left in situ. If it is not clean, it will be removed from the works area prior to removal of the dams. If required, dewatering of the works area prior to dam removal will be undertaken by pumping from the stream bed to either a) the cable trench for percolation or b) taken back to the wind farm site for treatment at an existing settlement pond or c) treatment using a Siltbuster. The most efficient method will depend on the volume of water present and the available percolation.

- The upstream dam will then be removed to permit flow though the new culvert. This will be done in phases, so a large volume of water isn't released at once. The downstream dam will be removed in a similar manner.

The two bridges along the grid connection route have been inspected by the specialist contractor and it confirms that HDD is the most appropriate ducting installation method at these two locations and at a third location (triple culvert). For directional drilling, a specialist contractor will be engaged. The HDD contractor will provide a site-specific method statement for this work – see draft in Attachment 6. It will incorporate the measures detailed in the CEMP, including emergency response plan, and the following measures:

- As rotary drilling techniques are required, drilling fluid will be required. A materials safety data sheet (MSDS) for the drilling fluid will be provided to, and approved by, the ECoW prior to works commencing.
- Measures to protect the watercourse will be erected before commencement of drilling. This will include silt fencing, sandbags and straw bales. Additional materials will be on hand in the event of a frac-out – refer to Appendix B in the TLI report (Appendix 7) for the 'frac-out' mitigation plan.
- Operations will to be limited to daytime hours and conditions when low levels of rainfall are forecast.
- The depth of the bore shall be a safe depth (minimum 1.5m) below the bed of the watercourse.
- The ECoW will monitor, or arrange for monitoring, drilling operations at all times
- Diesel tanks, used to store fuel for the various items of machinery, will be self-contained and double-walled. Refuelling will be carried out from these tanks for small plant such as generators and directly from delivery vehicles for larger plant. Specific mitigation measures relating to management of hydrocarbons are:

A suitably qualified ECoW will carry out monitoring of construction activities to ensure surface water quality is not impacted and where necessary instruct the contractor to implement remedial works.

5.3.1 Selection of Stilling Pond Trigger Level

Based on site-specific settlement trials [TO BE CONDUCTED] and published literature on the efficiency of buffer zones, the surface water treatment infrastructure has been designed as follows:

- Ponds to settle out particles >63um (i.e. fine sand) with 100% efficiency.
- Ponds to settle out particles <63um (i.e. silt and clay) with 31% efficiency.
- Buffer zones with minimum width of 50m to settle out remaining particles <63um with 97% efficiency.

Based on a pond inlet trigger level limit of 1,000mg/l, a concentration of 20mg/l TSS on discharge to any watercourse is designed. This will take up a small percentage of the available TSS headspace in the streams draining the site.

Assimilative Capacity = $[(C_{max} - C_{back}) \times F \times 86.4]$ kg/day

where:

C_{max} = maximum permissible concentration 25 mg/l TSS

C_{back} = background upstream concentration 10 mg/l TSS (maximum recorded at Graffy site
F = flow in the river (m^3/sec) 95%tile flow used
86.4 = constant to correct the units to kg/day

The assimilative capacity calculation is supported by a mass balance assessment which calculates the resultant concentration in the receiving waters due to the discharge. The mass balance assessment uses the following formula:

Mass Balance (T) = [(F x C) + (f x c)] / F + f mg/l

where:-

T = Resulting concentration due to the discharge (mg/l)
F = Flow in receiving waters at 95%tile (m^3/sec)
C = Average background concentration in receiving waters 10mg/l TSS
f = Discharge flow (total flow from the ponds in each catchment) (m^3/sec)
c = concentration in the discharge (mg/l)

Assimilative capacity and mass balance assessment is provided for total suspended solids (TSS) - the salmonid water regulations value of 25mg/l is used.

Stracashel River
background concentration = 10 mg/l
95%tile flow in the Stracashel River = 0.032 m^3/sec
Maximum permissible concentration = 25 mg/l (salmonid water regulations)
Discharge flow from the ponds in Stracashel catchment = 0.208 m^3/sec

Assimilative Capacity TSS = [(C_{max} – C_{back}) x F x 86.4] kg/day

= [(25 – 10) x 0.032 x 86.4]
= 41.47 kg/day

T TSS = [(F x C) + (f x c)] / F + f mg/l

= [(0.032 x 10) + (0.208 x 20)] / 0.032 + 0.208
= 18.67 mg/l TSS

The discharge will increase concentrations in the Stracashel River from 10 mg/l to 18.67 mg/l, using up 58% of the available headroom.

Stranagoppoge River
background concentration = 10 mg/l
95%tile flow in the Stranagoppoge River = 0.02 m^3/sec
Maximum permissible concentration = 25 mg/l (salmonid water regulations)
Discharge flow from the ponds in Stranagoppoge catchment = 0.164 m^3/sec

Assimilative Capacity TSS = [(C_{max} – C_{back}) x F x 86.4] kg/day

= [(25 – 10) x 0.02 x 86.4]
= 25.92 kg/day

T TSS = [(F x C) + (f x c)] / F + f mg/l

= [(0.02 x 10) + (0.164 x 20)] / 0.02 + 0.164
= 18.9 mg/l TSS

The discharge will increase concentrations in the Stranagoppoge River from 10 mg/l to 18.9 mg/l, using up 59% of the available headroom.

5.3.2 Maintenance of Site Drainage Systems

The drainage system for the wind farm will be maintained regularly to keep it operating effectively. The maintenance will include the following:

- inspection of silt fencing for silt build up.
- inspecting cross-drains for any blockages.
- inspecting settlement pond and outfalls.
- inspecting the stream crossing for obstructions.
- inspecting the progress of the re-establishment of vegetation.
- implementing appropriate remedial measures as required after the above inspections.

The above checks will be undertaken as part of the drainage audit which will commence on the installation of the drainage prior to construction and will continue through the construction phase. During the first year of the operation and maintenance phase of the wind farm, drainage inspections will also be carried out at regular intervals.

A record will be kept of any remediation measures which are deemed necessary following each audit and/or inspection. A template of the audit check list is provided in Attachment 9. Records of any remediation measures will be made readily available as part of the weekly reporting upon request by the IFI and Donegal County Council.

Maintenance will be in accordance with CIRIA C697 (SuDS and Maintenance Manual).

It is not envisaged that the operation of the wind farm will result in significant impacts on the hydrological regime or water quality of the area, as there will be no further disturbance of soils post-construction, and only minimum traffic movement. The drainage system will however remain in place during the operational period, albeit that settlement ponds will be backfilled following the completion of the works. The settlement ponds will be backfilled with suitable excavated material, with an allowance for the continuity of drainage across the top of the settlement pond from inlet to outlet.

5.4 Site Stability

It is estimated that approximately 46,593m^3 of peat will potentially be excavated during construction of the roads, cranage areas, substation and turbine foundations.

The peat depth within the development footprint was found to be <1.0m typically, but up to 5.4m. Deeper peat is found in small basin defined by rocky outcrop, so is contained.

Based on an assessment of ground conditions at the site it is determined that the construction of the wind farm has a low risk of construction-related peat instability. The full peat landslide risk assessment is provided in EIAR.

During construction the following measures will be employed to ensure peat and ground stability:

1. Avoid the stockpiling of peat at the turbine sites. Excess excavated peat will be removed to the peat recovery areas – locations shown on the site layout drawing.
2. Earthen / rock embankments will be used to hold the peat in place.
3. Peat turves will be stored on site for reuse in restoration along the roads and around the cranage areas and turbine foundations. Restoration will be carried out on an on-going basis as infrastructure is built. This will reduce the volume of peat in temporary storage and also reduce the areas of soil exposed to erosion.
4. Inspections and testing of roads and cranage area will be carried out during their construction to ensure that they can accommodate the design loadings. Formation levels for the turbine foundations will also be inspected, tested and certified prior to constructing the turbine foundations.

5. Monitoring of the peat during the road construction will be carried out in areas of deeper peat at the site. Based on the road construction method, monitoring pegs (for lateral displacement) will be used.

Engineers from INSERT COMPANY NAME will carry out monitoring of construction activities, with a view to identifying areas of unstable peat and to instruct the contractor to implement suitable remedial works, if required.

5.5 Archaeology

Dermot Nelis Archaeology prepared the Archaeological & Cultural Heritage Assessment for the proposed development – refer to Chapter 9 of the EIAR. The findings of the assessment were that there are no features of archaeological interest within the proposed development footprint; there are 11 RMPs within the 5km study area of the wind farm; one RMP within the 1km study area of the grid connection; and no RMP within the 1km study area of the transport route upgrade. It was concluded that there will be no direct or indirect construction phase effect on the recorded archaeological, architectural or cultural heritage resource. It is considered there will be a permanent direct imperceptible construction phase effect on any previously unrecorded archaeological remains that may exist within the development area. It is considered there will be a permanent direct imperceptible construction phase effect on eight townland boundaries that will be impacted on by the development.

Bogs are recognised as being areas of archaeological potential and often contain previously unrecorded well-preserved below-ground archaeological remains. As such, previously unknown archaeological sites could be encountered during construction earthworks and so, monitoring of excavation works will be carried out.

INSERT COMPANY NAME has engaged INSERT COMPANY NAME to carry out the necessary monitoring, liaise with the Department and report on its findings. The mitigation measures to be implemented for archaeology during construction are as follows:

1. Written and photographic records be created of the eight affected townland boundaries. The written and photographic records will be created in advance of groundworks commencing on site.
2. No groundworks will occur without the presence of a suitably qualified and licensed archaeologist to monitor all such disturbance. Monitoring will be carried out under licence to the Department of Culture, Heritage and the Gaeltacht and the National Museum of Ireland. Provision will be made for the full excavation and recording of any archaeological features or deposits that may be exposed during monitoring. The objective of archaeological monitoring is to record, to professional standards, any features and objects of archaeological importance that will be discovered in the course of the construction activity.
3. The Civil Works Contractor will work closely with the archaeologist and provide all necessary access and other arrangements.
4. Each excavating machine will be watched by one archaeologist at all times (1:1 ratio).
5. The Department will be consulted to agree the appropriate course of action in the event of the discovery and identification of any archaeological remains, which may include preservation in situ or excavation and recording. This may require suspension of earthworks at that location until agreement is reached.
6. The project archaeologist will keep the Department case officer informed of all stages of the archaeological site works.

5.6 Ecological Management Plan

Woodrow Sustainable Solutions Ltd and RPS prepared the Biodiversity chapter for the EIAR and RPS prepared the NIS for the proposed development.

Fourteen habitat types have been mapped across the proposed development. The vast majority of the application site and its surrounds comprises a range of upland habitats including wet grassland, wet heath, upland blanket bog and lowland blanket bog. These habitats are typical of the wider area which is characterised by upland habitat. The site is within the catchments of two SAC – Finn River SAC and West of Ardara/Maas Road SAC.

The proposed grid connection lies in proximity to a range of habitats including semi-improved grassland, forestry plantation, watercourses, heath and wet grassland. It is noted that the grid connection proposals will not give rise to the loss of any adjacent habitat with the proposals confined to the carriageway of the existing road/track on which the route is proposed.

Otter is the only mammal identified that could potentially be affected by the proposed development – the grid connection runs close to the Stracashel River. Other mammal species such as badger, red deer, red squirrel, pine marten and Irish hare are likely to utilise the site; red deer and Irish hare were recorded within the general vicinity of the site. However, it is considered that the relatively small areas of habitat which will be affected by the proposed development are likely to be of relatively low ecological value for these species.

There are no moderate or major effects predicted for terrestrial habitats as a result of the proposed development. Thus, there are no potential significant impacts arising which require avoidance, reduction or counterbalancing measures to mitigate or offset their adverse effects. In turn, there is no requirement for monitoring of habitats post-development.

The proposed development has potential to give rise to major adverse effects upon marsh fritillary. Pre-construction surveys will be carried out within the development footprint to ensure marsh fritillary isn't present. Should the species be recorded during these surveys, works will cease in these areas, fencing installed around the suitable habitats used by the species and appropriate mitigation will be agreed with NPWS. Appropriate mitigation in such a scenario would include the appropriate timing of habitat clearance works to align with translocation of the caterpillars within the period between late-July and September.

The proposed development is located in the headwaters of two different river catchments (Ownea and Finn), both of which are significant, due to Atlantic salmon stocks and their occurrence within SACs. The Ownea River also hosts populations of freshwater pearl mussel. The principal risk to fish and the aquatic environment will be during the construction phase of the proposed development.

The bat species recorded utilising the site are generally considered common and widespread in an Irish context. Low levels of bat activity were recorded for all the species detected. However, taking into account the EU Annex IV protected status of bats, the bat assemblage is considered to represent a feature of Local (Higher) importance for more common species to County Importance for rarer species. One potential bat roost was identified near turbine T04. Construction-related mitigation measures for bats are:

1. Pre-construction bat surveys will be conducted at the derelict cottage near turbine T04. These surveys will inform the requirement for further measures to preserve and possibly enhance this building, or alternative buildings. This information will also inform the application of a derogation license from NPWS to undertake appropriate mitigation action to ensure the conservation of bats using this roost, as required. The preferred option is the retention of the building and the implementation of a 30m exclusion zone during the construction phase, to prevent disturbance during times of occupancy.
2. The only location where removal of vegetation was judged to potentially impact on foraging / commuting bats was in the vicinity of T04. Construction of the access track between T03 and T04, as well as implementation of a 100m turbine buffer zone for bats, will result in the removal of a small open woodland consisting of mature Sitka spruce and sycamores that provides connectivity to a nearby forestry plantation via treelines and scattered mature trees. To replace the loss of bat commuting/foraging habitat adjacent to T4, there will be an equivalent area identified as compensatory habitat. The re-planting will aim to maximise future woodland, hedgerow and treeline

ecological function by specifying an appropriate species mix and replacement locations to maximise connectivity. The aim of the replanting is to strengthen connectivity from the cottage to the plantation to the north.

3. A low treeline/hedge (< 3m) will also be planted to replace trees along the western and southern edges of the cottage and although, this would fall on the edge of the turbine buffer for bats, planting is considered necessary to retain the integrity of the roost. Once this hedgerow/treeline has become established the taller trees around the cottage can be felled to limit the height of the bat features.
4. For the creation of bat buffers zones around other turbines, including T01, T05, and T06 the full extent of foraging features for bats, specifically forestry edge will not be impacted at locations where felling of conifer plantation is required. Any existing edge effect will be replicated post-felling by the residual edge of the plantation that remains unfelled.
5. There will generally be no night-time works, so lighting, which could interfere with bat activity, will not be required.

For birds, the following construction-related mitigation measures will be implemented:

1. As noted above, an ECoW will be appointed for the construction phase. With respect to birds, their role will include:
    a. Providing advice to ensure legal compliance with respect to nesting birds.
    b. Ensuring that all required exclusion zones for nesting birds are adequately set out, protected and signed-off, and that all contractors working on the site abide by them.
    c. Ensuring suitable measures are in place to protect retained or created habitats.
    d. Undertaking the necessary pre-construction protected species surveys (if suitably qualified) and supervising the implementation of any mitigation measures required.
    e. Liaison with contractors and construction staff working on site.
    f. Providing regular on-site advice with respect to any ecological issues that arise.
2. Wherever feasible, where suitable nesting habitat removal is required to facilitate the works (such as the footprint of the site track, turbines, hardstands and set down areas, excavation of the grid connection route, any vegetation removal or cutting of overhanging vegetation along the turbine delivery route), including dense ground cover and trees/scrub, it will be undertaken prior to the 01 March in the construction year. Vegetation removal required for creation of bat buffers around turbines, especially around T1 will be undertaken outside the bird breeding season (01 March to 31 August). This will avoid direct disturbance to a known sparrowhawk nest, as well as avoiding direct impacts to other breeding species.
3. Construction works will be appropriately phased to avoid seasonally sensitive ornithological receptors, and while this will necessitate a dynamic approach in anticipation of birds potentially moving to different nesting locations within/adjacent to the construction site (as may be the case with merlin), there will be some restrictions in place based on the distribution of birds recorded during the baseline, including:
    a. Commencement of construction works will not be permitted in the northern sections during the breeding season (01 March to 31 August). Construction works must be phased to ensure that the majority of the northern section of the development (T01 to T04) is completed prior to the onset of the breeding season (01 March).
    b. Road maintenance works, including excavation and laying of cabling along the grid connection route will not be permitted during the bird breeding season (01 March to 31 August) for two sections, including:
        i. along the L-6743 road between junctions to T01 and T04
        ii. from the met mast and following the L-2593 along the Stracashel River for 500m after the Graffy Bridge turn.
    c. No construction will be permitted within 500m of the merlin nesting location identified during the baseline surveys. Construction works are defined as all heavy civil works (including turbine erection) and all preparatory/finishing

works (including vegetation clearance, road capping, landscaping, fencing and light, manual tasks). Specifically, this will limit all works on tracks leading to T01/T02 and T04/T03 within 500m of the baseline nest sites. While no heavy civil works will be permitted during the breeding season, construction traffic will be facilitated access to work areas beyond the 500m buffer via the junction to T04/T03, provided this is undertaken without vehicles utilising the L-6743 between the T01 and T04 junctions, i.e. vehicle approach must be from the west (Graffy Bridge) side of the T04 junction. Access to the construction site via the T01 junction will not be permitted during the breeding season.

   d. If merlin occupy an alternative nest site during construction, a 500m exclusion zone buffer will be applied where all construction activities will only be permitted outside the bird breeding season (01 March to 31 August). Depending on the location of the nest, additional access restrictions may also be applied.

4. Compensatory measures are required to offset the potential displacement of 1-2 pairs of snipe breeding within 400 m of construction works (as well as operational turbines). Within the landholdings under the Applicant's 'control', areas beyond the 400 m turbine buffer have been identified for the creation or enhancement of existing wet areas for breeding snipe. This includes a variety of habitats, including semi-improved grassland as well as wet heath, upland blanket bog, marshy grassland and areas with wet flushes. The core target area will be along the Stracashel River and will tie in with enhancement measures for breeding whinchat. The feasibility of blocking some of the bog hags on the top of Graffy Hill and creating more stabilised wet areas of blanket bog will be investigated.
5. Several enhancement measures are proposed including:
   a. Provision of nesting baskets for merlin. Suitable locations in the area surrounding the wind farm will be targeted for the erection of nest baskets to provide a greater range of nesting options for merlin than is currently available. It is suggested that five general locations are selected and up to 15 baskets are erected. Locations up to 5 km from the wind farm site will be considered, if agreements with landowners can be secured. Ongoing monitoring will be undertaken post-construction to investigate levels of uptake.
   b. Securing agreements with landowners to implement habitat management measures designed to protect and enhance (if appropriate) the fields of wet grassland along the Stracashel River for breeding whinchat. Implementation will be monitored as part of the post-construction ornithological monitor program and the aim will be to increase the breeding density of whinchat in the area.
   c. Securing agreements with landowners to implement habitat management measures designed to create or enhance existing wet areas beyond the 400m turbine buffer for breeding snipe. As well as providing enhancement, this is considered as compensatory mitigation to offset the potential displacement of 1-2 pairs of breeding snipe during the construction and operational phase of the project.
   d. In the wider area, kestrels may be struggling with inter-specific nest site competition; as aggressive interaction with raven was noted during the 2020 breeding season. Provision of four nest boxes at selected sites along the Stracashel River valley is recommended to provide this species more nesting options in the area. Potential sites have been identified with locations beyond the1 km turbine buffer being targeted and pending securing landowner agreements.
   e. Where stream crossings are proposed these should be designed to including nesting crevices for grey wagtail. Provision of nest boxes/holes for dippers could also be considered.

Construction-phase bird monitoring requirements are detailed in Section 5.8.4.

5.7 Wash Down from Concrete Trucks and Cement Mixers

The concrete wash down protocol will consist of the following elements and will operate as follows:

- All concrete truck drivers will receive a toolbox talk and be familiar with the procedure and restrictions on washing of concrete chutes on site.
- Prior to each concrete pour the Construction Manager will check that all mitigation measures are in place. The ECoW will be responsible for the monitoring regime as outlined below.
- The works will begin with the cement truck arriving onto site at the proposed pour location, which will be identified by local signage.
- The concrete truck will back up into the pour location.
- The concrete truck will discharge into the form work (or into the concrete pump) under supervision of INSERT CWC NAME, where it will be contained.
- When the concrete discharge is complete, the concrete truck will back up to the concrete wash down area, the chute discharging the concrete on the back of the truck will be cleaned by brush into a steel skip that is enclosed in a concrete wash-down bund. This will be supervised by the INSERT CWC NAME Construction Manager, who will ensure that all excess concrete is removed into the skip only and has been removed from the chute before releasing the truck from site.
- The washing out of the inside of trucks will not be permitted on site. Wash down of the concrete trucks will occur back at the batching plant.

An illustration of the concrete truck washdown arrangements are shown on Plate 5-1. The Method Statement for concrete washdown is provided in Attachment 4. The concrete washdown area will be located at a location convenient to each pour, subject to environmental constraints and having regard to the traffic management of the site.

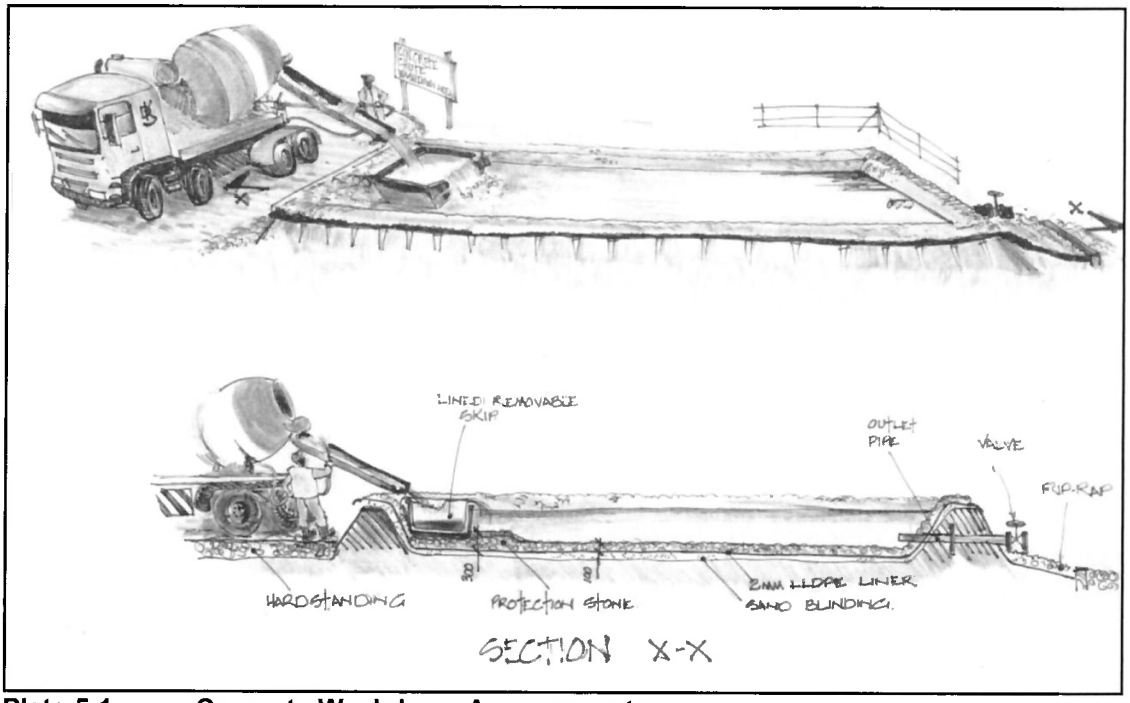


Plate 5-1: Concrete Washdown Arrangements

5.8 Site Monitoring

5.8.1 Safety Monitoring

The Civil Works Contractor as PSCS will provide a competent Safety Officer to be present on the site at all times during working hours for the purposes of providing advice on all on-going operations and to exercise a general supervision on the works taking place with a view to maintaining a safe site.

5.8.2 Water Quality Monitoring

The ECoW will undertake weekly inspections at all outfalls from the construction works.

The ECoW will be responsible for monitoring water chemistry at the agreed monitoring points in the streams draining development site, as shown on Figure 5-1. Table 5-2 summarises the proposed monitoring regime.

All samples collected will be input to a database and compared to baseline monitoring data. In the event of levels being identified which are outside of the baseline or above applicable guideline or legislative values an investigation will be undertaken.

It is also proposed to establish the site-specific relationship between turbidity values and TSS to allow real-time assessment of water quality at the ponds' inlets. Field measurement of turbidity will be taken at the pond inlets and samples of that water will be sent for TSS analysis. Once a sufficient number of samples have been collected, it will allow the relationship between turbidity and TSS concentration to be established for each pond. The 1,000mg/l TSS trigger value will then have an equivalent turbidity value, which can be measured in the field allowing for immediate action to be taken (i.e. the pond shut off), if required.

Table 5-3: Surface Water Quality Monitoring Plan

Monitoring Location	Monitoring Frequency	Monitoring Programme	Parameters
WQ1 to WQ10	Monthly	Starting 1 month prior to construction and continuing for the duration of construction.	Apparent Colour, TSS, Nitrate, Nitrite, Total Oxidised Nitrogen, Ortho-Phosphate, Ammoniacal Nitrogen, Turbidity, BOD, Free Ammonia, Total Phosphorus & TPH
WQ3, WQ5, WQ8 and WQ9	Continuous monitoring	Starting 1 month prior to construction and continuing for the duration of construction.	Turbidity with SMS alarm capability
WQ1 to WQ10 & All Settlement Pond Discharge Points	Weekly or Daily Depending on Site Activity	During and following periods of rainfall, concrete pouring, daily inspection will be carried out.	Visual inspection, turbidity measurement and TSS.
All Settlement Pond Discharge Points	Daily	During / following periods of heavy rainfall, daily inspection will be carried out.	Visual inspection.

Monthly samples will be submitted to an accredited laboratory for analysis. Test results will be maintained on site and available for inspection by Council and Inland Fisheries Ireland staff.

Furthermore, an aquatic ecological survey will be undertaken within 12 months of the completion of the construction phase of the development. The developer will appoint a suitably qualified Ecologist to complete a macro-invertebrate (Q-Value) assessment of the surface waters in the Stracashel and Stranagoppoge rivers upstream and downstream of the site. With reference to Figure 5-1, proposed locations for Q-value assessment are:

- WQ9 – downstream location on Stranagoppoge River.
- WQ1 – downstream location on Stracashel River.
- WQ3 – downstream location on Stracashel River

5.8.3 Environmental Monitoring

The onsite INSERT CWC COMPANY NAME Project Manager will monitor environmental performance on a daily basis on the site and improvement items will be communicated locally (e.g. excavator drivers and foreman) and to the site management. The INSERT CWC COMPANY NAME Project Manager will carry out daily visual inspections of settlement ponds and outfalls during the construction period in addition to visual inspections of the watercourses downstream of the site, to ensure suspended solids are not entering these rivers. The ECoW will be notified and remedial action will be taken immediately, should silt laden runoff be observed downstream of the on-site treatment measures. The ECoW will carry out inspections on a weekly basis at a minimum.

Water samples will be taken by the ECoW and analysed and appropriate action will be taken as outlined below, should the concentration of suspended solids rise above acceptable levels. The ECoW will carry out weekly inspections of the settlement ponds and rivers and a record will be kept including photographs of observations. This will form part of a formal weekly environmental audit, with all correction actions logged on a database.

If pumping of waters from foundation excavations is taking place the outlet from the pump will be the subject of hourly visual inspection during working hours. Unsupervised overnight pumping is not envisaged.

The inspections will be undertaken more regularly during and following extreme weather conditions. Earthworks will be suspended during extreme weather conditions. An extreme rainfall event will be classified as an event that corresponds to the Met Éireann Orange – Weather Alert for rainfall.

Table 5-4: Met Eireann Weather Alert for Rainfall – Expected Rainfall in mm

Met Eireann Orange – Weather Alert for Rainfall
50 mm – 70 mm in 24 hrs
40 mm – 50 mm in 12 hrs
30 mm – 40 mm in 6 hrs

Roads, drains and silt fencing/traps will be inspected for damage after intense storms and repaired or replaced as appropriate. Appropriate records of monitoring will be maintained as part of the drainage audits.

The inflow and outflow from the settlement pond will be monitored using turbidity monitors to check for increases over the threshold levels. Proposed trigger levels for the discharge from the ponds are 100mg/l TSS.

The INSERT CWC COMPANY NAME Project Manager will carry out turbidity monitoring at the inlet and outlet of each settlement pond.

Site environmental performance will be discussed at the weekly project meetings and any open corrective actions will be addressed.

5.8.4 Bird Monitoring

Bird monitoring during construction will consist of the following:

1. In the year prior to construction works commencing, the following bird monitoring is proposed:

a. Wider area breeding eagle/ merlin surveys, initially to a distance of 6 km from the site for eagles.
b. Breeding season walkovers – upland breeding bird surveys.

2. Construction works proposed during the nesting bird season (March to August inclusive) will be preceded by a nesting bird survey and associated reporting. Particular attention will be given to priority bird species and any species known to be sensitive to construction related disturbance, including breeding sparrowhawk, merlin, snipe, ground nesting passerines (meadow pipit, skylark) and whinchat.
3. There will be no clearance of vegetation suitable for nesting birds within the bird nesting season, unless checked for nesting birds by a suitably qualified ornithologist (performing the role of ECoW) and cleared by them for removal, taking account of both potential for direct nest destruction and disturbance to nesting birds.
4. Works during the bird nesting season will be supervised on a weekly basis by an appropriately qualified ornithologist (who may also perform the ECoW role if appropriately qualified for both). Their role will be to monitor nesting birds within the construction site and advise on buffer zones required in order to avoid impacts on them. In this regard, special consideration will be given to merlin, sparrowhawk at T1 and whinchat occurring around Graffy Bridge.

Additional post construction bird monitoring is proposed in the EIAR.

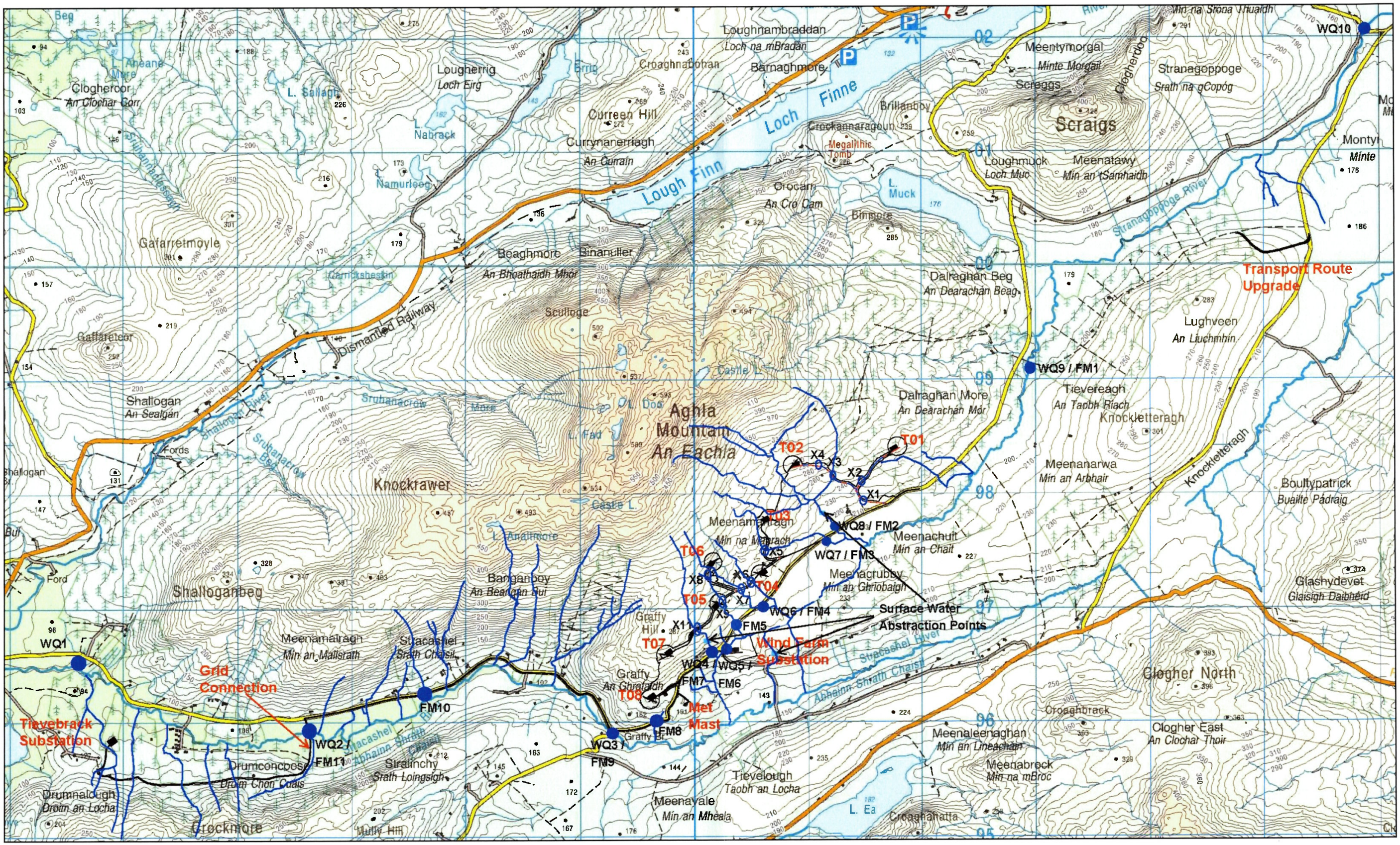


Figure 5-1: Location of Surface Water Quality Monitoring Points

6 CONSTRUCTION METHODS

The construction of the wind farm will have several main elements. These are listed below along with the main construction practices to be employed. The commencement of construction works will be preceded by a site investigation to inform the design of the turbine foundations, cranage areas and roads. The Local Authority and Inland Fisheries Ireland will be notified of the mobilization date to site.

6.1 Earthworks - General

Earthworks for the temporary construction site compound will be undertaken first. This will be followed by construction of roads to provide access to the turbine locations and subsequently construction of the cranage areas, turbine foundations and cabling. It is envisaged that 6 to 8 track-mounted excavators (20 to 30-tonne range) will be used during earthworks, along with 4 dumper trucks. With four access points from the public road, it is envisaged that the construction of the wind farm will be divided into smaller work areas.

6.1.1 Site Access

Construction traffic and deliveries to the site shall be in accordance with the Traffic Management Plan submitted under separate cover. Signage will be erected to ensure construction traffic follows the agreed routes to / from the site.

6.1.2 Working Hours

The proposed core working hours for the construction phase are 07:00 to 19:00 Monday to Saturday inclusive; generally, no construction works on Sundays or Bank Holidays. Work outside of these core hours will be permitted for:

- Concrete pours for foundations – earlier start times will be permitted to allow concrete deliveries to start at 05:00. This will only be required on approximately 10 to 12 days of the entire construction programme – i.e. during turbine foundation pours and during pours at the substation.
- Excavation of turbine foundations – later working hours may be required to complete excavation, testing and protection of the bearing stratum. This will only be required on up to eight days of the entire construction programme. It would only be needed where bearing stratum is unconsolidated material, which is not envisaged at the Graffy site. It will not cause nuisance to local residents.
- Lifting of turbine components – out-of-hour lifts will be permitted to avail of suitable weather windows for lifts. These operations are quite and would not be a source of noise nuisance. While core hours will be preferentially worked, night-time and Sunday / Bank Holiday lifts may be required.
- Delivery of over-sized loads – deliveries of over-sized loads is normally carried out at night to minimise impact on local traffic.

Work on Sundays or Bank Holidays will only be conducted in exceptional circumstances or emergency, as outlined above. In winter months, core working hours may be shortened to take account of daylight hours and to avoid light pollution.

6.1.3 Setting Out

A surveyor will set out the location of the wind farm infrastructure – road alignment, turbine locations, cranage areas, cable routes, site compound and peat recovery areas. Offset from this will be a working corridor in which the construction will take place – drainage, etc. Machinery and workers will not go outside of this work area to avoid unnecessary damage or disturbance to habitats and wildlife. The ECoW will set out the exclusion zones for habitat protection with appropriate signage erected. All workers will be made aware of the exclusion zones – their location and purpose; it will be part of the site induction course.

6.1.4 Environmental Controls

The environmental controls as detailed in Chapter 5 will be put in place as early as practicable in the construction programme. This will include:

1. Mowing / flailing of vegetation before 01 March to discourage birds nesting within the construction corridor. This is proposed as a more environmental alternative to topsoil stripping in advance of earthworks. Topsoil stripping will expose large areas of peat / topsoil to erosion and increase the risk of silt-laden runoff.
2. The setting out of sensitive environmental receptors as detailed in Section 6.1.3.
3. Installation of surface water management infrastructure, including clean surface water runoff diversions, silt fences, settlement ponds etc. Refer to Chapter 5 for details of surface water management.
4. Checking that all plant and machinery are equipped with silencers to minimize noise emissions.
5. Installation of exclusion zone rope and post fencing.
6. Any pre-construction surveys for nesting birds, Marsh Fritillary etc. will be carried out. Exclusion zones will be demarcated, as necessary.

An ECoW will be appointed to ensure that these controls are implemented, monitored for effectiveness and maintained during the construction programme. The ECoW will make regular visits to site during construction.

6.1.5 Site Clearance

There are some sections of commercial forestry to cleared for road construction, turbulence felling and buffer zones for bat protection. This felling will be carried out by a specialist contractor under licence from Forest Service adhering to all environmental controls.

The earthworks at the site presents the greatest risk for pollution of watercourse and damage to the environment. Management of earthworks is therefore an important aspect in the project. There are a number of general principles, planning conditions [CONFIRM] and work methods/plans that must be adhered to for earthworks as follows:

1. Setting out of work areas to be clearly delineated and explained to workers.
2. Surface water management infrastructure to be put in place ahead of earthworks.
3. Earthworks to be suspended in periods of prolonged heavy rainfall.
4. Plant, machinery and personnel to stay within the works corridor.
5. Works to proceed in accordance with the planning conditions, [SPECIFY THE RELAVANT CONDITIONS].
6. All machinery to be suited for purpose and kept in a good condition.
7. Soils of different types to be stored separately to permit later reuse in landscaping / site restoration – i.e. peat turves, peat, subsoil and rock. Soils to be stored in a manner that minimises erosion potential and doesn't present a risk to peat instability.
8. The disturbance of existing soil vegetation surface and soil permeability will be kept to a minimum during construction.
9. Restore excavated areas at soon as possible, and on an ongoing basis, with peat turves to minimise the extent of soils exposed to erosion.

10. As there will be surplus peat, the areas identified on the site layout drawing will be prepared for peat recovery. This will include construction of earthen berms to ensure stability.
11. Storage of excavated soil will be on near flat areas. Storage will not be on areas with deep peat or on steep slopes.
12. Monitoring of soil stability (in excavations and stockpiles) will be conducted throughout the construction period.

6.1.6 Plant & Equipment

An indicative list of the plant and equipment to be used for the construction of the wind farm is set out in Table 6-1.

Table 6-1: Indicative List of Plant & Equipment to be Used

Activity	Plant & Equipment
Site Compound	Generator Fuel storage / dispenser
Tree Felling	Harvester Forwarder
Site Clearance / earthworks	6 to 8 No 20 to 30-tonne track-mounted excavators 4 No. dumper trucks or tractor and trailers Dynamic compactor
Foundations	2 No 20 to 30-tonne track-mounted excavators Dumper truck 50-tonne crane teleporter
Turbine Installation	1 No 500 to 1,000-tonne crane 1 No 100-tonne crane Generator Teleporter
Cabling	20-tonne track-mounted excavator Cable drum carrier Cable pulling equipment teleporter

6.2 Settlement Ponds

Settlement ponds will be put in place in advance as construction progresses across the site. The proposed locations for settlement ponds are shown on Figure 5-1. Calculations for sizing the ponds is provided in Attachment 11. The ponds have been sized for a 10-year storm event (CIRIA Report 142, 1994; CIRIA Report 532, 2001; CIRIA C648, 2006 & CIRIA Report B14, 1993). Washed and rounded drainage stone will be placed at the inlet to the ponds to filter the flows before they enter the ponds. The [INSERT COMPANY NAME] Project Manager will supervise the installation of the settlement ponds and discharge point (including photos) and certify that the installation is in accordance with the detailed design drawings. Each settlement pond will be signed off by the design engineer.

The ponds will have a sinuous flow path and diffuse outfall which will encourage the diffuse spread of flows overland and back into natural drains down slope of the settlement ponds. A minimum distance of 50m flow path through vegetative buffer will be available. Where this cannot be provided by gravity flows from the pond, water will be pumped from the discharge end of the pond to a level spread area thus providing that minimum buffer distance – e.g. at turbine T06. The outflow from the ponds will be monitored in accordance with the monitoring plan in Section 5.7.

In the event of an emergency, the settlement ponds will provide a temporary holding area for any accidental spills on site as it will be possible to block off the outflow from these ponds for a limited period. Accidental Spill Response Details are included in Chapter 8. The settlement ponds will be fenced off for safety. A diffuse outflow detail is provided which will mitigate any increase in runoff. The diffuse outflow will have a minimum buffer of 50m to the nearest surface water drain. Erosion control and retention facilities, including the settlement pond will be regularly maintained during the construction phase.

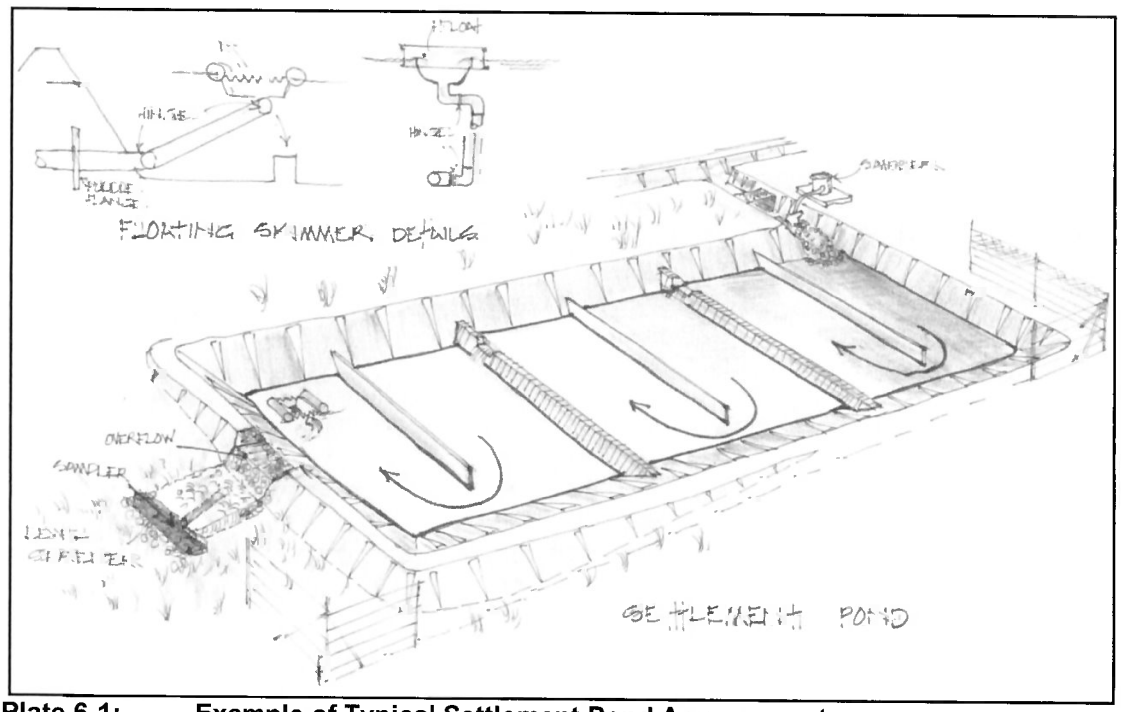


Plate 6-1: Example of Typical Settlement Pond Arrangement

6.3 Site Compound

The site compound will be located adjacent to the proposed substation. It will have a footprint area of approximately 38m x 18m.

Site offices, welfare facilities, fuel storage, refuelling points, waste receptacles, parking area etc. will be established. Wastewater effluent will flow to a sealed underground holding tank. It will be maintained under contract with the supplier, who must hold a current, valid waste collection permit. The holding tanking will be emptied periodically, and the wastewater taken for disposal at a wastewater treatment plant.

Upon completion of the construction activities, the construction compound will be removed, and the area reinstated to its original condition.

6.4 Roads

All access roads, excavations, bases and hardstands will be designed so as to incorporate drainage measures. Drainage will be installed on the upslope side of any excavations and to discharge such water in a manner which will not cause ponding, damming or areas of concentrated flow.

Detailed design for the site access roads indicates that conventional road construction is the optimal solution. The conventional road construction as shown on Figure 3-6 will be used. A method statement for road construction is provided in Attachment 2.

The road alignment will be marked prior to earthworks. The peat will be stripped, under archaeological monitoring, and used in the restoration of road verges of completed sections of road. Excess will be taken directly to one of the recovery areas. There will be no storage of soils within 50m of any watercourse. Relatively short sections (10 to 15m) of road will be stripped, so that road construction will follow behind. Road construction will require break-out the of high side and filling the low side where roads follow the contours – i.e. where there is a crossfall. Geogrid will be placed where required followed by capping stone. This will minimise the extent of soils / peat exposed to erosion. Surface water management infrastructure for 'dirty water' will be put in place on an ongoing basis; clean water diversion around / through the earthworks will have been installed ahead of road construction. Cable ducting will be installed closely behind road construction. Excavated peat turves will also be used to landscape the edges of constructed road sections.

The roads will be maintained during the construction period, and will be re-dressed to provide a clean, smooth running surface following concrete pours and prior to delivery of turbine components. Surface dressing will be imported from local quarries where the rock has a similar geochemistry to the bedrock on site.

Once constructed, roads will be tested at intervals to ensure that they are stable and meet the minimum requirements for the delivery of oversized loads. Plate bearing tests will be conducted on the roads to confirm minimum bearing capacity of 185kN/m^2 and meeting any other parameters of the turbine supply company.

6.5 Cranage Areas

The cranage areas will be constructed as the roads reach each turbine location. They will be constructed and tested in a similar manner to the roads. The high side of most of the cranage hardstands will need to be lowered by rock breaking. Rock extracted from this work will be reused to make the hardstand. The rock will be over-excavated on the high side of the hardstand to create storage capacity for excess peat. Peat placed in these areas will be held in place by the rock on the high side and the hardstand.

6.6 Turbine Foundations

Turbine foundation work is scheduled to start after the cranage areas are completed. For the proposed turbines, the foundations are cast-in-place reinforced concrete. The likely design for the turbines is the shallow foundation without the effects of buoyancy. They will be 20m to 22m diameter. This design will be confirmed to the contractor by the turbine supplier with the issue of the Foundation Release Form.

The construction of the turbine foundations will follow this general sequence:

1. The excavation extent will be marked at ground surface. The diameter of the excavation will take account of the foundation diameter, depth to target bearing stratum and safe side slopes of the excavation walls.
2. Where present, peat will be stripped from the excavation area, under archaeological monitoring. Peat turves will be placed on a flat surface nearby for later reuse in restoration / landscaping. The excess peat will be taken directly to one of the peat recovery areas. Downslope silt fences will be extended as required to intercept runoff from this exposed soil.
3. Overburden will then be excavated and stored separately adjacent to the excavation. If suitable, it will be reused as ballast over the turbine foundation. It is not expected that sufficient overburden will be found on site for ballast, requiring the importation of engineered fill.
4. Once the target excavation depth is reached, it will be inspected and tested by an engineer to confirm that it meets the minimum bearing capacity for the turbine. The sign-off for the foundation bearing stratum will include the following to ensure long-term stability of the turbine:

a. Minimum bearing of [INSERT FIGURE] kN/m^2.
b. Long term settlements to be less than [INSERT FIGURE] mm.
c. Differential settlement will not exceed [INSERT FIGURE] mm/m over [INSERT FIGURE] years.
d. Minimum rocking spring stiffness of $k_{\varphi,stat}$ = [INSERT FIGURE] MNm/rad and $k_{\varphi,dyn}$ = [INSERT FIGURE] MNm/rad.

5. Following approval of the bearing stratum, uplift by soil replacement may be required as follows:
    a. Placement of a separating geotextile followed by geogrid (Tensar TX160 or one with similar performance).
    b. Engineered fill, (with minimum 10% sand content and preferably up to 20%) to be placed and compacted in 250mm lifts – class 6F2 or similar approved.
    c. Laboratory test certificates will be provided by the quarry supplying the material and should include test results for particle size distribution (PSD), 10% fines and pyrite tests (TRL test suite).
    d. Plate bearing tests (4 No.) will be carried out at a minimum of every 750mm of engineered fill placed. Results should be provided in real-time to ensure the fill is properly compacted and meets the design requirements.
6. A 100mm-thick level concrete blinding layer is then placed, which extends 0.5m beyond the edge of the foundation. While shuttering is not used for this, the pour is contained in the excavation, so no release of concrete to the environment will occur. Washout of concrete truck chutes will take place at one of the designated locations on site.
7. The foundation basket and reinforcing steel is delivered to site and stored on the cranage area.
8. Once the blinding layer is set, the foundation basket and reinforcing steel is placed and tied.
9. The concrete shuttering is then placed around the foundation and the concrete is poured. This is normally done in one pour, but sometimes in two pours.
10. Once cured the shuttering is removed. Once the cube test results confirm that the concrete has reached sufficient strength, the excavation is backfilled using soil with a minimum dry unit weight of 18kN/m^3. Very often excavated soil is used – subject to density testing. The peat turves removed from the location is then reused to landscape around the turbine, so no stockpiles of soil remain at the site.
11. All waste and cut-offs will be removed from the turbine location on a daily basis and placed in the appropriate waste containers located at the site compound, or locally at the turbine location.

6.7 Turbine Installation

The installation of the turbine is the responsibility of the turbine supplier. It will follow completion of the civil works associated with the roads, cranage areas, foundations (backfill) and any works associated with the delivery route.

[INSERT TURBINE SUPPLIER NAME] will be responsible for the delivery of the turbines components from the delivery port (Killybegs) to the site. The civil contractor is responsible for any works along the delivery route. The Traffic Management Plan will be adhered to for turbine delivery.

The installation of the turbines will follow this general sequence:

1. Delivery of turbine components to the site by the specialist heavy haulage contractor, under permit and with garda escort. Deliveries are scheduled so that components are erected soon after arrival to minimise storage time on site.
2. Mobilisation of 2 No cranes to site for the installation of the turbines. These would typically be a 1,000-tonne crane and a smaller tailing crane, typically 100-tonne crane.

3. Installation follows a specific sequence as follows: control modules, Section 5 of the tower, Section 4 of the tower, Section 3 of the tower, Section 2 of the tower, Section 1 of the tower, nacelle, generator and rotor with blades.

Weather permitting, turbine installation takes approximately 5 days. This is followed by mechanical fit out and electrical fit out, which takes another 10 days. Once the turbine is energised, testing and commissioning is carried out, which takes another 10 to 15 days.

6.8 Internal Cabling

Internal cabling connecting the turbines will commence in Month 6. Cabling will generally follow adjacent to road alignments and to expedite restoration, installation of ducting will be done as the roads are constructed. Internal site cables will be pulled through the PVC ducting.

The installation of the cables will follow this general sequence:

1. The cable trench alignment will be set out by the surveyor. It will generally follow the road alignment and will follow closely behind road construction so restoration of road verges can be completed as soon as possible. Some sections of internal cables will be installed 'cross country' – i.e. T02 to T03, T05 to the substation and T07 to T08.
2. Peat will be stripped, under archaeological monitoring, and placed on a flat surface nearby for later reuse in restoration / landscaping.
3. The trench will be excavated to a depth of approximately 1.3m and a width of approximately 0.4m. Subsoil will be set to one side, separate from the peat.
4. The bedding material will be placed in the trench along with the required ducting and earthing cables. Once placed, the trench is backfilled with excavated material. A warning tile is placed near the top of the trench. The original ground surface is then restored.
5. Durable warning markers are then placed along the trench alignment at 100m intervals and at changes in direction.
6. Where the trench crosses roads or where it is located within the carriageway, the lower half of the trench is backfilled with lean-mix concrete. The upper half of the trench is backfilled with engineered fill, well compacted and the existing road surface repaired.
7. Where the cable passes drains, the ducting will be buried at least 300mm below the bed of the drain and surrounded with lean-mix concrete and the drain restored to its original condition.
8. Cable runs between turbines will be a single length of cable, so joints are avoided.
9. Where cabling crosses streams, HDD or temporary diversion (using a flume to bring clean water past the works area) will be used to install the ducting. Refer to Attachment 7 for HDD method statement.

Trenching for installation of ducting is expected to advance closely behind road construction.

Once all the ducting is installed, the cable is pulled between the turbines at the pulling pit adjacent to the turbine foundation. The cable is then pulled into the turbine and terminated. Once the cables are terminated in the turbines, the pulling pits are backfilled and landscaped.

6.9 Grid Connection

The grid connection route largely follows public roads and existing forestry roads to the ESB Tievebrack substation at Drumnalough – a distance of approximately 7.3km. A short section at the eastern end (near the substation) cuts across a field for a distance of approximately 50m. The grid connection will be an underground 110kV cable. This will be installed in ducting within a trench approximately 1.25m deep and 0.6m wide. A typical detail is shown in Plate 3-8.

Prior to the commencement of construction, the following will be carried out:

1. Detailed survey of route to identify all existing culverts, stream/drain crossings, existing underground utilities, etc.
2. Carry out detailed design of route, including the identification of the jointing bays.
3. Prepare a traffic management plan and detailed method statement.
4. Apply for a road opening licence.

Attachment 7 provides the construction methods for the installation of the underground grid connection. The installation of the trench / ducting / cable will follow this general sequence:

1. The cable trench alignment will be set out by the surveyor.
2. The trench will be excavated to a depth of approximately 1.25m and a width of approximately 0.6m. Where the trench is on the public road, the tarmac will be cut with a con saw. Excavated material will be loaded directly into dumper trucks and removed for either reuse on the wind fam site or taken to a licenced/permitted site for recovery or disposal.
3. The bedding material will be placed in the trench along with the required ducting and earthing cables. Once placed, the trench is backfilled with lean-mix / engineered fill as appropriate. A warning tile is placed near the top of the trench. The original ground surface is then restored / road surfacing repaired.
4. Jointing bays / pulling pits will be installed at predetermined locations. A typical jointing bay is shown in Plate 3-9. Proposed locations are identified in Attachment 7.
5. Trenching for installation of ducting is expected to advance at approximately 100m per day but is dependent on ground conditions. The trenching, installation of ducting, backfilling and restoration of the temporary road surface will be completed for each section each day. It is expected that 2 to 3 crews will work on the grid connection simultaneously.
6. Where stream crossings are required and the ducting can't be accommodated in the structure of the bridge, horizontal directional drilling (HDD) will be used. Three locations have been identified along the grid connection route where HDD will be employed. A draft method statement for HDD is provided in Attachment 6.
7. After the ducting is installed, the cables will be pulled and jointed. The pulling pits / jointing bays are then backfilled with sand and the surface restored to original condition.
8. Temporary road repairs will be followed by resurfacing of the public road along the length of the cable route installed in the public road.

6.10 Wind Farm Substation

The proposed wind farm substation is shown in Figure 3-2. It will be located in improved wet grassland with peat depths generally less than 1m within its footprint. The earthworks required for its construction will follow the same general approach as with roads and hardstands. This will consist of setting out, installation of surface water management infrastructure, preparation of peat recovery area to accept peat, peat stripping under archaeological supervision, installation of earthing grid, excavation for foundation, pouring of foundations, construction of control buildings and electrical fit out.

6.11 Construction Traffic

Construction traffic will consist of:

- Articulated lorries mobilising plant and equipment to the site.
- HGVs bringing stone / aggregate to the site for road and hardstand construction.
- Concrete trucks.
- Over-sized loads delivering turbine components to the site.
- Heavy goods vehicles delivering concrete, steel and other building materials.
- Workers coming to site in private cars and vans.

Traffic associated with the wind farm construction will comply with the Traffic Management Plan for the development. The traffic management plan will have regard to the restrictions on road usage during the bird breeding season – refer to Section 5.6.

The volume of traffic will depend on the activities planned for each day. Highest volumes will occur during the concrete pour for turbine foundations. Approximately between 65 and 75 loads of concrete will be required to complete each base. Pours will take place over a 12-hour period (approximately) with a constant supply of concrete. This will result in approximately 13 HGV movements per hour.

Over-sized Loads Delivering Turbines

HGVs bringing turbine parts will come from Killybegs. The proposed delivery route from Killybegs is summarised as follows:

1. Killybegs port to Donegal Town via the regional road R263 and national road N56.
2. From Donegal Town, it will follow the N15 through Ballybofey.
3. In Ballybofey, turn northwest onto the R252 towards Fintown.
4. Approximately 4km from Fintown, the route follows local road L-2023-1 to the location of the transport route upgrade / Coillte road (L-6733-1) to local roads L-6743-2 and L-6743-3 to the site entrances.

Concrete & Stone Deliveries

The concrete and aggregate supplier has not been identified. Deliveries of concrete and stone will be organised such that a one-way system is used on the local road network so that conflicts do not arise between trucks coming to / leaving the wind farm. Where a one-way system is not practical, two-way radios will be used to schedule lorries coming and going to avoid conflicts on the local roads.

Building Materials Deliveries

Building materials are likely to use the R252 and the local road network leading to the site and in accordance with the Traffic Management Plan.

Workers

Workers will come to site in cars and vans and will use the local road networks, depending on where they live.

7 WASTE MANAGEMENT PLAN

The management of waste generated during the construction of the wind farm and grid connection shall be in accordance with the current waste management regulations 1996-2020 and guidance documents including:

- EPA, 2013. *Design Out Waste - Preparation of Waste Reduction Factsheets for Design Teams.*
- Zero Waste Scotland, 2017. *Designing out Construction Waste - A Guide for Project Design Teams.*

The general approach will be prevention, reduction, reuse as per the EPA waste hierarchy – see Plate 7-1.

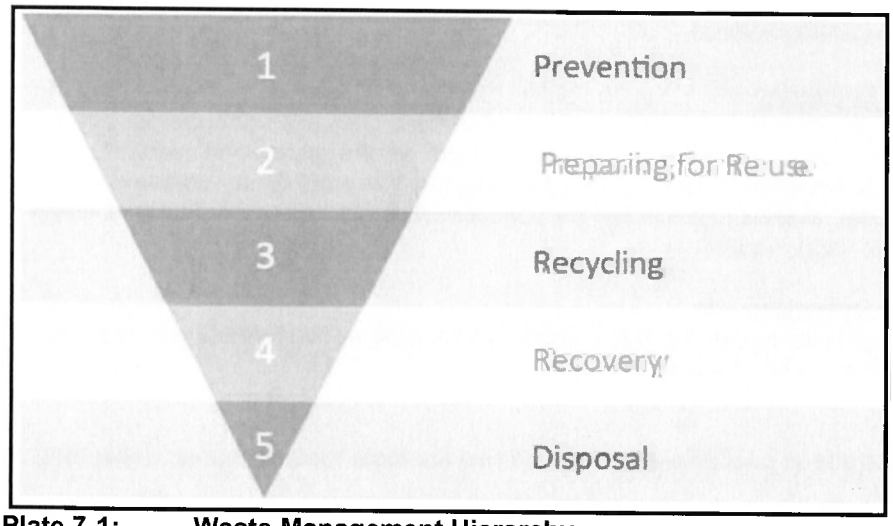


Plate 7-1: Waste Management Hierarchy

The contractor must be committed to preventing waste through implementing reduction and effectively managing resources from the design stage of construction to the completion of the construction of the project. This will ensure that:

- Legal and planning obligations are met.
- Waste production is minimised.
- Build costs are minimised.
- A framework for continuous assessment and best practice is implemented.
- Carbon emissions and negative environmental impacts of and from waste materials are reduced.

The least favoured option is to dispose of waste to landfill where embodied energy is not recovered

The construction site waste management plan involves a number of stages, namely:

- Planning.
- Implementation.
- Monitoring.
- Review.

7.1.1 Planning

The planning stage of the development has taken into account the nature of the site, design of the project, environmental considerations and construction methods to minimise the quantity of waste produced on site during its construction and maximise the use of existing materials.

The construction plan for the project was outlined in the EIAR and the NIS that was submitted to the Planning Authority at the planning stage. The methodology as outlined, requires the reuse of all excavated materials and therefore any wastes from this phase of the project are expected to be minimal.

The appointed contractor will be responsible for any and all disposal, from the construction works.

7.1.2 Implementation

This WMP includes:

1. An inventory of waste type expected to be produced in the course of the construction of the wind farm and grid connection. A provisional inventory is given in Section 7.3.
2. Estimates of the volume of each type of waste that is likely to be produced during construction.
3. End sources for all wastes generated during the project.

Best practice dictates that a statement showing how the contractor will minimise each type of waste is produced prior to any activity generating this waste. Waste minimisation measures are communicated to staff through toolbox talks.

7.1.3 Monitoring

The appointed contractor will have the responsibility for implementing and monitoring its employees and subcontractors in adhering to this waste management plan for all works associated with the wind farm and grid connection.

All workers will be fully briefed of the waste management plan during site induction and in toolbox talks. All site visitors will be briefed on appropriate waste storage and disposal units. Littering on site will not be tolerated. All personnel have a duty of care to challenge others littering on site. Should littering be encountered by site personnel then that person will be subject to the site disciplinary procedures as set out in the Health and Safety File.

The ECoW will carry out daily housekeeping and litter checks through the construction phase.

7.1.4 Review

A waste inventory will be maintained and kept up to date. It will include an inventory of all waste materials leaving the site for disposal.

7.2 Waste Management Principles

a) The contractor will avoid or minimise the volume of waste generated. All excavated materials will be reused on site (as per the principles outlined in the EIAR and the NIS submitted as part of the planning application).
b) Waste, including spoil, will not be stored within 50m of any watercourse.
c) All storage areas for waste will be within the main wind farm compound and not on the grid connection line. Any materials used during the days work will be removed to the wind farm compound at the end of the working day.

d) All waste storage areas will be secure.
e) Waste storage and disposal will be carried out in a way which prevents pollution in compliance with legislation.
f) Wastes transported off site will be by a licensed waste carrier and will be taken to a licensed / permitted waste facility. All loads will be transported under Waste Control dockets. These must detail:
    - An adequate description of the waste.
    - Source of the waste.
    - The appropriate code from the List of Wastes Regulations for the waste (commonly referred to as the EWC code).
    - Information on the quantity and nature of the waste and how it is contained.
    - Names and addresses of the transferor (the person currently in control of the waste) and the transferee (usually either a registered waste carrier or a waste management licence holder (waste manager).
    - The Standard Industry Classification (SIC) code (2007 or 2003 for hazardous waste only) of the business from where the waste was received.
    - Where applicable, indicate that the Waste Hierarchy has been complied with.
    - The place, date and time of transfer of the waste. If using a season ticket the period for which it is valid (i.e. valid from dd/mm/yyyy to dd/mm/yyyy).
    - If the waste is being taken to landfill the transfer note must also contain details of any treatments or processes that have already been applied.
g) Where the export of material off site is through a registered waste collector collecting general waste, the collector will be selected on the basis of whether they practice downstream segregation. Waste collectors who do not conduct downstream segregation will not be considered. In such circumstances collection dockets will suffice as duty of care records. Specific waste characterisation for each load of general waste will not be required of site personnel.
h) It is the responsibility of the contractor to ensure waste controls and duty of care checks are carried out as appropriate. It is their responsibility to ensure that all appropriate checks are conducted on the site and that personnel are trained appropriately.
i) Hazardous Wastes should be stored in a Control of Substances Hazardous to Health (COSHH) store as specified in Pollution Prevention Guidelines. Only trained operatives should handle hazardous substances. Please note that COSHH data sheets are not risk assessments and all risk assessment should be carried out separately. All stored hazardous waste will be clearly labelled.
j) Waste storage areas will be clearly located and signed. If space allows, key waste streams will be segregated.
k) All waste should be transported from site at appropriate frequency by a registered waste contractor to prevent over-filling of waste containers.
l) Frequency of Checks. The contractor will ensure that all storage facilities are checked on a weekly basis.

7.3 Waste Streams

C&D waste will arise on the project mainly from the excavation works. There will also be unavoidable construction waste from surplus and damaged construction materials. However, the nature of the proposed development will not contribute significantly to waste arisings.

The wastes/spoils likely to be generated during the construction phase will include the following:

- Excavated material emanating from earthworks will be used on site for landscaping and restoration of earthworks areas. It is not envisaged that any soil from the wind farm construction will be taken off site for disposal.
- Concrete collected at the washout area will also be taken to a C&D waste recycling facility or put to beneficial reuse on site.

- Excavated material from cable trenches on the road will not be reused as trench backfill and concrete and engineered fill will need to be used. Excavated material may be put to beneficial reuse on the wind farm site. If not, it will be taken to a permitted / licensed facility for disposal or recovery.
- Drilling fluid from the HDD works will be collected. It is estimated that for each 100m section of drilling, there will be approximately 8m³ of waste arisings – 50:50 mixture of slurry and soil cuttings. This material will be temporarily stored in a bunded tank before being taken off site for disposal at landfill.
- Cut-offs from building material - will be taken off site for re-use (where appropriate), recycled (in the case of copper and other metal cut-offs), or taken to a licensed landfill facility.
- Domestic type waste generated by contractors - will be collected on site, stored in an enclosed skip and disposed of at a licensed landfill facility. A number of skips of 8m³ (typical) will be kept in the site compound. Covered waste skips may also be kept at the turbine locations during turbine installation as there will be a lot of package waste to be dealt with. When full, a permitted waste collection contractor will be retained to remove the skips to a permitted facility for recovery / recycling / disposal. These subcontractors will be identified nearer the commencement of construction. The Site Manager will ensure that each waste management subcontractor used have the necessary permits in place for each waste type being managed.
- Foul effluent from the welfare facilities will be collected in a sealed tank and periodically emptied by a permitted waste collection contractor.
- Records of all wastes that leave site will be kept by the Project Manager in the site offices for inspection

8 EMERGENCY RESPONSE PLAN

8.1 Introduction

This Emergency Response Plan (ERP) contains predetermined guidelines and procedures to protect the environment during the construction phase of the Graffy Wind Farm. This outlines the immediate response to an accidental release or emergency at the construction site. It will be incorporated into the Preliminary Health & Plan developed by the PSCS and the Site-Specific Health & Safety Plan developed by the Main Contractor in its role as PSCS.

8.2 Emergency Response Procedures

An emergency response plan deals with the immediate physical effects of a pollution incident and outlines the initial response. Attachment 12 provides a template of the incident reporting form.

8.2.1 Emergency Response Liaison

The Main Contractor will designate an individual to serve as the Emergency Response Liaison Officer for this project. The emergency response liaison will coordinate the emergency response for the duration of any emergency at or nearby the project site. The Emergency Response Liaison will be immediately reachable at all times during project construction.

In the event of any spillage of polluting material on site, whether accidental or otherwise, the Main Contractor shall:

1. Carry out an immediate investigation to identify and isolate the source of the contamination.
2. Put all necessary measures in place to prevent further contamination and carry out a clean-up of the incident.
3. Notify the appropriate Regulatory Authorities promptly – Inland Fisheries Ireland, Local Authority, etc. Emergencies contact lists and phone numbers will be posted in the site offices and site compound.
4. The Emergency Response Liaison will make a decision whether an oil spill clean-up contractor is required and engage its services as appropriate. Oil spill clean-up contractors include:

    a. Verde Environmental – 1890 20 10 20
    b. Rilta Environmental – 01-401 8000
    c. AQS Environmental Solutions – 1800 500 020 / 086-8131010
    d. Enva – 1850 504 504

8.2.2 Environmental Emergency Procedure

An emergency preparedness and response procedure are required to prevent environmental pollution incidents and limit effects of any such incidents.

All personnel working on site will be trained in pollution incident control response and the use of pollution prevention equipment. An adequate supply of containment booms and oil/chemical absorbent materials shall be kept on site at all times. Material to contain silt-laden runoff water will also be kept on site, including geotextile for silt fence construction, sandbags or straw bales. A supply of rip-rap stone (clause 6A type material) will be kept on site to construct a containment berm if required.

In the event of any spillage of polluting material on site or if analysis / observations made on the quality or appearance of surface water runoff indicates that contamination has taken place, the following actions shall apply:

1. Carry out an immediate investigation to identify and isolate the source of the contamination, including the inspection of the bunding for the fuel/oil storage tanks/drums.
2. In instances where surface water is impacted by silt, earthworks will be stopped in the area contributing to the incident. The source of the polluting water will be identified, and emergency measures put in place, which might include excavation of a temporary stilling pond, installation of silt fencing / straw bales etc., or, if feasible, pumping of water to the existing stilling ponds.
3. Put in place measures to prevent further contamination and to minimise the effects of any contamination on the environment.
4. Notify the Planning Authority – Environment Section and Inland Fisheries Ireland immediately in the event of Environmental Incident, pollution or aquatic habitat damage. See contact numbers included in Table 8-1 below.
5. Engage the service of emergency response contractor.

It should be noted that actions '1' and '4' will take place simultaneously and the relevant authorities will be notified without delay.

Table 8-1: Notifiable Authorities in the Event of a Spillage

Agency	Contact Number
Inland Fisheries Ireland, 24-hour pollution incident reporting	1890 34 74 24
Inland Fisheries Ireland, Ballyshannon Office	071-9851435
Donegal County Council – Environment Section	074-9153900

8.2.3 Accidental Spillage from Leaking or Damaged Fuel Lines

Emergency spill kits will be kept on site for use in emergencies.

In the event of an accidental spillage from leaking or damaged fuel lines, the spillage should be cleaned up with absorbent material e.g. sand or turf mold and placed in a designated bunded location while awaiting removal offsite to a licensed facility. The Accidental Spill Response Details are included in Figure 8-1 of this Report. Materials should be disposed of in accordance with the Local Authority regulations.

In the event of an emergency, the settlement ponds will provide a temporary holding area for any accidental spills on site as it will be possible to block off the outflow from these ponds for a limited period.

Appropriate action following the detection of any oils or fuels in the surface water is outlined as follows:

- Increased monitoring in receiving waters at monitoring locations in the receiving water course as appropriate.
- Investigation of the cause of the spillage.
- Ceasing the discharge from the settlement pond through the use of a shut off valve or similar.
- Ceasing work in the area, and/or,
- Provision of pumping equipment or vacuum tankers to divert flow to other settlement ponds.

8.2.4 Accidental break out of silt

Following an accidental break out of silt, emergency measures will be put in place. During the construction period, an emergency facility (sandbags or shut off valve to block off the outlet pipe in the settlement ponds) will be provided to prevent discharge from the settlement ponds in the event of a breakout of silt. All surface water runoff from the earthworks areas lead into settlement ponds. This will mitigate the risk of any accidental spillage on site affecting watercourses.

Additional silt fencing will be installed if it is deemed appropriate for further protection of receiving waters. A turbidity meter will be used regularly to monitor the nearest downstream watercourse to monitor any increase over baseline readings which have been taken pre-construction. The results will be examined on a weekly basis to ensure no contamination of watercourses is occurring as a result of construction. Records will be kept of the readings and made available to an authorised person under the meaning of the Local Government (Water Pollution) Acts, 1977 and 1990, as amended.

The ECoW appointed by the developer will ensure the effective operation and maintenance of the drainage and other mitigation measures during construction.

Additional silt fencing, sandbags / straw bales will be kept on site for use in emergencies.

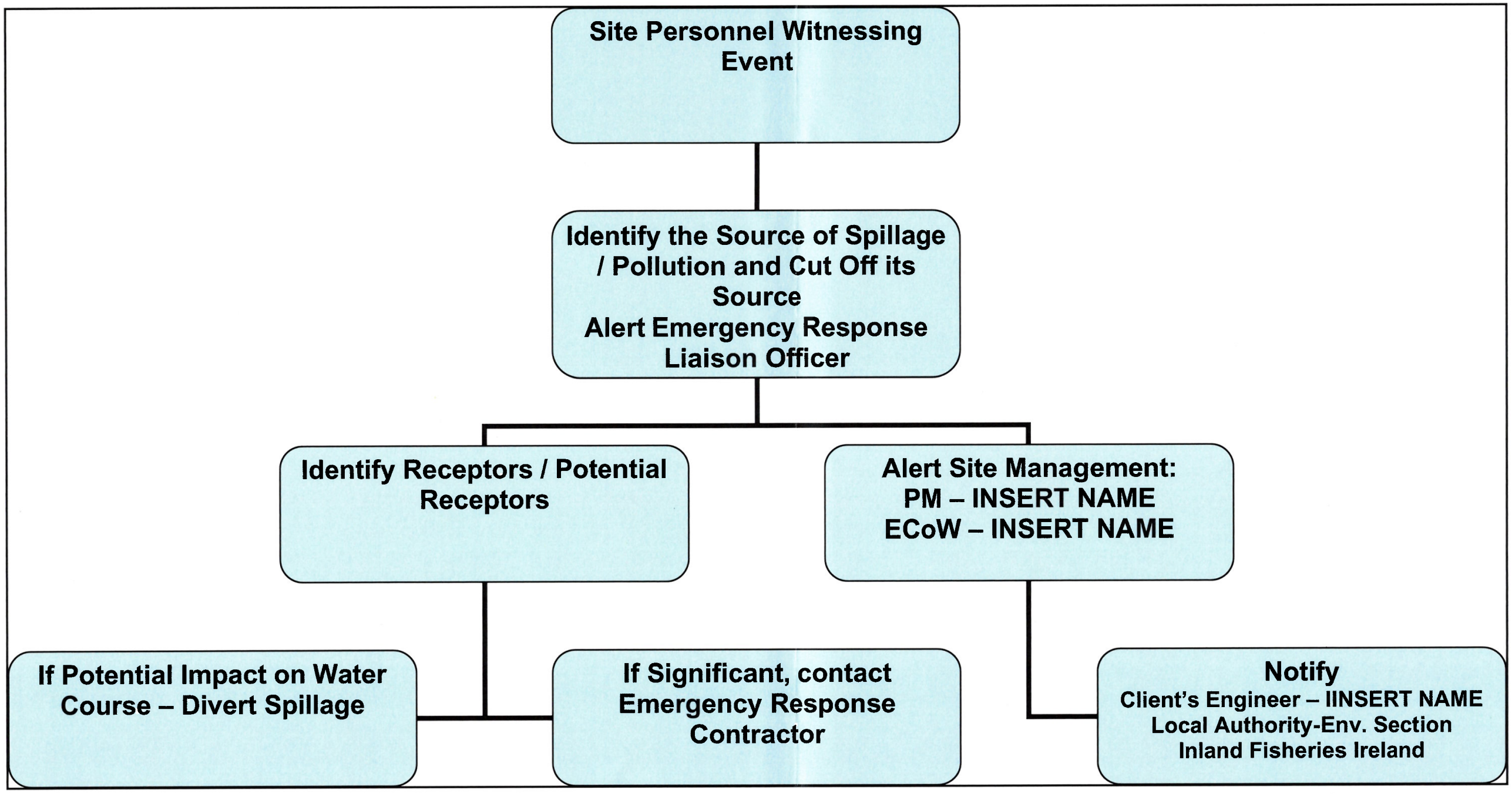


Figure 8-1: Accidental Spill Response Details

LIST OF ATTACHMENTS

ATTACHMENT 1

COPY OF PLANNING PERMISSION

ATTACHMENT 2

METHOD STATEMENT:
ROAD CONSTRUCTION

Proposed Graffy Wind Farm
Glenties,
County Donegal

Draft Method Statement
Construction of New Wind Farm Access Roads

Prepared for:
Cuilfeach Teoranta
McKendrick Place
Pearse Road
Letterkenny
County Donegal

Prepared by:
Keohane Geological & Environmental Consultancy
Ivy House
Clash
Carrigrohane
County Cork

April 2021

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1 INTRODUCTION

1.1 Overview of Scope of Work

Cuilfeach Teoranta is applying for planning permission to construct the Graffy Wind Farm, near Glenties County Donegal. The proposed wind farm will replace the wind farm permitted previously – planning numbers 09/30520 and PL 05B.237656 refer. It will consist of eight turbines, wind farm substation, transport route upgrades and underground connection to the National grid. The grid connection route largely follows public roads and existing forestry roads to the Eirgrid Tievebrack substation at Drumnalough – a distance of approximately 7.3km.

The development of the wind farm will involve the construction of approximately 4.5km of wind farm access road. An additional 734m of new road is required offsite for the transport of oversized loads. This document is produced to outline works involved in construction of roads and hardstands. This Method Statement should be read in conjunction with the Construction Environmental Management Plan (CEMP) prepared for the site. The procedures detailed in this document will be advised to all construction workers. The primary focus of these procedures is the protection of water quality, avoidance of risk of peat landslide and to maintain the existing peatland hydrology (greenfield) conditions as much as possible.

1.2 Environmental Setting

The site is located on the lower slopes of the Aghla Mountain in the valleys of Stracashel and Stranagoppoge Rivers. The land use is low intensity hill grazing by sheep and commercial forestry. Turbines are located at elevations of between approximately 200mOD and 292mOD. The Aghla Mountain rises to over 600mOD to the north of the wind farm site.

The western side of the site is drained by the Stracashel River and its tributaries. It flows in a westerly direction towards Glenties. The West of Ardara/Maas Road SAC extends west along the valley of the Stracashel River downstream of Graffy Bridge. In addition to being part of an SAC, the Stracashel River is an important fisheries river, and the Owenea River catchment (to which the Stracashel River flows) is one of six freshwater pearl mussel catchments in County Donegal.

The eastern side of the site is drained by the Stranagoppoge River. It flows in a general north-easterly direction and joins the Finn River at Bellanamore. The Finn River flows in a general easterly direction through Ballybofey and Strabane, where it is called the Foyle River. It discharges to Lough Foyle at Derry. The River Finn SAC extends east along the valley of the Stranagoppoge River downstream of the public road running along the southern side of the wind farm site.

2 CONSTRUCTION WORKS

2.1 Introduction

The construction of wind farm access roads will involve the following components:

1. Set out of road alignment.
2. Demarcating environment protection buffer zones with post and rope fencing and signage.
3. Installation of surface water management infrastructure.
4. Removal of peat, topsoil and unsuitable (soft) soils from the road alignment.
5. Construction of roads using geogrid, imported stone and site-won aggregate.

Detail road design will be carried out by the Client's Engineer – [INSERT COMPANY NAME]. The design will specify the thickness of stone, strength of geogrid etc., but the general methods of the construction will be as per that set out herein. Site access roads will be constructed to allow for both the construction of the wind farm and the operation and maintenance of the wind farm. Approximately 4.5km of access road will be required to service the wind farm. An additional 7.34m of new road is required as part of the transport route upgrade. Based on the surveys conducted, conventional road construction will be used; the requirement for floating roads is not envisaged.

2.2 Minimum Road Requirements

Site access roads have the following minimum requirements:

- A useable roadway width of 4m along straight runs and wider at curves.
- A useable road width for jib assembly of 6m (i.e. the road width within 80m of the cranage area is to be 6m wide).
- The clearance width for over-sized loads must be 6m.
- The clearance height for over-sized loads must be 4.6m.
- Radius of curve is a minimum of 30m.
- [INSERT TURBINE MANUFACTURER'S SPECIFATIONS FOR GRADIENTS, STRENGTH, ETC.]

2.3 Plant & Equipment

An indicative list of the plant and equipment to be used for the construction of roads is set out in Table 2-1.

Table 2-1: Indicative List of Plant & Equipment to be Used

Activity	Plant & Equipment
Site Clearance / earthworks	6 to 8 No 20 to 30-tonne track-mounted excavators 4 No. dumper trucks or tractor and trailers Dynamic compactor
Cabling	20-tonne track-mounted excavator Cable drum carrier Cable pulling equipment teleporter

2.4 Construction Sequencing

An important consideration for the construction of the site access roads will be the sequencing of the works. The works will follow this sequence:

- Establish site compound and mobilise construction plant and equipment.
- Set out road alignment.
- Establish surface water management infrastructure and demarcate buffer zones to sensitive habitats.
- Prepare peat regeneration areas to accept excess peat.
- Construct new roads.

2.5 Construction of Roads

The construction of the wind farm access roads will mostly be conventional techniques. Floating roads are not envisaged but are discussed here for completeness. Construction methods for both are detailed in the subsections below.

2.5.1 Construction of New Conventional Roads

New roads will be constructed with the wind farm and for the transport route upgrade. Much of these roads will be constructed using conventional road construction methods. The site roads pass through peatlands, commercial forestry and improved grassland.

1. The new road alignment will be marked out by the site engineer using surveying equipment (GPS). Machinery will stay within this corridor; there will be no unnecessary encroaching on nearby / adjacent vegetation by machinery.
2. The settlement ponds will already have been constructed and certified by the Client's Engineer [INSERT COMPANY NAME].
3. Clean water interceptors will be installed upgradient of the road alignment to divert clean water away from the earthworks area, reducing the volume of water to be treated in the settlement ponds as far as possible.
4. Silt fences will be erected to control surface water runoff from the earthworks areas.
5. Trees will have been felled and removed in forestry areas by a specialist contractor under licence from Forest Service.
6. Peat / topsoil stripping will be carried out under archaeological supervision.
7. Peat / topsoil stripping will be carried out in short sections and the road constructed progressively behind.
8. Peat turves will be used to restore road verges on an ongoing basis, with excess peat brought directly to the peat restoration area.
9. The road construction will be made up of:
    a. Layer of geogrid, if required.
    b. Site won / imported aggregate to form the road subgrade. Rock will be won on site in a cut/fill fashion. Thickness = 400mm minimum.
    c. Imported aggregate for the running course. Thickness = 50mm minimum.
10. Permanent roadside drainage will be constructed progressively as the road advances. Check dams will also be installed progressively at a maximum separation of 30m on the steep sections of the road and at maximum 80m intervals on the flat road sections as directed by the ECoW.
11. Clean water from upslope of the road will be brought under the road at intervals to clean water breakout locations.
12. Runoff water from the road alignment, potentially carrying silts and fines will be taken to small settlement ponds (to remove silt) at breakout locations with discharge via a level spreader and overland flow.
13. The minimum road specifications required by the turbine manufacturer are set out in Section 2.2.

Plate 2-1 illustrates the road construction sequencing.

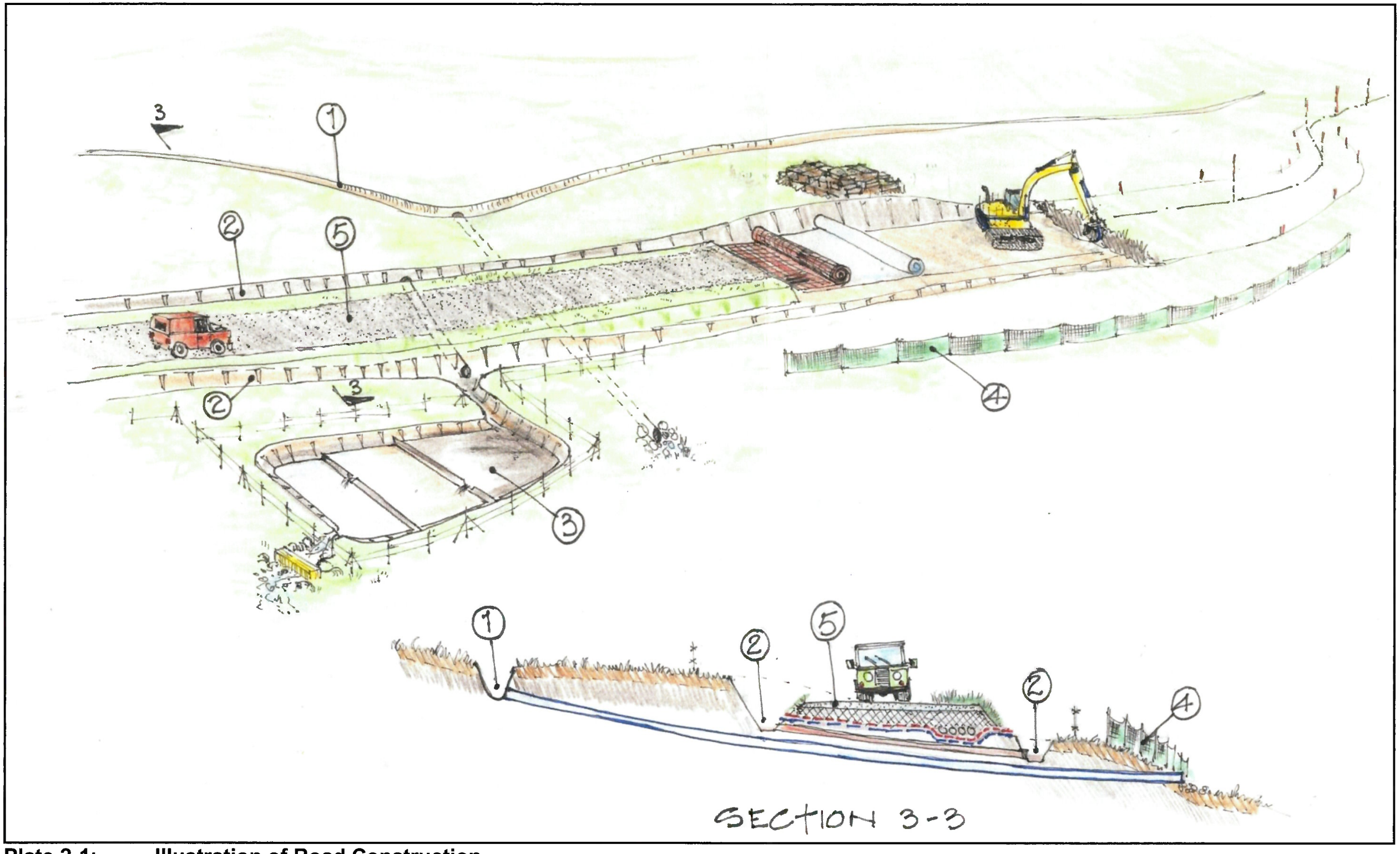

Plate 2-1: Illustration of Road Construction

2.5.2 Construction of Floating Roads

If floating roads are used, construction will follow this sequence:

1. The new road alignment will be marked out by the site engineer using surveying equipment (GPS). Machinery will stay within this corridor; there will be no unnecessary encroaching on nearby / adjacent vegetation by machinery.
2. The settlement ponds will already have been constructed and certified by the Client's Engineer [INSERT COMPANY NAME].
3. Clean water interceptors will be installed upgradient of the road alignment to divert clean water away from the earthworks area, reducing the volume of water to be treated as far as possible.
4. Silt fences will be erected to control surface water runoff from the earthworks area.
5. The road construction will be made up of:
    a. Layer of geogrid.
    b. Imported aggregate to form the road subgrade. Thickness = 400mm minimum.
    c. A second layer of geogrid may be used to further strengthen the road, pending detailed design.
    d. Imported aggregate to form the capping layer. Thickness = 200mm minimum.
    e. Site-won aggregate for the running course. Thickness = 50mm minimum.
6. The minimum road specifications required by the turbine manufacturer are set out in Section 2.2.

Plates 2-2 and 2-3 show sections of typical conventional and floating road construction, respectively.

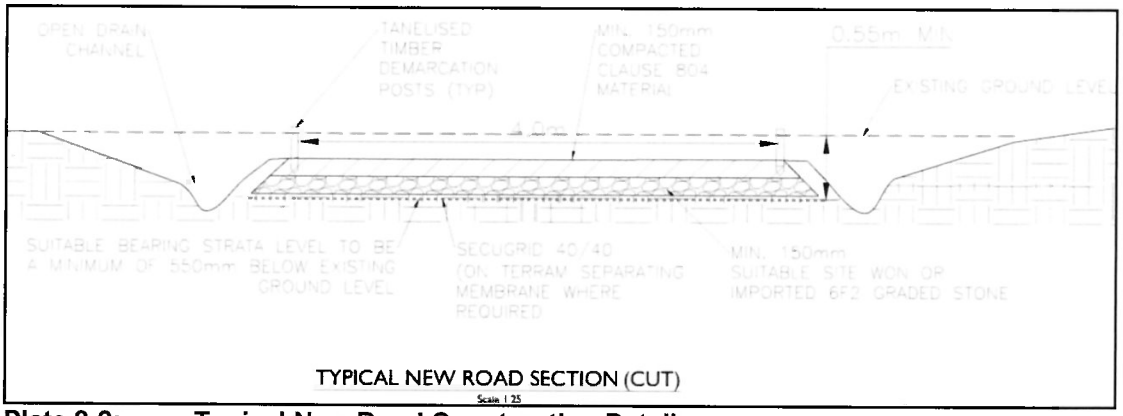

Plate 2-2: Typical New Road Construction Details

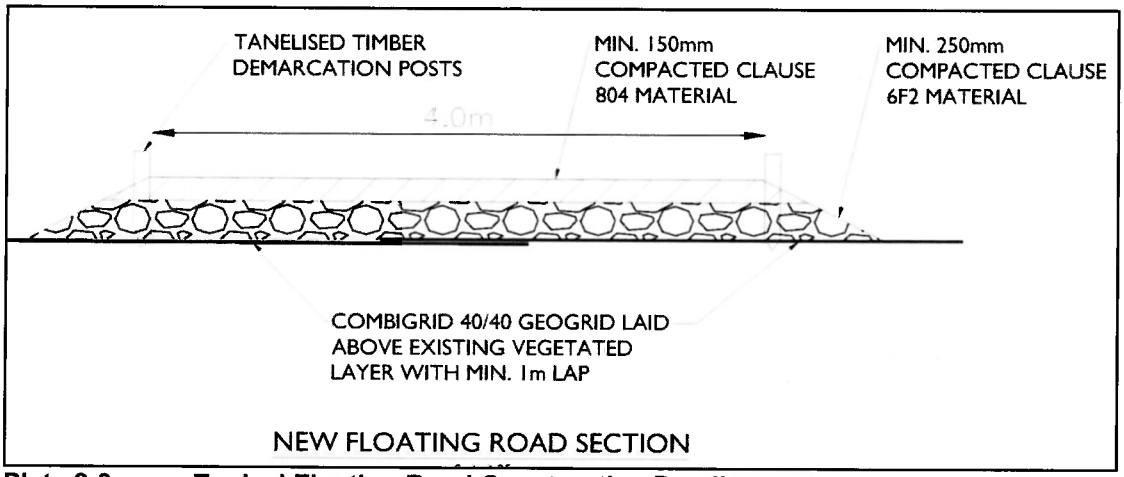

Plate 2-3: Typical Floating Road Construction Details

2.5.3 Road Upgrade / Strengthening

Some sections of existing roads will need to be widened and strengthened. The specific locations will be determined by the Client's Engineer and agreed with Coillte and the County Council as appropriate.

Where road widening / strengthening is required, the following sequence of works will be used:

1. The section of road to be widened and strengthened will be marked out by the site engineer using surveying equipment (GPS).
2. The Project Ecologist / ECoW will inspect the road section for the presence of non-native invasive plant species. Appropriate action will be taken if found, in accordance with the Biosecurity Method Statement.
3. If no non-invasive species are required to be removed, surface water management infrastructure requirements will be identified by the ECoW and installed – i.e. check dams, silt fences etc. Clean water interceptors will be installed upgradient of the road alignment, as required, to divert clean water away from the earthworks area,
4. Machinery will stay on the road to carry out the works; there will be no unnecessary encroaching on nearby / adjacent vegetation by machinery.
5. Depending on the available space, a new roadside drain will be installed upslope of the existing drain.
6. The road construction will be made up of:
    a. Removal of the soft layer to formation level. Soil and vegetation will be used to landscape along the road verge.
    b. A layer of geogrid will be placed in the widened section of road and lapped onto the existing road surface.
    c. Imported aggregate to form the road subgrade. Thickness = 400mm minimum.
    d. A second layer of geogrid may be used to further strengthen the road, pending detailed design, which would continue across the existing road surface if strengthening is required.
    e. Imported aggregate to form the for the running course.
7. The minimum road specifications required by the turbine manufacturer are set out in Section 2.2.
8. Silt fences and check dams will be removed once the landscaping is established.

Plate 2-4 illustrates the road widening / strengthening.

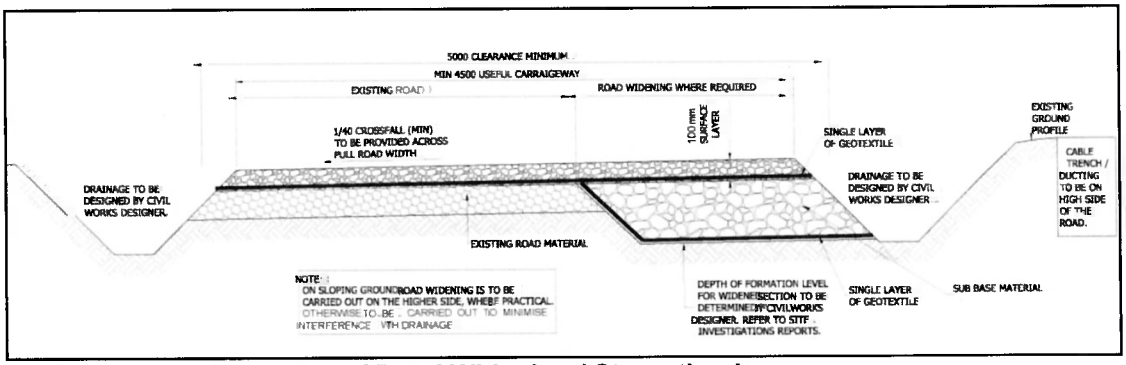

Plate 2-4: Illustration of Road Widening / Strengthening

3 MITIGATION MEASURES

Measures will be put in place to ensure there is no impact on water quality in the adjacent water courses during road construction, as follows:

1. A minimum buffer of 50m from watercourses will be used for the temporary storage of peat and soils, storage of fuels / chemicals, the refuelling of mobile plant, and the placement of the washout area for concrete trucks.
2. To reduce the volume of water to be treated and to reduce the erosion potential of exposed peat and soils, clean surface water runoff will be diverted around earthworks areas.
3. Areas stripped of vegetation will be kept to a minimum. Areas along roads and around hardstandings will be reinstated on an on-going basis as this infrastructure is constructed. This will reduce areas of soil exposed to erosion. To achieve this, short sections of road (30 to 50m per day) will be stripped.
4. Roadside drainage will be provided to collect runoff from new site roads. Check dams will be installed at intervals within the channels to slow flows and remove silt. Small settlement ponds will be constructed at breakout locations for this runoff water. Discharge from these small settlement ponds will be via a level spreader to overland flow. Where the roadside drainage ties into existing drains or streams, the flow will be through a roadside settlement pond.
5. Larger settlement ponds will be provided at the turbine, peat regeneration areas and substation locations – shown indicatively on Drawing XXX (Surface Water Infrastructure Layout), [INSERT DRAWING ONCE PLANNING GRANTED AND LAYOUT FINALISED]. They will be used to treat surface water runoff from the larger earthwork areas. Each will be sized for the catchment area contributing to that pond and to treat water to the agreed emission limit value. Discharge from ponds will be diffuse overland flow for polishing.
6. Diesel tanks, used to store fuel for the various items of machinery, will be self-contained and double-walled. Refuelling will be carried out from these tanks or from delivery vehicles. Specific mitigation measures relating to management of hydrocarbons are:
    a. Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice - (Enterprise Ireland BPGCS005).
    b. Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of.
    c. Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
    d. Appropriate spill control equipment, such as oil soakage pads, will be kept within the construction site to deal with any accidental spillage.
7. Earthworks will be temporality suspended during prolonged periods of heavy rainfall. In this regard, weather forecasts will be monitored by the ECoW.
8. Excess peat will be taken directly to the peat restoration area, from which runoff will be controlled.
9. Supplies of silt fencing, straw bales and/or sandbags will be kept at the site compound and installed where additional mitigation is required.

Monitoring of surface water management will be carried out during the construction phase by the ECoW. This will include the following:

1. Monitoring of environmental performance on a daily basis on the site and improvement items will be communicated locally (e.g. excavator drivers and foreman) and to the site management.

2. Daily visual inspections of settlement ponds and outfalls during the construction period in addition to visual inspections of the watercourses downstream of the site, to ensure suspended solids are not entering these streams and rivers. This will include turbidity monitoring at the inlet and outlet of each settlement pond.
3. The ECoW will carry out inspections of settlement ponds, check dams, outfalls and the rivers on a weekly basis.
4. Roads, drains and silt fencing/traps will be inspected for damage after intense storms and repaired or replaced as appropriate. Appropriate records of monitoring will be maintained as part of the drainage audits.
5. Water samples will be taken by the ECoW at the agreed monitoring points.

ATTACHMENT 3

METHOD STATEMENT:
PEAT MANAGEMENT

Proposed Graffy Wind Farm
Glenties,
County Donegal

Draft Method Statement
Peat Management

Prepared for:
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Prepared by:
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Carrigrohane
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April 2021

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1 INTRODUCTION

1.1 Overview of Scope of Work

Cuilfeach Teoranta is applying for planning permission to construct the Graffy Wind Farm, near Glenties County Donegal. The proposed wind farm will replace the wind farm permitted previously – planning numbers 09/30520 and PL 05B.237656 refer. It will consist of eight turbines, wind farm substation, transport route upgrades and underground connection to the National grid. The grid connection route largely follows public roads and existing forestry roads to the Eirgrid Tievebrack substation at Drumnalough – a distance of approximately 7.3km.

The construction of the wind farm and associated infrastructure will involve the stripping of peat. This document is produced to outline works involved in the management of peat and the environmental mitigation measures required as a result of these works. This Method Statement should be read in conjunction with the Construction Environmental Management Plan (CEMP) prepared for the site. The procedures detailed in this document will be advised to all construction workers. The primary focus of these procedures is the protection of water quality and the avoidance of risk of peat landslide.

1.2 Environmental Setting

The wind park is in a rural upland area in the upper catchments of the Stracashel and Stranagoppoge rivers and along the foothills of Aghla Mountain. The turbines are located to the north of local road L-6743 at elevations of between 200m and 292m.

The land use is primarily rough grazing for sheep. Conifer plantations are widespread in the area, with forestry within the central and eastern part of the site. There is evidence of small-scale historic turf cutting at the site; active turf cutting is occurring in the general area, particularly at the low-lying elevations to the southwest of the wind farm site. The site substation is located to the south of local road L-6743 in improved wet grassland, used for sheep grazing.

The grid connection to the Tievebrack substation follows local roads L-6743 and L-2593 to the east towards the R250. The eastern-most 2km of the grid connection follows a forestry road, passing a mink farm. Access route improvements needed for local road L-6733 to the northeast of the wind farm, turbine T01 and an internal access road between turbines T04 and T05/T06, are within commercial forestry. Agreement has been reached with Coillte for this development. The transport route upgrade (construction of a new forestry road) is also within commercial forestry.

The streams draining the site flow to the Stracashel and Stranagoppoge rivers. The western side of the site is drained by the Stracashel River and its tributaries, which form part of the Owenea River catchment. Downstream of Graffy Bridge, the Stracashel River is designated as part of West of Ardara/Maas Road Special Area of Conservation (SAC). This is a large SAC selected for a wide range of habitats and/or species listed on Annex I / II of the E.U. Habitats Directive. The Owenea River catchment is one of six freshwater pearl mussel catchments in County Donegal. Turbines T05 to T08, the substation and the grid connection route are within the catchment of the Stracashel River. The eastern side of the site is drained by the Stranagoppoge River. The Stranagoppoge River forms part of the River Finn SAC, which extends downstream from local road L-6743 near the wind farm site. Turbines T01 to T04 and the transport route upgrade are located in the catchment of the Stranagoppoge River.

The site is underlain by the Termon Formation and Slieve Tooey Quartzite Formation. These are Precambrian-aged rocks, showing a high degree of metamorphism and complex relationships due their long history of folding, faulting, igneous intrusions and other tectonic activities. The bedrock is covered by a thin layer of peat, generally <1.0m but up to 5.4m deep is small peat basins developed between bedrock ridges. Bedrock outcrop is frequent across the site. The bedrock is classified as a poor aquifer. Water supplies in the locality are sourced from streams and wells (dug and bored); the area is not serviced by mains water.

2 PEAT MANAGEMENT

2.1 Introduction

The construction of the Graffy Wind Farm will result in the excavation of approximately 46,593m^3 of peat. This will be managed in a number of ways, depending on the type of peat and the area on the site from where it is excavated. Excavated peat will be:

1. In the case of excess peat, brought to the designated peat restoration areas – approximately 33,573m^3.
2. Reused in restoration near to where it is excavated – approximately 13,020m^3.

The goals and objectives of a peat management Method Statement are to:

1. Minimise interference to areas of the blanket bog that have to date had relatively low anthropogenic interference.
2. Carry out all excavation works and peat handling in a manner that would not cause deterioration of water quality in the streams leaving the site and draining to the Stracashel and Stranagoppoge rivers.
3. Carry out all excavation works and peat handling in a manner which would not lead to peat stability issues or landslide risk.

2.2 Peat Restoration Area

Several areas of the site will be used to place excess peat. The preparation of these areas to receive peat will be as follows:

1. Setting out of the peat restoration areas (PRAs).
2. Installation of clean surface water diversions around the upgradient side of the PRAs to reduce the volume of potentially contaminated water.
3. Construction of a settlement pond at the low point of the PRA and installation of silt fencing downgradient of the works.
4. Construction of an earthen / rockfill berm around the perimeter of the PRAs. These will tie into natural rock outcrops / bedrock ridges. Earthen / rockfill berms will also be constructed in the larger PRAs as these areas are filled to create workable cells of approximately 25m x 50m. These will be lower than the perimeter berm and will assist with peat stability.
5. Construction of a temporary access road to the PRA.
6. Stripping of a small area of acrotelm peat from within the PRA to receive peat. Stripped turves will be placed on the outer slope and crest of the perimeter berm to restore and landscape the berms.
7. Placement of excavated catotelm peat to a depth of approximately 1.3m into the stripped area. Peat to be placed so that incident rainfall runoff is directed to the settlement pond.
8. Once filled, strip the next section of PRA to receive peat. Stripped turves (acrotelm peat) to be placed on the surface of the peat just deposited in the previous area. Turves to be placed right-way-up to accelerate regeneration. If insufficient acrotelm peat to cover the entire surface area and in accordance with guidelines (Standen V. (1993)[1]), strips of acrotelm peat will be laid as parallel turves to allow for natural re-colonisation of areas of bare peat.
9. This method of filling with continuing restoration of the peat surface will continue until the PRA is at capacity. The upslope edge of the PRA will be graded into the adjoining topography so it will receive overland sheet runoff.

[1] Standen V. (1993). *The Effects of Transplantation. Impact on Vegetation and Selected Invertebrate Groups*. The Vasculum 70. 13.14.

10. The PRAs will be fenced off with sheep wire fencing to protect the reinstatement process and to avoid accidents with grazing animals and users of the site. Additional signposting will be installed at 20m intervals to advise against the hazards of soft peat.

Figure 1 illustrates the filling of a peat restoration area.

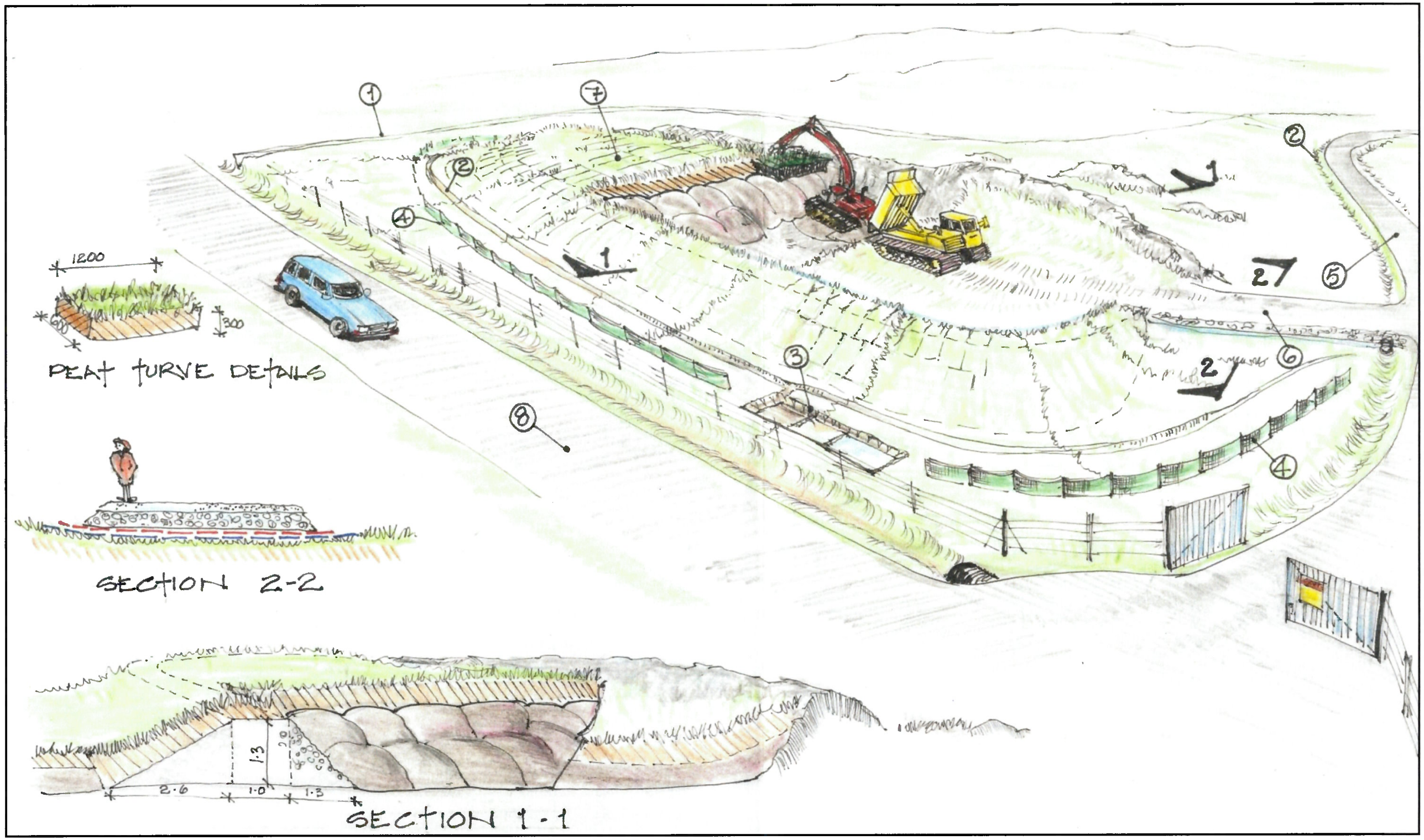

Figure 1: Illustration of Peat Restoration Area

2.3 Reuse of Peat

Road verges and the perimeter of hardstand areas will be restored using excavated peat to blend into the adjacent topography. Excavated peat will be used to progressively landscape along road verges, around hardstand areas and over turbine foundations.

2.4 Peat & Ground Stability

It is estimated that approximately 46,593m^3 of peat will potentially be excavated during construction of the roads, hardstand areas and turbine foundations.

The peat depth within the development footprint was found to be approximately 0.5m typically, but up to 5.4m.

Based on an assessment of ground conditions at the site it is determined that the construction of the wind farm has a low risk of construction-related peat instability. The full peat landslide risk assessment is provided in EIAR.

During construction the following measures will be employed to ensure peat and ground stability:

1. Avoid the stockpiling of peat at the turbine site. Excess excavated peat will be removed to the nearest PRA.
2. Earthen / rockfill embankments will be used, as required, to hold the peat in place.
3. Peat turves will be stored on site for reuse in restoration along the roads and around the cranage areas and turbine foundations.
4. Inspections and testing of roads and cranage area will be carried out during their construction to ensure that they can accommodate the design loadings. Formation levels for the turbine foundations will also be inspected, tested and certified prior to constructing the turbine foundations.
5. Monitoring of the peat during road construction will be carried out in areas of deeper peat at the site – i.e. on the approach to T07. Based on the road construction method, monitoring pegs (for lateral displacement) will be used.

Geotechnical specialists from the Client's Engineers will carry out monitoring and inspections of construction activities, with a view to identifying areas of unstable peat and to instruct the contractor to implement suitable remedial works, if required.

2.5 Plant & Equipment

An indicative list of the plant and equipment to be used for peat management (this is in addition to the plant and equipment to be used during general wind farm construction) is set out in Table 1. This is in addition to plant used for road / hardstand construction.

Table 1: Indicative List of Plant & Equipment to be Used

Plant & Equipment
1 No. 12- to 16-tonne wide track excavator with ditching bucket (bog master)
2 No. 12-tonne tracked dumpers

3 MITIGATION MEASURES

Measures will be put in place during peat management to ensure there is no impact on water quality in the adjacent water courses, as follows:

1. Peat will not generally be stockpiled on site. The use of peat will be identified prior to being excavated so that its management at the beginning of each day is predetermined. In order of preference, it will either be:
    a. Taken directly to its final use location for restoration. This will be the acrotelm peat used for road verge / hardstand perimeter restoration.
    b. Stored briefly adjacent to the work area for reuse in restoration. This will be the acrotelm peat used for road verge / hardstand perimeter restoration.
    c. Taken directly to the peat restoration area.
2. When stored for reuse, there will be a minimum buffer of 50m from watercourses.
3. Surface water management infrastructure will be installed ahead of excavation of peat to manage runoff from these areas.
4. Earthworks will be temporality suspended during prolonged periods of heavy rainfall. In this regard, weather forecasts will be monitored by the ECoW.
5. Supplies of silt fencing, straw bales and/or sandbags will be kept at the site compound and installed where additional mitigation is required.

In addition to the surface water monitoring that will be carried out (and as detailed in the CEMP), monitoring of peat management will be carried out during the construction phase. This will include the following:

1. Monitoring of the peat during road and hardstand construction in any areas where peat depth exceeds 1.5m at / near the construction works. Based on the road construction method, monitoring pegs (for lateral displacement) will be used.
2. Geotechnical specialists from the Client's Engineers will carry out monitoring and inspections of construction activities, with a view to identifying areas of unstable peat and to instruct the contractor to implement suitable remedial works, if required.

ATTACHMENT 4

METHOD STATEMENT:
CONCRETE POURS & CONCRETE TRUCK WASHOUT

Proposed Graffy Wind Farm
Glenties,
County Donegal

Draft Method Statement
Concrete Pours & Concrete Truck Washout

Prepared for:
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April 2021

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The construction of the wind farm and associated infrastructure require the pouring of 8 number turbine foundations, foundations at the substation and lean-mix for the cable route along the road. Turbines will require approximately 4,000m^3 of concrete; the substation will require approximately 500m^3 of concrete; the grid connection will require approximately 2,520m^3 of lean-mix; and the met mast will require approximately 100m^3. Therefore, approximately 7,120m^3 of ready-mix concrete will be required for the wind farm construction.

The purpose of this document is to set out the environmental protective measures to be put in place during the delivery of concrete and pouring of foundations. This Method Statement should be read in conjunction with the Construction Environmental Management Plan (CEMP) prepared for the site. The procedures detailed in this document will be advised to all construction workers and concrete delivery drivers during site induction and/or toolbox talks. The primary focus of these procedures is the protection of water quality.

1.2 Environmental Setting

The site is located on the lower slopes of the Aghla Mountain in the valleys of Stracashel and Stranagoppoge Rivers. The land use is low intensity hill grazing by sheep and commercial forestry. Turbines are located at elevations of between approximately 200mOD and 292mOD. The Aghla Mountain rises to over 600mOD to the north of the wind farm site.

The western side of the site is drained by the Stracashel River and its tributaries. It flows in a westerly direction towards Glenties. The West of Ardara/Maas Road SAC extends west along the valley of the Stracashel River downstream of Graffy Bridge. In addition to being part of an SAC, the Stracashel River is an important fisheries river, and the Owenea River catchment (to which the Stracashel River flows) is one of six freshwater pearl mussel catchments in County Donegal.

The eastern side of the site is drained by the Stranagoppoge River. It flows in a general north-easterly direction and joins the Finn River at Bellanamore. The Finn River flows in a general easterly direction through Ballybofey and Strabane, where it is called the Foyle River. It discharges to Lough Foyle at Derry. The River Finn SAC extends east along the valley of the Stranagoppoge River downstream of the public road running along the southern side of the wind farm site.

2 CONCRETE WORKS

Concrete pours at the wind farm will be required as follows:

1. Blinding layer for turbine foundation – 35m^3.
2. Foundation for turbines – 500m^3.
3. Foundations for substation – 500m^3, delivered over serval days.
4. Lean-mix for cable trench – 39m^3/day, assuming 100m of ducting installed per day on roads.

The most intensive period of pours will be during turbine foundations, with approximately 65 loads required on the day of the pour.

2.1 Turbine Foundation Preparation & Concrete Pours

An outline of the foundation construction is set out below:

1. Following approval of the formation level, the blinding layer, of minimum thickness 100mm, is poured. While shuttering isn't used, these pours take place within excavations, with no possibility of concrete escaping to the surrounding environment.
2. Reinforcing steel is then installed, followed by erecting the foundation shuttering – see Plate 2-1 for examples of turbine foundation sequencing.
3. Expanding foam is used to seal gaps in the shuttering to prevent concrete leak.
4. Prior to the pours, the Client's Engineer inspects the shuttering and the [INSERT CIVIL WORKS CONTRACTOR NAME] Construction Manager ensures that all environmental protection measures are in place. These will be checked also by the ECoW.
5. Signage is erected to direct drivers to the pour location and the designated washout location. All concrete truck drivers will receive a toolbox talk and be familiar with the procedure and restrictions on washing of concrete chutes on site.
6. The works will begin with the concrete truck arriving to site at the pour location that will be identified by site signage. Access to / from the site will be in accordance with the traffic management plan.
7. On arrival at the pour location, the driver will back the truck as close to the foundation as possible and:
    a. In the case of blinding layers, discharge the concrete into an excavator bucket. The excavator driver will then place the concrete where it is needed.
    b. In the case of turbine foundations, discharge the concrete into the concrete pumping truck.
8. When the concrete discharge is complete, the chute discharging the concrete will be cleaned by brush into the concrete pump / excavator bucket without the requirement of water.
9. The truck will then go to washout location, where the chute only will be washed. Once the chute washout is complete, the truck will return to the batching plant/quarry for full washout.
10. For the delivery of lean-mix along the cable route, the chute will only be brushed clean. Washdown of the truck and chute will be done at the batching plant/quarry, unless other arrangements are made with the approval of the ECoW which doesn't present a risk to surface water quality.

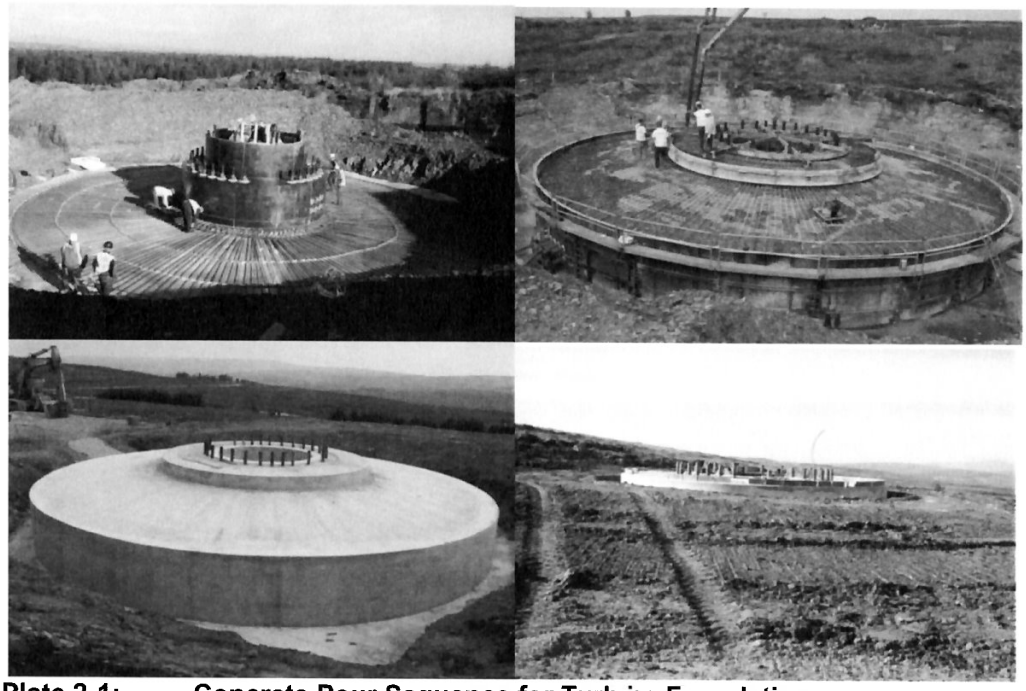

Plate 2-1: Concrete Pour Sequence for Turbine Foundation

2.2 Plant & Equipment

An indicative list of the plant and equipment to be used for concrete pours is set out in Table 2-1.

Table 2-1: Indicative List of Plant & Equipment to be Used

Plant & Equipment
Teleporter
20-30 tonne excavator
Generator & vibrator
Concrete trucks and pumps
Various hand tools for floating concrete

2.3 Wash Down from Concrete Trucks and Cement Mixers

The concrete wash down protocol will consist of the following elements and will operate as follows:

- All concrete truck drivers will receive a toolbox talk and be familiar with the procedure and restrictions on washing of concrete chutes on site.
- Prior to each concrete pour the [INSERT CIVIL WORKS CONTRACTOR NAME] Construction Manager will check that all protection measures are in place. The ECoW will be responsible for the monitoring regime as outlined below.
- The works will begin with the cement truck arriving on site at the proposed pour location, which will be identified by local signage.
- The concrete truck will back up into the pour location.
- The concrete truck will discharge into the form work (or into the concrete pump) under supervision of [INSERT CIVIL WORKS CONTRACTOR NAME], where it will be contained.

- When the concrete discharge is complete, the concrete truck will back up to the concrete wash down area, the chute discharging the concrete on the back of the truck will be cleaned by brush into a steel skip that is enclosed in a concrete wash-down bund. This will be supervised by the [INSERT CIVIL WORKS CONTRACTOR NAME] personnel and/or ECoW, who will ensure that all excess concrete is removed into the skip only and has been removed from the chute before releasing the truck from site.
- The washing out of the inside of trucks will not be permitted on site. Wash down of the concrete trucks will occur back at the batching plant.

An illustration of the concrete truck washdown arrangements are shown on Plate 2-2. The concrete washdown area will be located a minimum distance of 50m from any watercourse.

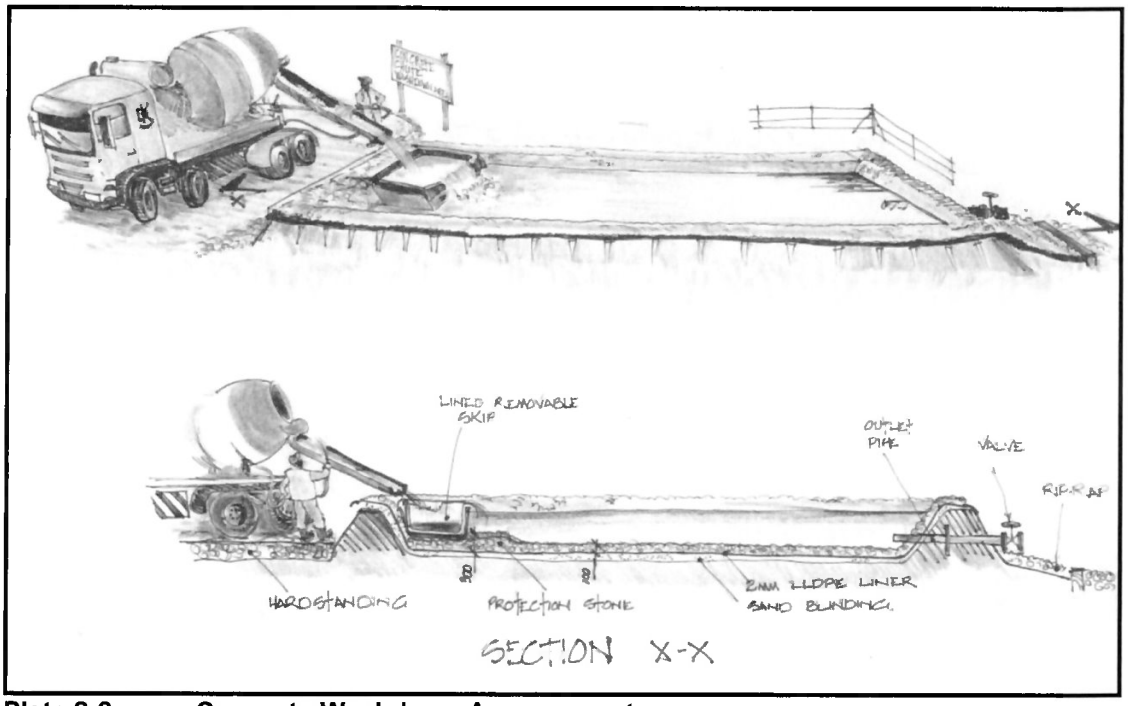

Plate 2-2: Concrete Washdown Arrangements

3 MITIGATION MEASURES

Measures will be put in place to ensure there is no impact on water quality during concrete pours at the site:

1. Silt fencing, straw bales and sandbags will be installed between concrete pour locations and the nearest watercourse, as appropriate.
2. Placement of blinding concrete will occur within excavations below ground surface, so concrete escape into the environment can't occur.
3. All concrete pours for foundations will be into sealed formwork. Any excess concrete will not be discarded on site.
4. Washout of concrete chutes will be done at a dedicated washout facility. Full washout of concrete trucks will be done offsite at the batching plants where facilities should be in place to treat wash-down water.
5. Washout of chutes following pours for the cable route are likely to be done at the batching plants as these pours will be remote from the main wind farm.
6. The capacity of the washout skip is $6m^3$, with an additional capacity of at least $10m^3$ capacity in the stone-lined secondary containment.
7. The on-site washout facility will be double-lined. It will be located a minimum of 50m from any watercourse or drain. Clean water will be decanted from the washdown facility when its pH falls below 9.

In addition to the surface water quality monitoring set out in the CEMP, monitoring of concrete pours and washout will consist of:

1. Prior to the pours, the Client's Engineer will inspect the shuttering and ensure that all mitigation measures are in place.
2. The Client's Engineer / ECoW will be on site to observe concrete pours and washout.
3. The [INSERT CIVIL WORKS CONTRACTOR NAME] Project Manager / ECoW will routinely inspect the washout facility to ensure that it is operating properly. If it isn't, use of the washout facility will cease – trucks will have to washout at the batching plant.

ATTACHMENT 5

METHOD STATEMENT:
BIOSECURITY

Graffy Wind Farm
Glenties
County Donegal

Draft Method Statement
Biosecurity

Prepared for:
Cuilfeach Teoranta
Letterkenny
County Donegal

Prepared by:
Keohane Geological & Environmental Consultancy
Ivy House
Clash
Carrigrohane
County Cork

April 2021

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1 INTRODUCTION

1.1 Overview of Scope of Work

Cuilfeach Teoranta is applying for planning permission to construct the Graffy Wind Farm, near Glenties County Donegal. The proposed wind farm will replace the wind farm permitted previously – planning numbers 09/30520 and PL 05B.237656 refer. It will consist of eight turbine, wind farm substation and underground connection to the National grid.

The purpose of this document is to set out the biosecurity protocol to be put in place during construction works, with particular focus on works within the riparian zones. The procedures detailed in this document will be advised to all construction workers at the site during site induction and toolbox talks. The protocol is based on

- Inland Fisheries Ireland Biosecurity Protocol for Field Survey Work (IFI, 2010).
- European Communities (Birds and Natural Habitats) Regulations 2011, S.I No 477 of 2011.
- Biodiversity Series – Invasive Knotweeds and Regulations, Version 1.2, January 2012, National Biodiversity Data Centre.
- Invasive Species Ireland – Invasive Plant Management http://invasivespeciesireland.com/invasive-plant-management/
- Assessing and Managing Invasive Species within Protected Areas. Protected Area Quick Guide Series. The Nature Conservancy.

Non-Native Species (NNS) are any animal or plant introduced (deliberately or accidently) by human activity to an area in which they do not naturally occur. Some animals and plants may have been transported here a long time ago and be considered "naturalised", but these are still considered non-native species. Invasive Non-Native Species (INNS), sometimes referred to as 'invasive alien species', are those non-native species that have the ability to spread rapidly and become dominant in an area or ecosystem, causing adverse ecological, environmental and economic impacts[1]. Non-native species subject to restrictions under Regulations 49 and 50 are listed in the third schedule of S.I No 477 of 2011.

1.2 Environmental Setting

The site is located on the lower slopes of the Aghla Mountain in the valleys of Stracashel and Stranagoppoge Rivers. The land use is low intensity hill grazing by sheep and commercial forestry. Turbines are located at elevations of between approximately 200mOD and 292mOD. The Aghla Mountain rises to over 600mOD to the north of the wind farm site.

The western side of the site is drained by the Stracashel River and its tributaries. It flows in a westerly direction towards Glenties. The West of Ardara/Maas Road SAC extends west along the valley of the Stracashel River downstream of Graffy Bridge. In addition to being part of an SAC, the Stracashel River is an important fisheries river, and the Owenea River catchment (to which the Stracashel River flows) is one of six freshwater pearl mussel catchments in County Donegal.

The eastern side of the site is drained by the Stranagoppoge River. It flows in a general north-easterly direction and joins the Finn River at Bellanamore. The Finn River flows in a general easterly direction through Ballybofey and Strabane, where it is called the Foyle River. It discharges to Lough Foyle at Derry. The River Finn SAC extends east along the valley of the Stranagoppoge River downstream of the public road running along the southern side of the wind farm site.

[1] Scottish Natural Heritage et al, 2019. Good Practice during Wind Farm Construction, 4th Edition.

The construction of the wind farm road and grid connection will cross a number of small tributaries of the Stracashel and Stranagoppoge rivers, and in the case of the grid connection, the Stracashel River itself.

The biodiversity assessment and habitat survey carried out for the wind farm did not record any invasive species within the proposed development area. Japanese knotweed was recorded outside of the wind farm site along the banks of the Stracashel River, near the grid connection route, at the following grid references:

- G 8665 9590
- G 8669 9589
- G 8674 9586

These stands lie beyond 7m from the proposed grid connection crossing at the forestry bridge and as such will not be disturbed by the proposed works. Locations are shown on Figure 1.

No other scheduled invasive species were recorded within the vicinity of the site, however a stand of snowberry was recorded adjacent to the proposed grid connection route at G 9018 9661. Locations are shown on Figure 2. This species is unlikely to be spread through the proposed grid connection works within the roadbed. This species, while considered invasive, is not subject to any legal restrictions or requirements.

Note

1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided

2. If recieved electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.

3. This drawing should be read in conjunction with all other relevant drawings and specifications.

Legend

Site Boundary

Japanese Knotweed

Rev	Description	By	Ckd	Date

Elmwood House, 74 Boucher Road,
BELFAST, BT12 6RZ
T: 028 9066 7914

Client: Cuilfeach Teoranta

Graffy Windpark

Invasive Species Plan: Japanese Knotweed

Status	Scale @ A3	Date
Preliminary	**1:1250**	**23.02.21**

RPS Project Number
NI 2256

Revision
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Note

1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.

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3. This drawing should be read in conjunction with all other relevant drawings and specifications.

Legend

- Site Boundary
- Snowberry Stands

Rev	Description	By	Ckd	Date

Elmwood House, 74 Boucher Road,
BELFAST, BT12 6RZ
T: 028 9066 7914

Client: Cuilfeach Teoranta

Graffy Windpark

Invasive Species Plan: Snowberry

Status	Scale @ A3	Date
Preliminary	**1:1250**	**23.02.21**

RPS Project Number
NI 2256

Revision
--

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2 BIOSECURITY PROTOCOL

2.1 Introduction

The construction of the wind farm will involve the crossing of a number of watercourses with roads and cables (internal cabling and grid connection), which will require work within the riparian zone. While no instream works are proposed, plant and machinery will be brought from other sites, and taken to different sites after the works are complete. It is therefore possible that machinery brought to site could bring invasive species to the site and / or transfer invasive species from the Graffy Wind Farm site to other sites after the works are completed.

This document sets out the protocol to be used for the mobilisation of plant and machinery to the site, particularly for works within the riparian zone; daily precautions to be taken; and protocol for decontaminating plant and machinery after completion of works within the riparian zone.

2.2 Pre-mobilisation Surveys

Prior to mobilisation to site the project ecologist will carry out a survey to identify whether there are any invasive plant species within the construction site. It is important to note that no invasive species were identified on the site during any of the many habitat surveys conducted to date.

1. The location and extent of any invasive species identified will be mapped.
2. If present, areas with invasive species and appropriate buffer zones will be fenced using post and rope fence with appropriate warning signs.
3. Depending on what is found and where it is found, a site-specific management plan will be prepared, which will address how the invasive species will be eradicated or contained. It is not practical to prepare a management plan at this stage as no invasive species has been identified. Things to be considered in the site-specific management plan will include:
    a. Type of species involved, its extent and how well/long it is established.
    b. Does the invasive species infestation extend into the earthworks area?
    c. Does the invasive species infestation extend close to water courses?
    d. Does the invasive species infestation extend into the SAC? Is a Habitats Regulation Assessment (HRA) required per Article 6 of the Habitats Directive, and is a license required under the nature conservation legislation?
    e. Would protected species be impacted – e.g. are birds using the invasive species for nesting?
    f. Notification of adjacent landowners.
    g. Whether a specialist contractor is needed.
    h. Establishment of exclusion zones to prevent personnel and vehicles entering the infested areas.
    i. Isolation and treatment of soils excavated from infested areas. Treatment methods would need to be considered including use of herbicides, hand removal, strimming, deep excavation with off-site treatment and disposal etc.
    j. Any health and safety issues associated with invasive species – e.g. toxic chemicals in the sap of giant hogweed that can cause painful skin irritation.
    k. Monitoring of eradication programme.
4. Workers on site will be made aware of any invasive species found and educated on their identification. This would form part of the site induction.

2.3 Protocol for Machinery Mobilisation

Before [INSERT CONTRACTOR NAME] mobilises plant and machinery to site, they will be washed using high pressure steam cleaning, or pressure washer. Following washing, and prior to mobilisation to site, they will be inspected to ensure all material and debris has been removed. Disinfectant (Virkon Aquatic or similar) will then be sprayed on the tracks, wheels and undercarriage of the machinery.

2.4 During Works in the Riparian Zone

Only machinery cleaned and disinfected (per Section 2.3) will be allowed work in the riparian zone. Workers' cars/vans will be parked back from the riparian zone to avoid potential for contamination.

A disinfection station will be setup for workers leaving the site to clean and disinfect work boots. This will consist of a shallow tray for washing boots and a handpump strayer with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product).

2.5 Protocol for Machinery Demobilisation

Upon completion of the works in the riparian zone, the plant and machinery will be inspected, and all plant debris removed. The plant and machinery will then be taken to the site compound and will be washed using high pressure steam cleaning, or pressure washer. Following washing, and prior to demobilisation from site or use elsewhere on site, they will be inspected to ensure all material and debris has been removed. Disinfectant (Virkon Aquatic or similar) will then be sprayed on the tracks, wheels and undercarriage of the machinery.

If machinery is to remain on site for work in other areas of the wind farm, they will be washed again before demobilisation from site.

ATTACHMENT 6

METHOD STATEMENT: HORIZONTAL DIRECTIONAL DRILLING

Proposed Grid Connection
Between
Graffy Wind Farm,
&
Tievebrack Substation, Glenties County Donegal

Draft Method Statement
Horizontal Directional Drilling

Prepared for:
Cuilfeach Teoranta
McKendrick Place
Pearse Road
Letterkenny
County Donegal

Prepared by:
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April 2021

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1 INTRODUCTION

1.1 Overview of Scope of Work

Cuilfeach Teoranta is applying for planning permission to construct the Graffy Wind Farm, near Glenties County Donegal. The proposed wind farm will replace the wind farm permitted previously – planning numbers 09/30520 and PL 05B.237656 refer. It will consist of eight turbines, wind farm substation, transport route upgrades and underground connection to the National grid. The grid connection route largely follows public roads and existing forestry roads to the Eirgrid Tievebrack substation at Drumnalough – a distance of approximately 7.3km. A short section at the eastern end (near the substation) cuts across a field for a distance of approximately 50m. The grid connection will be an underground 110kV cable.

Three locations have been identified along the route where horizontal directional drilling (HDD) is required. These are at the two bridges along the route and at a triple culvert location. This draft Method Statement contains details for the HDD method of construction that will be utilised at stream / river crossings, where HDD is considered the most appropriate solution considering technical and environmental issues.

A specialist HDD contractor will be appointed for this work, who will prepare site-specific method statements for each crossing location.

1.2 Environmental Setting

The grid connection route will extend the Graffy Wind Farm substation to Eirgrid's Tievebrack substation at Drumnalough. Its alignment follows public and forestry roads for most of its 7.3km route. The public roads are undivided rural roads that follow the valley of the Stracashel River. The eastern half of the grid road follows public roads. At Dromconcoose, the route turns south onto a forestry road, crossing the Stracashel River and continues east along the forestry road to the Tievebrack substation. The West of Ardara/Maas Road SAC extends west along the valley of the Stracashel River downstream of Graffy Bridge. Protection of the surface water quality during the installation of the cable and works in proximity to the Stracashel River and its tributaries is therefore a priority.

In addition to being part of an SAC, the Stracashel River is an important fisheries river, and the Owenea River catchment (to which the Stracashel River flows) is one of six freshwater pearl mussel catchments in County Donegal.

1.3 HDD Overview

HDD is a trenchless technology used in a number of industries, including the installation of utility ducting and pipelines under roads, railways and rivers. A drilling rig is used to drill a small diameter pilot hole along a predetermined path between the launch pit and exit pit. The direction of the drill bit is monitored and controlled by the operator. Controls at the cutting head allows the operator to change the drilling direction and maintain the predetermined path. Plate 1-1 shows a typical direction drilling rig used for utility-sized applications, such as that required for the works at Graffy Wind Farm.

Once the pilot hole reaches the exit pit, the borehole is reamed to the required diameter. The reaming can be done as the pipeline/ducting is pulled in behind it or can be done with a separate pass. The process is illustrated in Plate 1-2.

Plate 1-1: Typical Utility-Sized Horizontal Drilling Rig

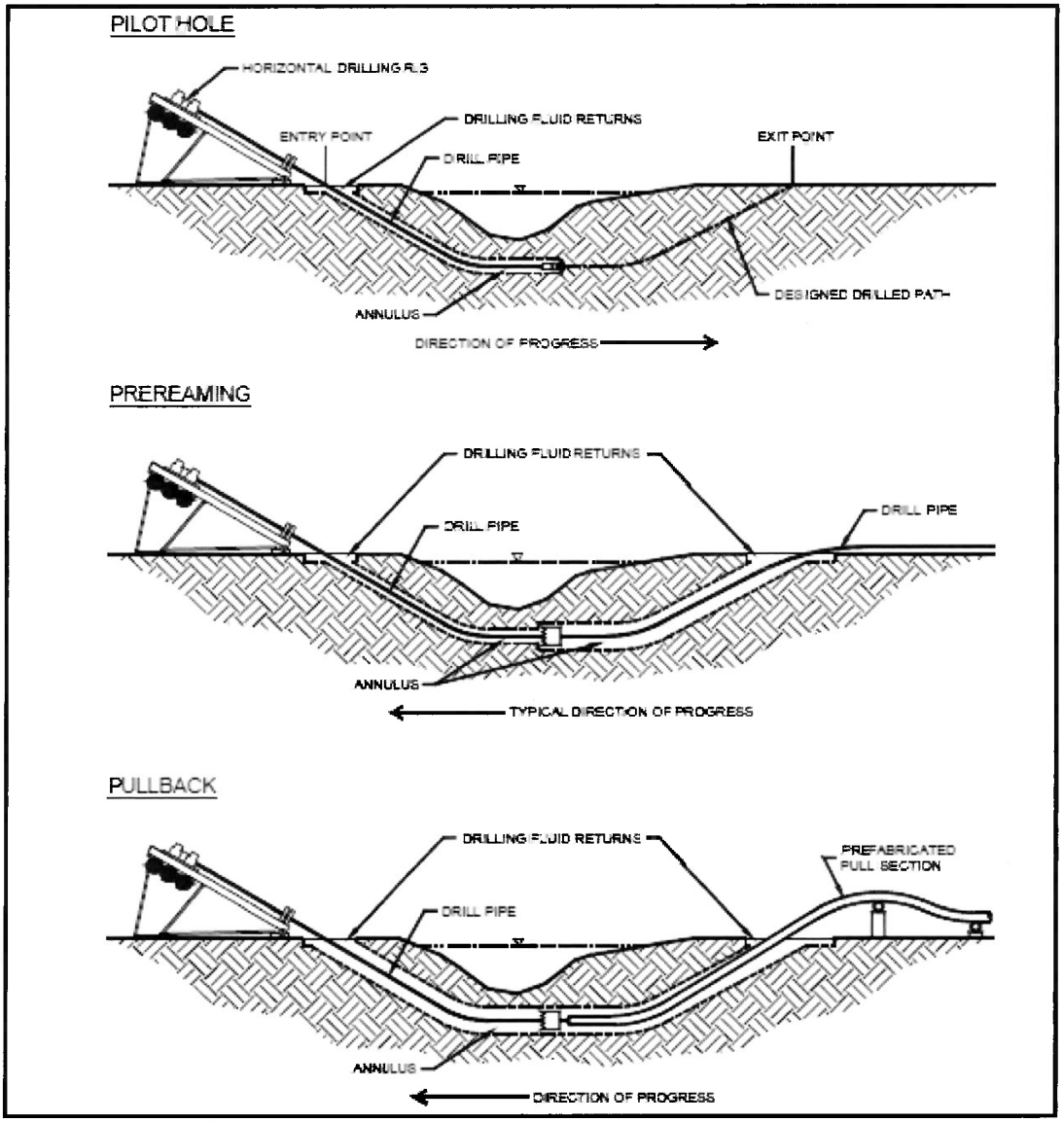


Plate 1-2: HDD Process

2 HORIZONTAL DIRECTIONAL DRILLING

2.1 Introduction

Site Investigations have been undertaken on behalf of the Developer, and it was established that ground conditions were suitable for the application of HDD at [INSERT LOCATIONS].

A launch pit will be excavated within the open field above the watercourse, on the [INSERT LOCATION DETAILS], with a minimum set back of 25 metres from the watercourse. The drilling rig will be set up adjacent to the launch pit.

Although it is considered that the ground conditions at the launch pit support good bearing capacities a small amount of clean stone material may be required to level the footings of the drill rig, at this location. The exit pit for the drill head shall be positioned in the [INSERT DETAILS OF THE EXIT PIT], approximately 25 metre set back from the watercourse. The coil of 160mm Outer Diameter HDPE pipe will be positioned and back fed under the watercourse, from this exit pit location.

At the point where the HDD duct passes under the watercourse, the minimum clearance distance shall be 2.5 metres, ensuring no undermining or up thrust force on the watercourse bed, which could result in 'frac-out'.

Once the outer duct installation is complete, the launch and exit pits will be backfilled with selected excavated materials. A precast transition / jointing chamber will be permanently inserted adjacent to the locations of the launch and exit pits, in line with Eirgrid requirements. Reinstatement will be in line with Client's Engineer requirements. Environmental controls are to be put in place, with ongoing monitoring throughout the duration of the works.

Details of this crossing are shown on Drawings [INSERT DRAWING NUMBER] (Location Plan), and [INSERT DRAWING NUMBER] (Cross sectional Detail), copies of which can be found in Appendix A of this document.

2.2 HDD Locations

TLI has inspected the grid route and has identified three locations where HDD is required. These are briefly described below.

2.2.1 Bridge 1 – Coillte Bridge

Bridge 1 is a flat slab bridge within the forestry access road and has insufficient room to install the cable within the bridge deck to EirGrid/ESB specification (450mm cover to top of ducts), the design of the bridge is therefore inadequate to accommodate the proposed works. It is proposed to horizontal directional drill (HDD) approximately 1500mm beneath the waterway and bridge foundations. This depth is based on locating a suitable clay/silt formation for HDD and the required depth may increase subject to geotechnical investigations. The river at this bridge crossing is part of the 'West of Ardara/Maas Road Special Area of Conservation', it is therefore proposed to setup the HDD back from the bridge in order to drill under the SAC and the bridge. The total length of the HDD will be approx. 100m.

It is proposed to align the HDD within the existing access road corridor, however some road widening works may be required to facilitate the HDD. The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber.

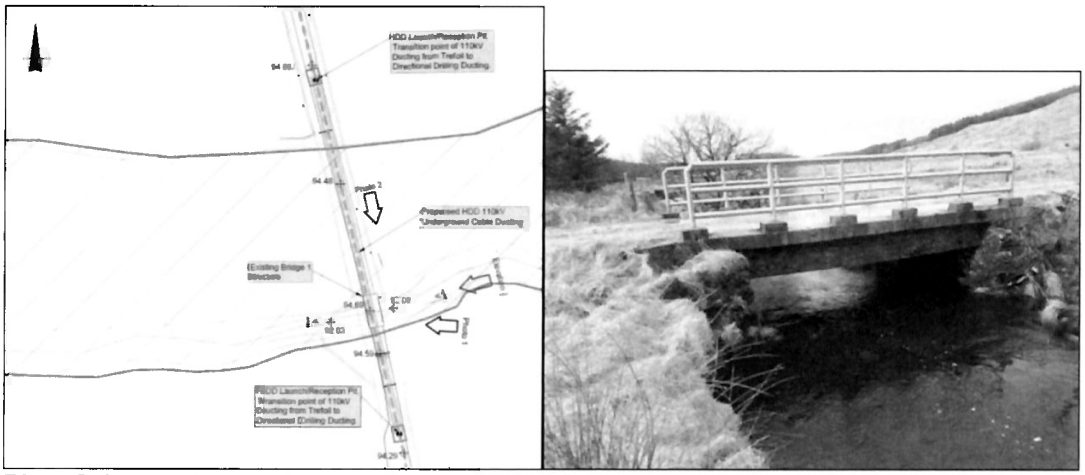


Plate 2-1: Location of HDD at Coillte Bridge

2.2.2 Bridge 2 – Public Road Bridge

Bridge 2 is a flat slab bridge in the public road and has insufficient room to install the cable within the bridge deck to EirGrid/ESB specification (450mm cover to top of ducts), the design of the bridge is therefore inadequate to accommodate the proposed works. It is proposed to horizontal directional drill (HDD) approximately 1500mm beneath the waterway and bridge foundations. This depth is based on locating a suitable clay/silt formation for HDD and the required depth may increase subject to geotechnical investigations.

The total length of the proposed HDD will be approx. 40m. It is proposed to align the HDD within the existing road corridor, however some road widening works may be required to facilitate the HDD, this may include a temporary works area within the adjacent private lands. The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber

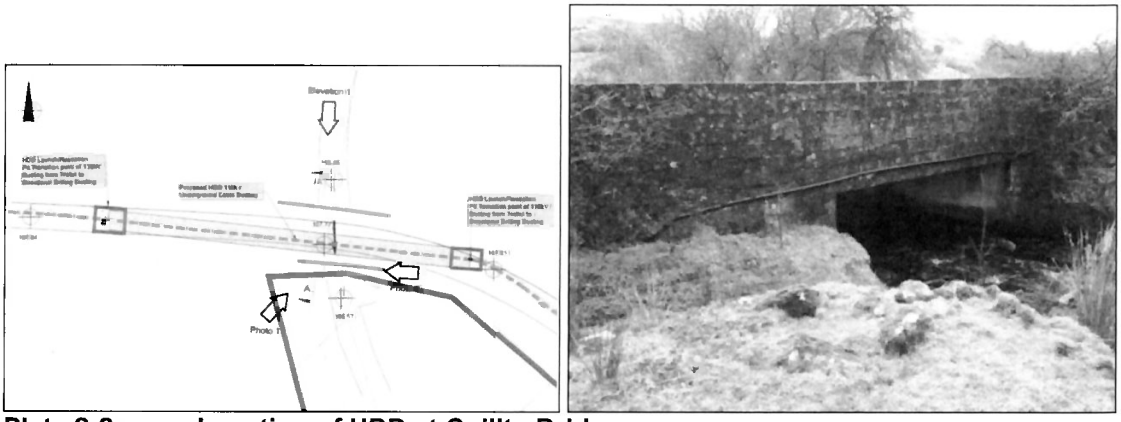


Plate 2-2: Location of HDD at Coillte Bridge

2.2.3 Culvert No. 27

One culvert has been identified that requires HDD. This consists of 3 No. 500mm HDPE pipe – see Plate 2-3. Because it is wide, normal undercrossing is not feasible.

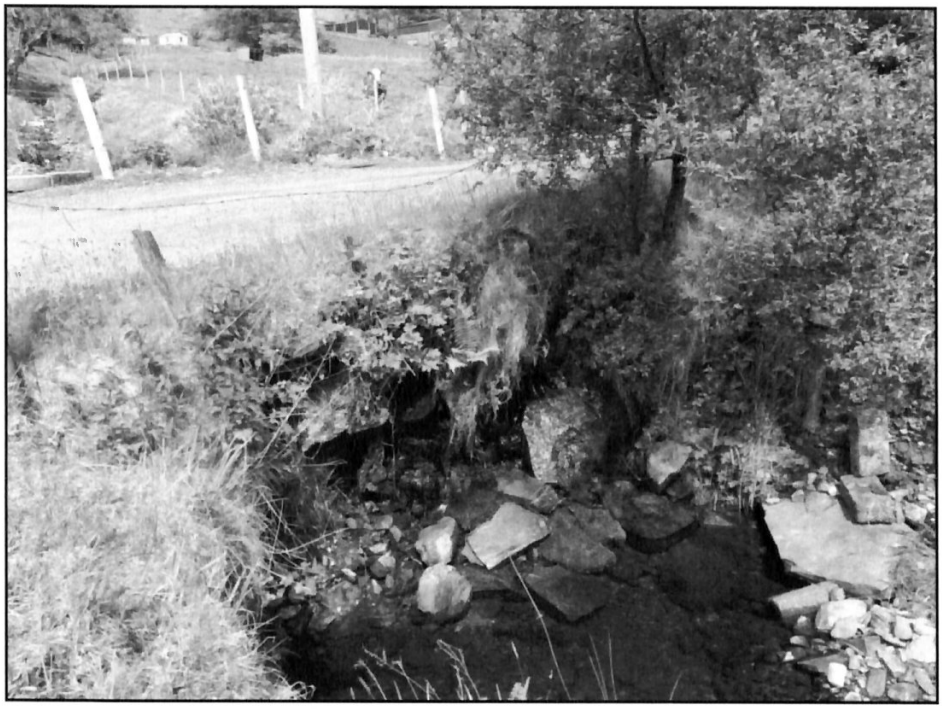


Plate 2-3: Culvert No. 27

2.3 Directional Drilling Works

2.3.1 Directional Drill Launch, Reception Pit and Joint Bay Excavation

Equipment:

- 2-3 General Operatives
- 1 Excavator Operator
- 1 no. tracked excavator

Materials:

- Geogrid
- Stone for drilling rig platform
- Materials for surface water protection – silt fences, straw bales, sandbags
- Hydrocarbon spill kit

Method:

2 no. separate excavations will be made to a depth of approximately 1.5 metres to accommodate the directional drilling launch and exit pits. Spoil arisings will be stored adjacent to the pit locations for reinstatement, at a minimum 25 metre buffer distance to the watercourse. Temporary spoil mound shall have side slopes battered back to 1:1. Slit fencing is to be erected around the base of the temporary mound. Soil will be reinstated on completion of drilling and jointing operations.

2.3.2 Storage of Materials – Drilling Operations

Equipment:

- 1 no. Drill Rig
- Drill Head circa 180mm.
- Drill Rods
- Operational control box.
- 1 no. water trailer

Materials:

- Coil of 160mm Outer Diameter HDPE Pipe.

Method:
All equipment will be stored on or immediately adjacent to the temporary drilling pad location, with a minimum set back distance of 25 metres from the watercourse.

2.3.3 Drill Operations

Equipment:
- 1 no. Drill Rig
- 1 no. Drill Operator
- 1 no. Labourer
- Drill Head circa 180mm.
- Drill Rods
- Operational control box.

Materials:
- Coil of 160mm Outer Diameter HDPE Pipe.
- Biodegradable drilling fluid – see MSDS attached.

Method:
The drill head will be placed in the open excavation (launch pit) and it will be guided in by the operator for the first 1-2 metres.

A series of drill rods will be connected to the head as it travels further along the shaft.

The drill position is always known to the operator and the drill can be manoeuvred in 3 planes / axis.

A drilling lubricant will be required this will be delivered directly to the drill head. This will be a biodegradable non-toxic slurry mixture or equivalent.

Once the conduit is completed, the drill head is exposed at the exit pit and removed. The drill rods are connected to the duct pipe and the drill in reversed pulling the pipe back through the conduit.

2.3.4 Managing Arisings from Drill Operations

Equipment:
- 1 no. General Operative
- 1 no. pump
- 1 no. diesel generator

Materials:
- 1 no. mobile bunded storage tank

Method:
It is anticipated that 4m^3 of spoil will be excavated for each 100-metre section of pipe. This spoil will be largely subsoil material.

A drilling lubricant will be required which will be delivered directly to the drill head. This will be a biodegradable non-toxic slurry mixture.

The majority of the arisings will exit the launch pit within the slurry mixture. It is conservatively assumed that 1 part slurry will be required for every 1 part of drill spoil. Therefore, for each 100-metre section of pipe approximately 8m^3 of arising will need to be catered for.

A mobile bunded tank will be located next to the launch pit into which the arisings will be pumped. This will be stored outside of the 25-metre watercourse buffer zone. Arisings will be taken offsite for disposal.

2.4 Design Measures

The following design measures will be implemented during the electrical connection works:

1. No in-stream works will be permitted.
2. Works shall not take place at periods of high rainfall and shall be scaled back or suspended if heavy rain is forecast.
3. A floating hydrocarbon boom and spill kit will be employed.
4. Plant will travel slowly across bare ground at a maximum of 5km/hr. If truck rutting is observed, then bog mats or rolling road will be employed to prevent ground damage on the access routes to watercourse crossings on both banks. This will prevent solids reaching a watercourse from damaged access tracks.
5. Silt fencing will be erected at a setback distance of 5m from the joint bays during excavation. Silt fences will also be erected along both banks of the river downslope of the works.
6. Any excess construction material shall be removed from the works areas and disposed of in a fully licensed landfill.
7. No re-fuelling of mobile machinery will take place on site or within 50 metres of any watercourse. The drilling rig will be refuelled at the launch pit; it is not practical to move it for refuelling.
8. All construction workers will be given a toolbox talk addressing the environmental topics concerning the drilling prior to commencement of construction.
9. In relation to the trenchless installation of the cable, silt fences will be erected down slope of the works area. As noted, the works area will be a minimum of 25 metre back from the watercourse and within this zone, the natural vegetative cover will not be altered and no construction traffic will use the area so that the natural filtering capacity of the vegetation if required will remain intact.
10. Biodegradable, non-toxic drilling fluid will be used.
11. To minimise any risk of breakout when actively drilling the following measures will be taken:
    a. Drilling fluid volumes and pressures will be constantly monitored to detect any possible leaking of drilling fluid into the surrounding geology that might lead to breakout.
    b. The watercourse will be monitored during drilling to immediately identify a frac-out, should one occur. In the event of a frac-out, drilling would immediately cease.
    c. If drilling fluid losses are identified, then drilling drilling fluid pumping will be stopped immediately.
    d. An attempt can then be made to seal the affected zone and continue drilling. This can be done by either using a higher viscosity drilling fluid or by addition of an environmentally suitable stop-loss additive.
12. By using a competent HDD contractor and following the correct procedures the possibility of any 'frac-out' into the watercourse during the HDD process is therefore negligible.

2.5 Monitoring

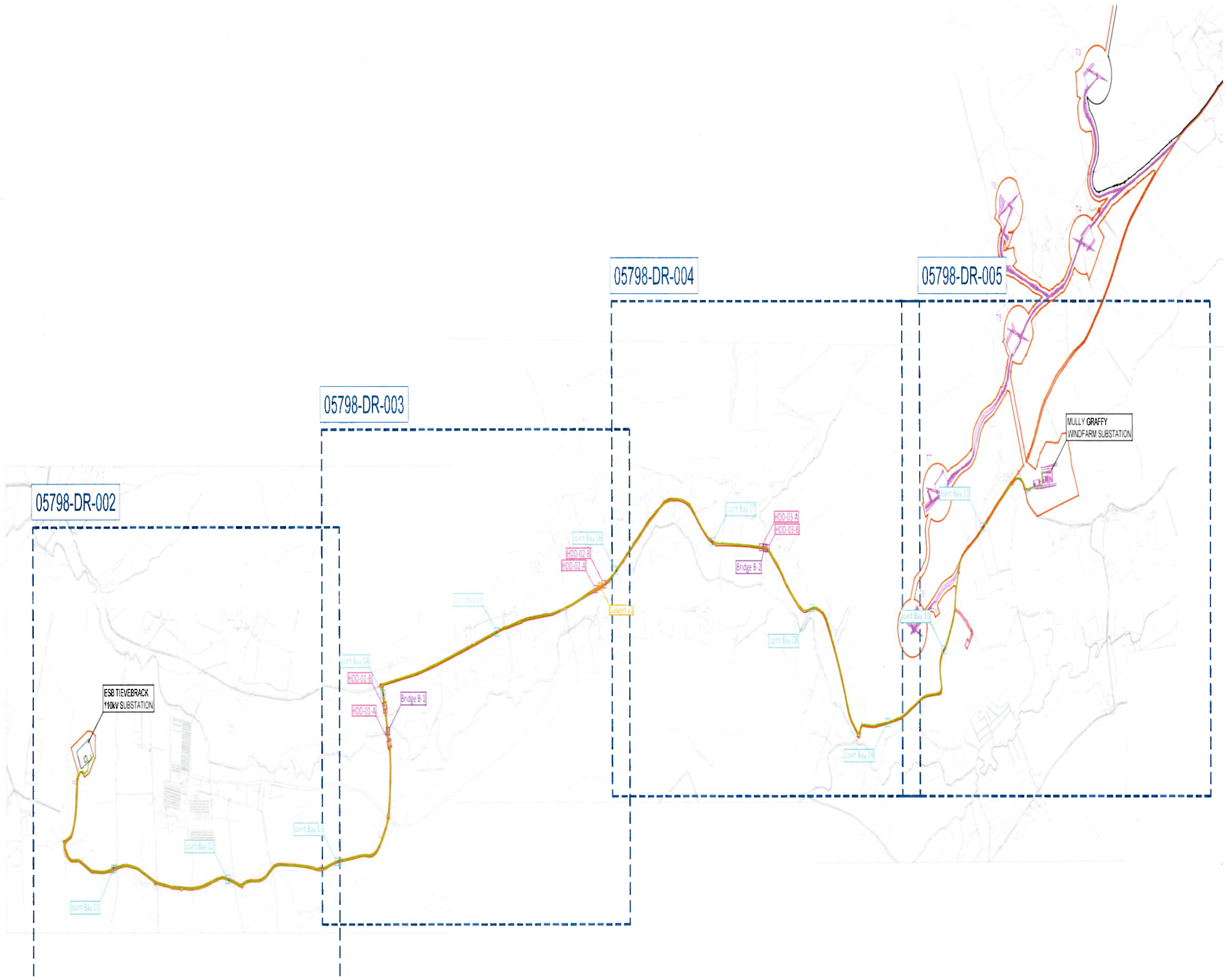
All works undertaken including preparatory works will be carried out under supervision of a suitably qualified Environmental Engineer / Ecologist. Surface water quality monitoring will be carried out by the ecological clerk of works (ECoW) appointed for the project and in accordance with the Surface Water Quality Monitoring Plan which has been prepared for the project.

ISO A0 841mm x 1189mm

Map Series:
Prime Data Vector

ITM Centre Point Co-ordinate:
X,Y = 587974,896360

Ordnance Survey Ireland Licence No.
EN 0073721



Overall Site Layout Plan

Scale : NTS

Project Management Initials | Designer CH | Checked SK | Approved RG

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PROJECT

Mully Graffy Windfarm
110kV Grid Connection

CLIENT

Cuilfeach Teoranta

CONSULTANTS

NOTES: -

- This drawing is to be used only for the purpose of the planning application and is subject to detailed design.
- Position of underground cable and location of joint bays, link boxes and comms chambers may vary depending on site conditions.
- Position of link boxes and comms chambers is to be agreed onsite with EirGrid/ESB
- Other services may be encountered on the route
- Position of HDD launch/reception shown points are indicative only and will be subject to site investigation works and detailed design

LEGEND: -

Proposed 110kV UGC Route (~7.3km)
Proposed Planning Boundary
Mully Graffy Windfarm Infrastructure

ISSUE/REVISION

P01	16.03.21	Issued for Planning
P02	05.03.21	Issued for Planning
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

05-798

SHEET TITLE

Overall Site Layout Plan

SHEET NUMBER

05798-DR-001

ATTACHMENT 7

CONSTURCTION METHODOLOGY
GRAFFY WIND FARM - 110kV UUNDERGROUND CABLE

CONSTRUCTION METHODOLOGY

Mully Graffy Windfarm - 110kV Underground Cable

Document No: 05798-R01-01

Cuilfeach Teoranta

Revision:	Author:	Checked:	Date:	Notes:
00	SK	RG	06.03.21	*Issued for Client Review*
01	SK	RG	16.03.21	*Updated following Client Review*

Table of Contents

Table of Figures

1.0 Introduction

The purpose of this document is to outline and explain the construction techniques and methodologies which will be implemented during construction of the proposed Mully Graffy Wind Farm 110kV underground cable grid connection to the existing ESB Tievebrack 110kV Substation in Co. Donegal. The grid connection will consist entirely of underground cabling (UGC) with the majority of the UGC to be installed within the public road network.

The UGC works will consist of the installation of 5 No. ducts in an excavated trench to accommodate 3 No. power cables, and 1 No. fibre communications cable to allow communications between the Mully Graffy Wind Farm Substation and Tievebrack 110kV substation.

This document is intended to be used as an aid to understand the methodologies to be employed during construction and should be read in conjunction with all other specialist reports which accompany the Planning Application. In addition, this document is in outline form only and will be revised and updated prior to the commencement of any construction activities, detailed Method Statements will be prepared in respect of each aspect of the proposed development.

2.0 Proposed 110kV Underground Cable Route

The proposed UGC route is approximately 7.3km in length and runs in a easterly direction from the existing Tievebrack 110kV Substation to the proposed Mully Graffy Wind Farm substation location utilizing existing access tracks, forestry access tracks, the public road network, and some section of private land.

The exact location of the UGC within the proposed site boundary is subject to minor modification following a further detailed assessment to be undertaken prior to construction and following consultation with Donegal County Council and all other relevant stakeholders, having regard to all environmental protection measures outlined in the planning application and accompanying technical reports.

Below **(Figure 1)** which outlines the proposed UGC route, with each section of the route being formulated in detail within Table 1.

This proposed grid connection route is shown as an Overall Site Layout Plan in Drawing No. 05798-DR-001.

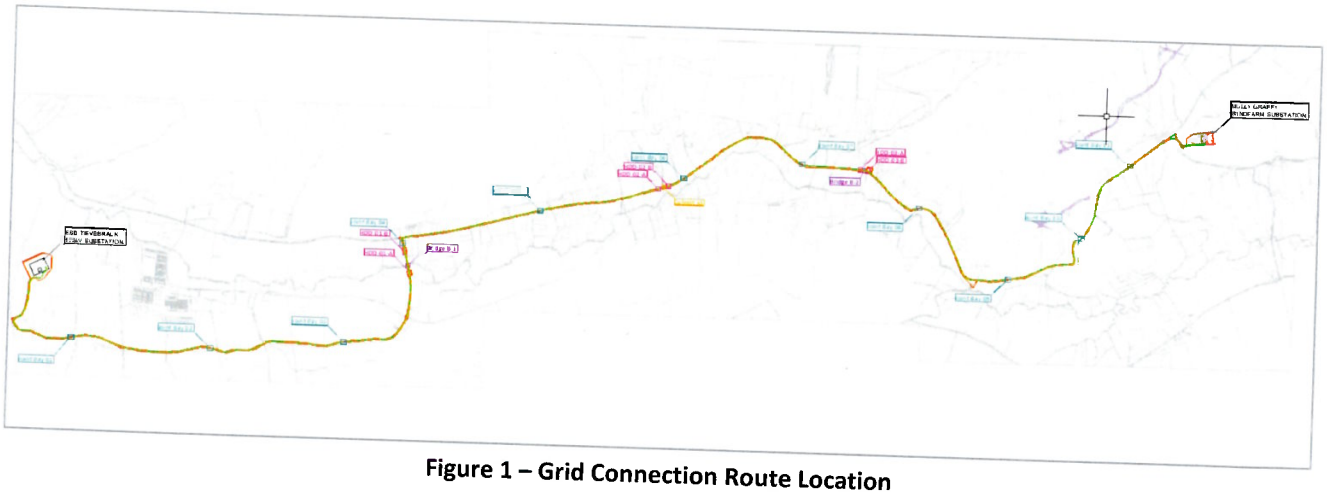


Figure 1 – Grid Connection Route Location

Table 1 of this report summaries the route location features of the underground cable connection and proposed route.

Table 1 – Approximate Route Location of Preliminary Design:		
Substation/Forestry Access Roads	**Public Roads**	**Private Land / WF**
2,675m	4,429m	210m

Table 1: Tievebrack 110kV Substation to WF Substation – UGC Route Location Summary

Table 2 below separates the UGC route into a number of sections and describes the specific construction requirements of each individual section and identifies access routes to the work areas. All plant and equipment employed on the proposed works will be subject to good site organisation and hygiene, particularly during construction activities.

Table 2 - Summary of 110kV Underground Cable Route	
Section	**Description**
Section 1 2,675m	**UGC from Tievebrack 110kV Substation to L2593-2 Local Road** The proposed underground cable route exits Tievebrack 110kV Substation and follows the existing access road from the substation in a easterly direction to the junction with the L2593-2 local road. It is proposed to install the ducting within the existing access road corridor for the entirety of this section. <u>Section 1 Features:</u> ▪ *4 Joint Bays and associated chambers* Joint bays will be located below ground and finished/reinstated to the required landowner specification. Each joint bay will have an associated communication chamber and link box which will have a surface access hatch matching existing ground levels. The final position of the joint bays, link boxes and comms chamber will need to be agreed with ESB as part of the design approval process. It is proposed to install all joint bays within the corridor of the existing access road. Track widening works may be required at some locations to facilitate the joint bays. ▪ *13 Culvert Crossings* The UGC will cross existing culverts using an undercrossing or overcrossing method which will be selected based on the cover available above the culvert. Culvert crossings have been designed in-line with the EirGrid specifications. Where it is not possible to cross under an existing culvert while maintaining the culvert in place, the culvert may be replaced.

Table 2 - Summary of 110kV Underground Cable Route	
Section	**Description**
	▪ *1 HDD Crossing* There is one flat slab bridge in this section of the route (Bridge 1) which does not have sufficient cover available to install the cable within the bridge deck. It will therefore be necessary to horizontal directional drill (HDD) under this bridge and watercourse. The river at this bridge crossing is part of the 'West of Ardara/Maas Road Special Area of Conservation', it is therefore proposed to setup the HDD back from the bridge in order to drill under the SAC and the bridge. The total length of the HDD will be approx. 100m. It is proposed to align the HDD within the existing access road corridor, however some road widening works may be required to facilitate the HDD. The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber.
Section 2 4,639m	**UGC within the Road Network to the Windfarm Substation** From section 1 the UGC merges onto the L2593-2 local road which it follows in a easterly direction, after passing Graffy Bridge the UGC continues east in the L6743-3 local road. The final section of the UGC leaves the L6743-3 local road and merges onto the L20230-0 local road which it follows south towards the proposed windfarm substation entrance. <u>Section 1 Features:</u> ▪ *7 Joint Bays and associated chambers* Joint bays will be located below ground and finished/reinstated to the required Donegal specification for the roadway. All reinstatement works will be carried out in-line with the 'Guidelines for Managing Openings in Public Roads – 2017'. Each joint bay will have an associated communication chamber and link box which will have a surface access hatch matching road/ground levels. The final position of the joint bays, link boxes and comms chamber will need to be agreed with ESB as part of the design approval process. It is proposed to install all joint bays within the corridor of the existing carriageway, some chambers may be installed in the road verge. Road widening works may be required at some locations to facilitate the joint bays. ▪ *37 Culvert Crossings* The UGC will cross existing culverts using an undercrossing or overcrossing method which will be selected based on the cover available above the culvert.

Table 2 - Summary of 110kV Underground Cable Route	
Section	**Description**
	Culvert crossings have been designed in-line with the EirGrid specifications. Where it is not possible to cross under an existing culvert while maintaining the culvert in place, the culvert may be replaced. All reinstatement works will be carried out in-line with the 'Guidelines for Managing Openings in Public Roads – 2017'. ▪ *2 HDD Crossings* <u>Culvert 27 (Triple Culvert):</u> Culvert 27 is made up of three twin-wall pipes installed adjacent to each other, which do not have sufficient cover available to install the cable over the culverts. There is a relatively large water flow in this watercourse and it is therefore proposed to HDD under the culverts. It is proposed to complete the HDD within the exiting road corridor, the total length of the proposed HDD will be approx. 50m. The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber. <u>Bridge 2:</u> There is one flat slab bridge in this section of the route (Bridge 2) which does not have sufficient cover available to install the cable within the bridge deck. It will therefore be necessary to HDD under this bridge and watercourse. It is proposed to complete the HDD within the exiting road corridor, the total length of the proposed HDD will be approx. 40m. It is proposed to align the HDD within the existing road corridor, however some road widening works may be required to facilitate the HDD, this may include a temporary works area within the adjacent private lands. The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber.
Refer to Figure 1 and to the planning drawings submitted for location details. Note: The precise location of the proposed cable route within the planning application boundary may be subject to change as result of existing services/utility locations, ground conditions and any environmental constraints.	

3.0 Preliminary Site Investigations

It would be proposed to carry out Preliminary site investigations along the cable route prior to construction to confirm design assumptions.

The following items may be carried out for the proposed cable route:

- Slit trenches at locations of service crossings (Full road/track width).
- Trial holes along the route to ascertain ground conditions and thermal resistivity of the soil.
- Trial holes at all joint bay positions to ascertain ground conditions and thermal resistivity of the soil.
- Boreholes at proposed HDD locations to ascertain ground conditions.

Traffic Management – Single lane Closure with Stop/Go system in place as required.

Equipment:

- 4x4 vehicle
- Concrete vibrator
- Wheeled dumper
- Soil compactor
- 360° tracked excavator (only rubber tracked machines will be allowed on public roads)

4.0 Access Routes to Work Area

The majority of the proposed underground cable will be installed within the public road network and existing access tracks and will therefore be accessed via the existing road network and access points. Where the cable route is located on private lands, contractor(s) will be required to utilise the local public road network in the vicinity of the work area and from there utilise existing access points, where appropriate.

A detailed Traffic Management Plan will be prepared, and agreed with Donegal County Council, prior to the commencement of construction. Some work areas will require a road closure where it is not possible to safely implement a Stop/Go system. Where road closures are necessary, a suitable diversion will be implemented using appropriate signage, following consultation with Donegal County Council.

Careful and considered local consultation will be carried out, to minimise the amount of disturbance caused during works. Prior to the commencement of construction, the contractor will assess all access routes and determine any additional access requirements which will be incorporated as part of the method statement. All plant and equipment employed during the proposed works (e.g. diggers, tracked machines, footwear etc.) will be inspected prior to arrival on site and on leaving site and cleaned where necessary to prevent the spread of invasive aquatic / riparian species.

5.0 Traffic Management

Traffic management and road signage will be in accordance with the Department of Transport: Traffic Signs Manual - Chapter 8: Temporary Traffic Measures and Signs for Road Works and in agreement with Donegal County Council. All work on public roads will be subject to the approval of a road opening license application. The contractor will prepare detailed traffic management plans for inclusion as part of the road opening applications. Where road widths allow, the UGC installation works will allow for one side of the road to be open to traffic at all times by means of a 'Stop/Go' type traffic management system, where a minimum 2.5m roadway will be maintained at all times. Where it is not possible to implement a 'Stop/Go' system a full road closure will be required. Temporary traffic signals will be implemented to allow road users safely pass through the works area by channelling them onto the open side of the road. Typically, the UGC will be installed in 100m sections, and no more than 100m will be excavated without the majority of the previous section being reinstated.

All construction vehicles will be parked within the works area so as not to cause additional obstruction or inconvenience to road users or residents. The traffic signals will be in place prior to the works commencing and will remain in place until after the works are completed. The public road will be checked regularly and maintained free of mud and debris. Road sweeping will be carried out as appropriate to ensure construction traffic does not adversely affect the local road condition.

In the event of emergency; steel plates, which will be available on site, can be put in place across the excavation to allow traffic to flow on both sides of the road.

All traffic management measures will comply with those outlined in the accompanying Traffic Management Report and will be incorporated into a detailed Traffic Management Plan to be prepared, in consultation with Donegal County Council, prior to the commencement of UGC construction.

6.0 Road Opening Licence

The proposed grid connection works will require a road opening licence under Section 254 of the Planning and Development Act 2000-2015 from Donegal County Council. A Traffic Management Plan (TMP) will be agreed with Donegal County Council prior to the commencement of the development. The TMP will outline the location of traffic management signage, together with the location of any necessary road closures and the routing of appropriate diversions. Where diversions are required, these will be agreed with Donegal County Council in advance of the preparation of the TMP.

7.0 Construction Hours

Standard working hours for construction will be 8.00am to 8.00pm Monday to Friday and 8.00am to 6.00pm on Saturday (if required), with no works on Sundays or Bank Holidays except in exceptional circumstances or in the event of an emergency. All site personnel will be required to wear project notification labelling on high visibility vests and head protection so that they can be easily identified by all workers on-site.

8.0 UGC Construction Methodology

The proposed UGC will consist of 3 No. 125mm diameter HDPE power cable ducts and 2 No. 125mm diameter HDPE communications duct to be installed in an excavated trench, typically 600mm wide by 1,250mm deep, with variations on this design to adapt to bridge crossings, culvert crossings, service crossings and watercourse crossings, etc. The power cable ducts will accommodate 1 No. power cables per duct. The communications duct will accommodate a fibre cable to allow communications between the Mully Graffy Wind Farm substation and Tievebrack 110kV substation. The ducts will be installed and the trench reinstated in accordance with the landowner or Donegal County Council specifications, the electrical cabling/fibre cable is then pulled through the installed ducts in approximately 450-700m sections. Construction methodologies implemented and materials used will ensure that the UGC is installed in accordance with the requirements and specifications of ESB.

8.1 Trenching Methodology

The following section outlines the methodology to be followed during trenching works:-

- The Contractor, and their appointed Site Manager, will prepare a targeted Method Statement concisely outlining the construction methodology and incorporating all mitigation and control measures included within the EIAR and as required by planning conditions where relevant;
- All existing underground services along the UGC route shall be confirmed prior to the commencement of construction works;
- At watercourse crossings, the contractor will be required to adhere to the environmental control measures outlined within the EIAR, the detailed Construction Environmental Management Plan (CEMP) and best practice construction methodologies;
- Where the cable route intersects with culverts, the culvert will remain in place (where possible) and the ducting will be installed either above or below the culvert to provide minimum separation distances in accordance with ESB and Irish Water specifications;
- In the event that culverts require removal for ducting installation, it is proposed that a suitable method of damming the water source and pumping the water around the work area would be set out in a method statement and agreed with the relevant stakeholders. Once the ducts are installed the culvert will be reinstated to match existing levels and dimensions. If works of this nature are required, the contractor will liaise with Inland Fisheries Ireland in advance of works;
- Traffic management measures will be implemented in accordance with those included in the EIAR, and a detailed Traffic Management Plan will be prepared and agreed with Donegal County Council;
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height. Stockpiles will be located a minimum of 50m from surface water features and all stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECoW);
- Excavated material shall be employed to backfill the trench where appropriate and any surplus material will be transported off site and disposed of at a fully authorised soil recovery site;
- Any earthen (sod) banks to be excavated will be carefully opened with the surface sods being stored separately and maintained for use during reinstatement;

- The excavated trench will be dewatered if required, from a sump installed within the low section of the opened trench. Where dewatering is required, dirty water will be fully and appropriately attenuated, through silt bags, before being appropriately discharged to vegetation or surface water drainage feature;
- Where required, grass will be reinstated by either seeding or by replacing with grass turves;
- No more than a 100m section of trench will be opened at any one time. The second 100m will only be excavated once the majority of reinstatement has been completed on the first;
- The excavation, installation and reinstatement process will take on average of 1 no. day to complete a 100m section;
- Where the cable is being installed in a roadway, temporary reinstatement may be provided to allow larger sections of road to be permanently reinstated together;
- Following the installation of ducting, pulling the cable will take approximately 1 no. day between each joint bay, with the jointing of cables taking approximately 1 week per joint bay location.

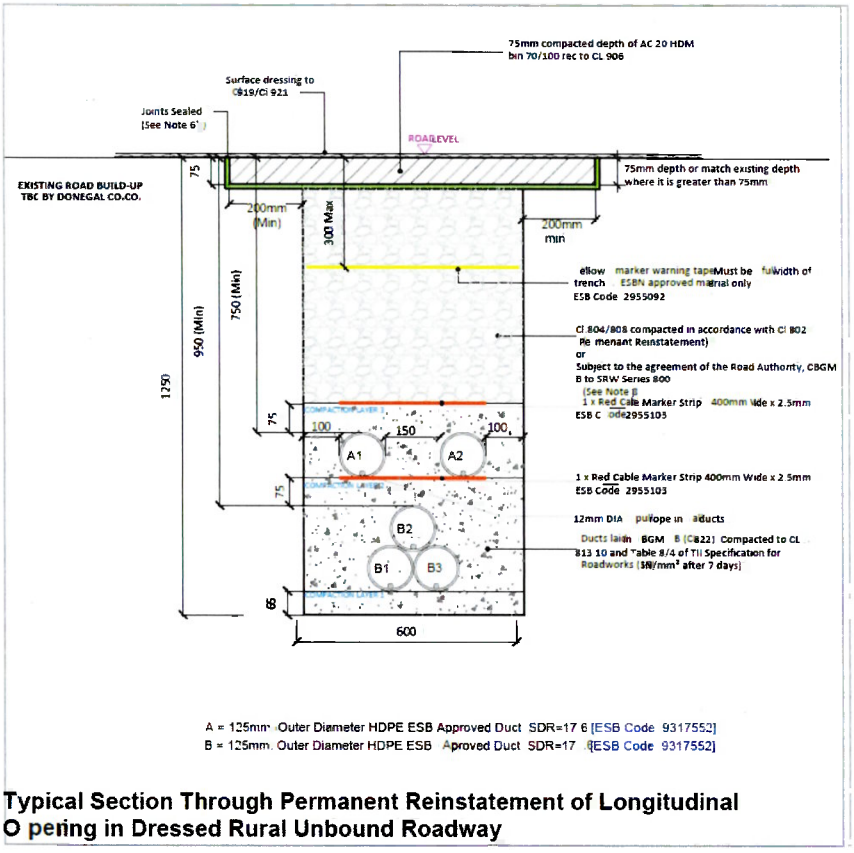
Figure 2 - Typical 110kV Underground Duct Installation

8.2 Ducting Installation Methodology

For the trenching and ducting works the following step by step methodology will apply for the standard trefoil trench design:

1. Grade, smooth and trim trench floor when the required 1,250mm depth and 600mm width have been obtained.
2. Place bedding layer of Cement Bound Granular Mixture B (CBGM B) material in accordance with the specification and compact it so that the compacted thickness is as per the drawings.
3. Lay the bottom row of ducts in trefoil formation as detailed on the design drawings. Use spacers as appropriate to establish horizontal duct spacing. Fit a secure cap / bung to the end of each duct run to prevent the ingress of dirt or water.
4. Carefully surround and cover ducts with CBGM B in accordance with the design drawings and specifications and thoroughly compact without damaging ducts.

5. Place cable protection strips on compacted CBGM B directly over the ducts.
6. Lay the top row of ducts onto the freshly compacted CBGM B including the cable protection strips above the bottom row of ducts. Place a secure cap at the end of each duct to prevent the ingress of dirt or water.
7. Carefully surround and cover ducts with CBGM B material in accordance with the drawings and thoroughly compact without damaging ducts.
8. Place red cable protection strip on top of compacted CBGM B over each set of ducts as shown on the drawings.
9. Place and thoroughly compact CBGM B material or Clause 804 backfill or soil backfill as specified and place warning tape at the depth shown on the drawings.
10. For concrete and asphalt/bitmac road sections, carry out immediate temporary/permanent reinstatement in accordance with the specification and to the approval of the local authority and/or private landowners, unless otherwise agreed with local authorities *(Figure 3).*
11. For unsurfaced/grass sections, backfill with suitable excavated material to ground level leaving at least 100mm topsoil or match existing level at the top to allow for seeding or replace turves as per the specification of the local authority or landowner *(Figure 4).*
12. Clean and test the ducts in accordance with the specification by pulling through a brush and mandrel. Install 12mm polypropylene draw rope in each duct and seal all ducts using robust duct end seals fitted with rope attachment eyes in preparation for cable installation at a later date. All the works should be witnessed by ESBN Clerk of Works (CoW) as required.



Typical Section Through Permanent Reinstatement of Longitudinal Opening in Dressed Rural Unbound Roadway

Figure 3 – Typical 110kV Trefoil Trench in Rural Roadway

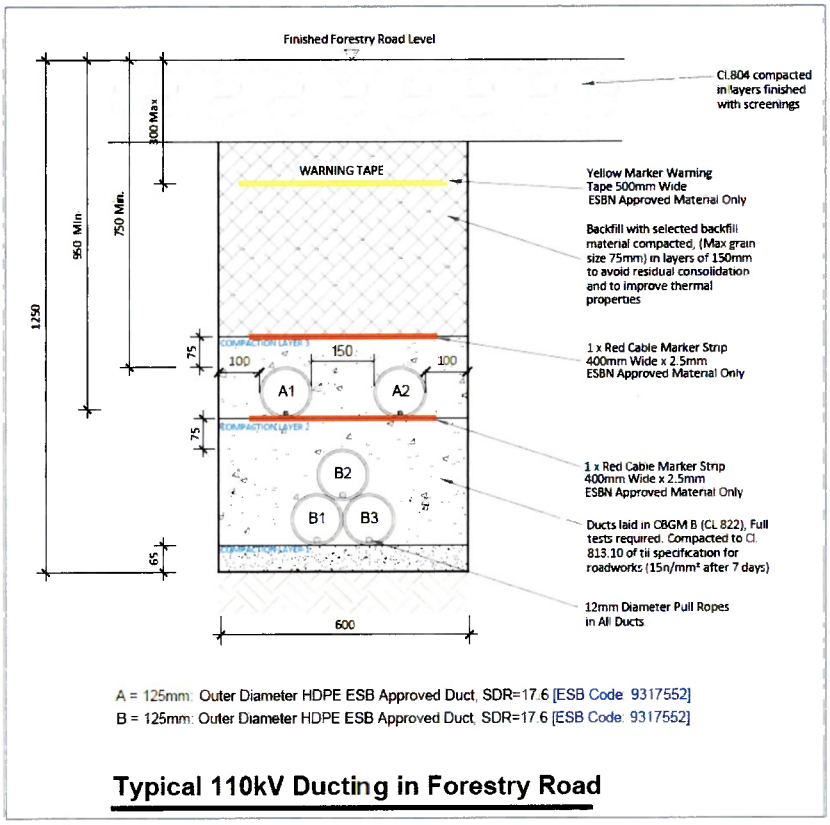


Figure 4 - Typical Trench in Forestry Road Section

Equipment:

- 2-3 General Operatives;
- 1 Excavator Operator;
- 1 no. tracked excavator (only rubber tracked machines will be allowed on public roads);
- 1 no. dumper or tractor and trailer.

Materials:

- Sand for pipe bedding;
- Ready-mix Concrete where necessary (delivered to site);
- Trench backfilling material (excavated material and aggregates) to relevant specifications;
- 125mm diameter HDPE ducting;
- Temporary Surface Reinstatement Materials

8.2.1 UGC Installation on Public Road

The majority of the 110kV route is located within public road carriages and where applicable the trench will be installed in the non-trafficked strip between the wheel marks on the road. The cable will be micro-sited based on the presence of exiting utilities and the nature of the road and the adjoining terrain. It is preferable to excavate a trench within the middle of the lane, or the middle of the roadway to reduce load on the cable.

8.2.2 UGC Installation on Forestry Tracks

Where the cable is installed in forestry tracks the location where the cable is laid will depend on several factors such as; width of track, bends along the track and crossings. Where the track needs to be widened, stone will be brought in to build up the area to the same level of the track. The excess material from the track will be used elsewhere on reinstatement works.

8.3 Surface Cable Markers & Marker Posts

Surface cable markers will be placed along the route where cable depth is unavoidably shallow, due to constraints such as existing services, to indicate the precise location of the UGC. These markers will be metallic plates in accordance with ESB standards.

Marker posts will be used on non-roadway routes to delineate the cable route and joint bay positions. Corrosion proof aluminium triangular danger sign, with 700mm base, and with centred lightning symbol, on engineering grade fluorescent yellow background shall be installed in adequately sized concrete foundations. Marker post shall also be placed in the event that burial depth is not standard. Siting of marker posts to be agreed with ESBN as part of the detailed design process *(Figure 5)*.

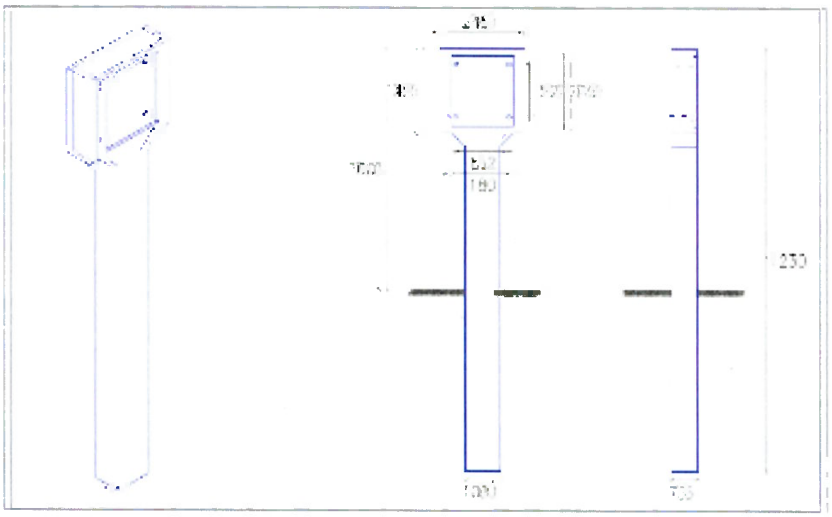


Figure 5 - Typical ESB Marker Posts Example

8.4 Managing Excess Material from Trench

All excavated material will be temporarily stored adjacent to the trench prior to re-use in the trench reinstatement (where applicable). Stockpiles will be restricted to less than 2m in height. Excess material and excavated tar, etc. will be transported off site by an appropriately authorised waste collector and disposed of at an appropriately licenced waste facility.

8.5 Storage of Plant and Machinery

All plant, machinery and equipment will be stored on site within the UGC works area or within the temporary construction compounds to be located within the Mully Graffy Windfarm. Oils and fuels will be stored in an appropriately bunded area within the temporary construction compounds.

8.6 Joint Bays and Associated Chambers

Joints Bays are to be installed approximately every 450m - 700m along the UGC route to facilitate the jointing of 2 No. lengths of UGC. Joint Bays are typically 2.5m x 6m x 1.75m pre-cast concrete structures installed below finished ground level. Joint Bays will be located in the non-wheel bearing strip of roadways, however given the narrow profile of local roads this may not always be possible.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between the proposed Mully Graffy Wind Farm substation and the existing 110kV substation at Tievebrack. Earth Sheath Link Chambers are also required at every joint bay along the cable route. Earth Sheath Links are used for earthing and bonding cable sheaths of underground power cables, so that the circulating currents and induced voltages are eliminated or reduced. Earth Sheath Link Chambers and Communication Chambers are located in close proximity to Joint Bays. Earth Sheath Link Chambers and Communication Chambers will be pre-cast concrete structures with an access cover at finished surface level.

The precise siting of all Joint Bays, Earth Sheath Link Chambers and Communication Chambers is subject to approval by ESBN. Marker posts will be used on non-roadway routes to delineate the duct route and joint bay positions.

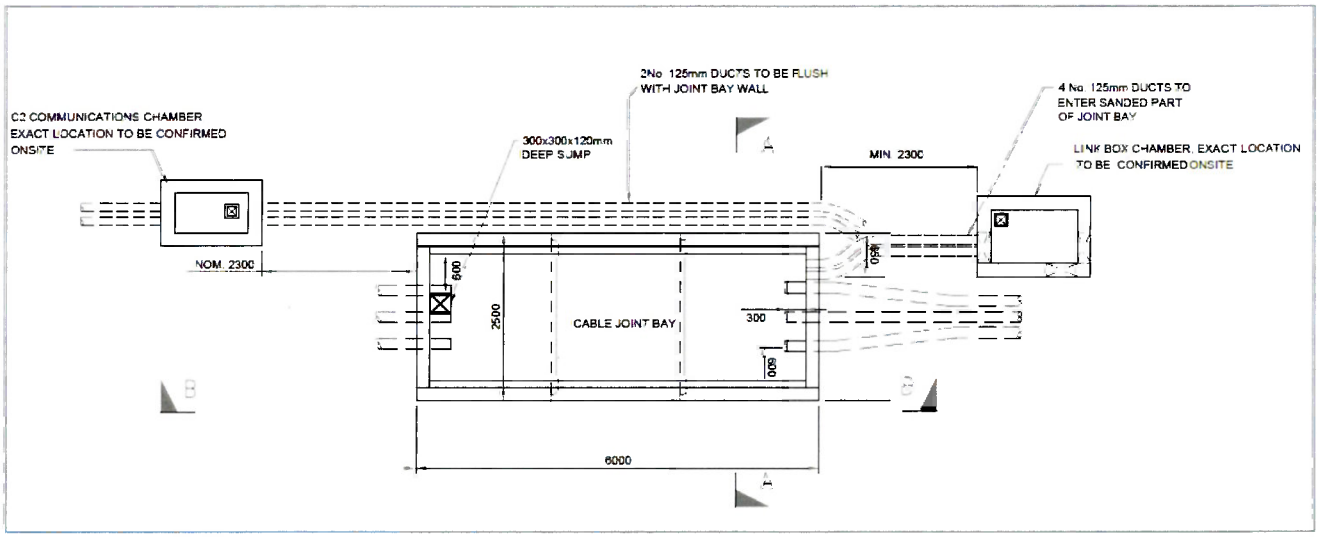


Figure 6 – Typical 110kV Joint Bay Plan Layout

8.7 Joint Bay Construction and Cable Installation

Before starting construction, the area around the edge of the joint bay which will be used by heavy vehicles will be surfaced with a terram cover (if required) and stone aggregate to minimise ground damage. Any roadside drains within the temporary works area will be culverted and check dams made from stone or sandbags covered with terram will be inserted upstream and downstream of these culverts to intercept any solids generated during the insertion or which wash out during the works. If the ground slopes from the working area toward a watercourse or if there is evidence of solids washing off the works area toward nearby watercourses or drains, a silt fence with straw bales, will be interposed between the works area and the watercourse.

All excavated material will be stored near the excavations and reused for reinstatement works. Any soil required for reinstatement that will be temporarily stockpiled on site will be placed at least 15m back from

the nearest watercourse on level ground and will be ringed at the base by silt fencing and be regularly monitored by a designated competent person for signs of solids escape. In which case an additional line of silt fencing with straw bales will be added in line with the relevant environmental control measures.

If the joint bay needs to be dewatered, this will be pumped to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the dewatering process to comply with the environmental control measures.

The following steps outline the methodology for joint bay construction and reinstatement:

1. The contractor will excavate a pit for joint bay construction, including for a sump in one corner.

2. Grade and smooth floor; then lay a 50mm depth of thick sand for pre-cast concrete construction on 200mm thick Clause 804 granular material.

3. Place pre-cast concrete sections on sand bedding. *(Figure 7)*

Figure 7 - Typical joint bay under construction (pre-cast)

4. Where joint bays are located under the road surface the joint bay will be backfilled with compacted layers of Clause 804 and the road surface temporarily reinstated as specified by the local authority.

5. Precast concrete covers may be used as temporary reinstatement of joint bays at off road locations. These covers are placed over the constructed joint bay and are then removed at the cable installation stage of the project.

6. At a later date to facilitate cable installation and jointing, reinstate traffic management signage, secure individual sites, re-excavate three consecutive joint bays and store excavated material for reuse.

7. The cable is supplied in pre-ordered lengths on large cable drums *(Figure 8).* Installing "one section" of cable normally involves pulling three individual conductors into three separate ducts. The cable pulling winch must be set at a predetermined cut off pulling tension as specified by the designer. The cable will be connected to the winch rope using approved suitably sized and rated cable pulling stocking and swivel or the pulling head fitted by the cable manufacturer. A sponge may also be secured to the winch rope to disperse lubricant through the duct. Lubrication is also applied to the cable in the joint bay before it enters the duct.

Figure 8 - HV cable pulling procedure (Typical drum set-up)

8. Once the "two sections" of cable (total of 6 conductors) are pulled into the joint bay, a jointing container is positioned over the joint bay and the cable jointing procedure is carried out in this controlled environment. *(Figure 9)*

Figure 9 - HV cable jointing container

9. Following the completion of jointing and duct sealing works in the joint bay, place and thoroughly compact cement-bound sand in approximately 200mm layers to the level of the cable joint base to provide vertical support. Install additional layers of cement-bound sand and compact each layer until the cement-bound sand is level with the top of the joint. Install an additional 100mm cement-bound sand layer. Install cable protection strip. Backfill with cement-bound sand to a depth of 250mm below surface and carry out permanent reinstatement including placement of warning tape at 400mm depth below finished surface.

Equipment:

- 2-3 General Operatives
- 1 Excavator Operator
- 360° tracked excavator (13 ton normally, 22 ton for rock breaker)
- 1 no. tracked dumper or tractor and trailer

Materials:

- Sand for pipe bedding

- Clause 804 Material
- 125mm diameter HDPE ducting;
- Precast Joint Bay Chamber Units
- Link Boxes & C2 Comms Chambers (precast)

9.0 Horizontal Direction Drilling (HDD)

Horizontal Direction Drilling (HDD) is a method of drilling under obstacles such as bridges, railways, water courses, etc. in order to install cable ducts under the obstacle. This method is employed where installing the ducts using standard installation methods is not possible. There are two bridges on this UGC route which will require HDD due to there being insufficient cover and depth in the bridge to cross within the bridge deck. There is also a triple culvert which will require HDD due to the large flow of water through the culverts.

Detailed site investigation works will be completed at each of the proposed HDD locations to confirm ground conditions. This information will be obtained by completing boreholes at each location, the results from the borehole data will be used to design the HDD and proposed crossing depth. A bespoke design will be prepared for each HDD crossing by a specialist drilling contractor. As part of each HDD design an Outline Frac-Out Mitigation Plan will be prepared by the contractor which will detail the measures which will be implemented to prevent, contain, control and stop any potential frac-out. A sample 'HDD outline Frac-Out Mitigation Plan' is shown in Appendix B of this report.

The proposed drilling methodology is as follows:

1. A works area of circa. 40m^2 will be fenced on both sides of the river crossing,
2. The drilling rig and fluid handling units will be located on one side of the bridge and will be stored on double bunded 0.5mm PVC bunds which will contain any fluid spills and storm water run-off.
3. Entry and exit pits (1m x 1m x 2m) will be excavated using an excavator, the excavated material will be temporarily stored within the works area and used for reinstatement or disposed of to a licensed facility.
4. A 1m x 1m x 2m steel box will be placed in each pit. This box will contain any drilling fluid returns from the borehole.
5. The drill bit will be set up by a surveyor, and the driller will push the drill string into the ground and will steer the bore path under the watercourse.
6. A surveyor will monitor drilling works to ensure that the modelled stresses and collapse pressures are not exceeded.
7. The drilled cuttings will be flushed back by drilling fluid to the steel box in the entry pit.
8. Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit pit and will pull a drill pipe back through the bore to the entry side.
9. Once all bore holes have been completed, a towing assembly will be set up on the drill and this will pull the ducting into the bore.
10. The steel boxes will be removed, with the drilling fluid disposed of to a licensed facility.
11. The ducts will be cleaned and proven and their installed location surveyed.
12. The entry and exit pits will be reinstated to the specification of ESB Networks and Donegal County Council.

13. A transition coupler or transition chamber will be installed at either side of the bridge/ following the horizontal directional drilling as per ESB requirements, this will join the HDD ducts to the standard ducts.

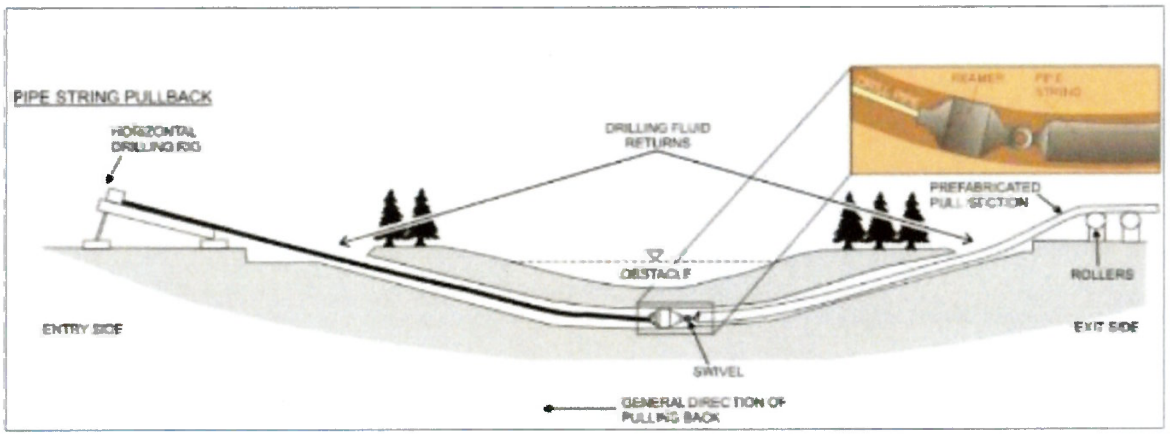


Figure 10 - Typical HDD Installation

10.0 Watercourse Damming and Reinstatement Methodology

Sections of the proposed trenching and ducting will involve instream works at numerous culvert crossing locations in order to install cabling. To facilitate the works, these watercourses will be dammed and the water diverted over or around the works using either a flume pipe or a diversion channel. Following the completion of works at the watercourse, the dam will be removed and the watercourse reinstated.

Duration: 1-2 Days per location

Personnel, Machinery & Equipment:

- 2-3 operatives
- Wheeled dumper or track dumper (6 to 8 tons)
- 360˚ tracked excavator

Materials:

- Pipe culvert
- Box culvert
- Cable ducting and trenching backfill
- Sand bags
- Water pump
- Geotextile membrane
- Straw bales

Standard Methods - Dam & Flume Work:

1. The flume pipe(s) will be set out on the bed of the existing stream.

2. A dam will be constructed using sand bags and suitable clay material around the flume pipe(s) and across the stream so that all the flows are diverted through the pipe(s).

3. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream trenching location prior to construction, to minimise silt loss.

4. The ducting installation works will be carried out in the dry stream bed and under/around the flume pipe(s). If required, a temporary sump will be established and used to collect any additional water. This water will be removed by pumping to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the de-watering.

S tandar dMethods - Dam & Divert Work:

1. A suitable channel for the stream will be excavated adjacent to the original channel.

2. Bedding stone will be placed on the bed of the new channel.
3. A dam will be constructed using sand bags and suitable clay material across the stream so that the flow is diverted down the new channel.

4. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-river trenching location prior to construction, to minimise silt loss.

5. The proposed trench will be excavated in the dry stream bed. If required, a temporary sump will be established and used to collect any additional water. This water will be removed by pumping to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the de-watering.

Standard Methods - Reinstatement ofthe Watercourse at Dam and Flume Locat ions

1. Following the completion of works, the stream bed will be reinstated with original or similar material and the spawning gravels replaced under the supervision of an aquatic ecologist.

2. Once the stream bed is appropriately re-instated the dam and the flume pipe(s) will be removed thus restoring the stream to its original condition.

Stan dard Methods - Reinsta tement o fthe Watercour seat Dam and Divert Loc ations·.

1. Following the installation of the cable ducts, the stream bed will be reinstated with original or similar material and the spawning gravels replaced under the supervision of an aquatic ecologist.

2. Once the stream bed is appropriately reinstated, the dam will be removed thus restoring the stream to its original alignment.

3. The temporary channel will then be reinstated with the previously excavated material.

11.0 Replacement of Existing Culverts

Due to the depth and construction of some existing culverts (i.e. shallow stone built culverts), it may be necessary to replace some culverts as part of the proposed grid construction works. The works will take place in a dry stream bed, following damming methods outlined in Section 10 'Watercourse Damming and Reinstatement Methods' above. A trench will be excavated in the dry stream bed and cable ducts will be laid using the methods outlined Section 8.2 'Ducting Installation Methodology' above.

Duration: 1-2 Days per location

Personnel, Machinery & Equipment:

- 2-3 operatives
- Wheeled dumper or track dumper (6 to 8 tons)
- 360˚ tracked excavator
- Water pump

Materials:

- Pipe culvert
- Box culvert
- Cable ducting and trenching backfill
- Sand bags
- Geotextile membrane
- Straw bales

Standard Methods - Replacement of Existing Culvert:

1. Where applicable, under the supervision of an aquatic ecologist, spawning gravels will be removed at the watercourse crossing location.

2. The old culvert will be removed using an excavator.

3. A new HDPE or precast concrete pipe or box culvert will be installed in the watercourse. The new structure will be installed 300mm below the original bed level.

4. The spawning gravels will be replaced under supervision of an aquatic ecologist both upstream, downstream and inside the new structure. Washed gravel will be added to the stream bed if required by the aquatic ecologist.

5. Crushed stone will be laid over the culvert and built up in layer to provide vehicular access across the watercourse.

6. The surface/road level will be reinstated as per the existing track/road requirements.

12.0 Relocation of Existing Services

In order to facilitate the installation of the proposed underground cable, it may be necessary to relocate existing underground services such as water mains or existing cables. In advance of any construction activity, the contractor will undertake detailed surveys and scans of the proposed route to confirm the presence or otherwise of any services. If found to be present, the relevant service provider will be consulted with in order to determine the requirement for specific excavation or relocation methods and to schedule a suitable time to carry out works.

13.0 Major Watercourse Crossings

The proposed cable route contains 2 No. bridge watercourse crossings and one large culvert crossing which will be completed using horizontal directional drilling. Where the cable route intersects with existing watercourses, a detailed construction method statement will be prepared by the Contractor prior to the commencement of construction and is to be approved by the Local Authority and relevant environmental agencies.

A large number of other minor watercourses crossing locations have been noted along the proposed cable route, i.e. culverts, pipe drains and minor field drains. It is proposed to cross existing culverts using open trenching with either an undercrossing or an overcrossing, depending on the depth of the culvert. A schedule of the culverts identified and the proposed crossing method to be implemented is detailed in Appendix A of this report. A detailed site survey of all culverts will be completed as part of the next phase of the project prior to construction. The proposed culvert crossing methods are detailed in *Figures 11* and *12*.

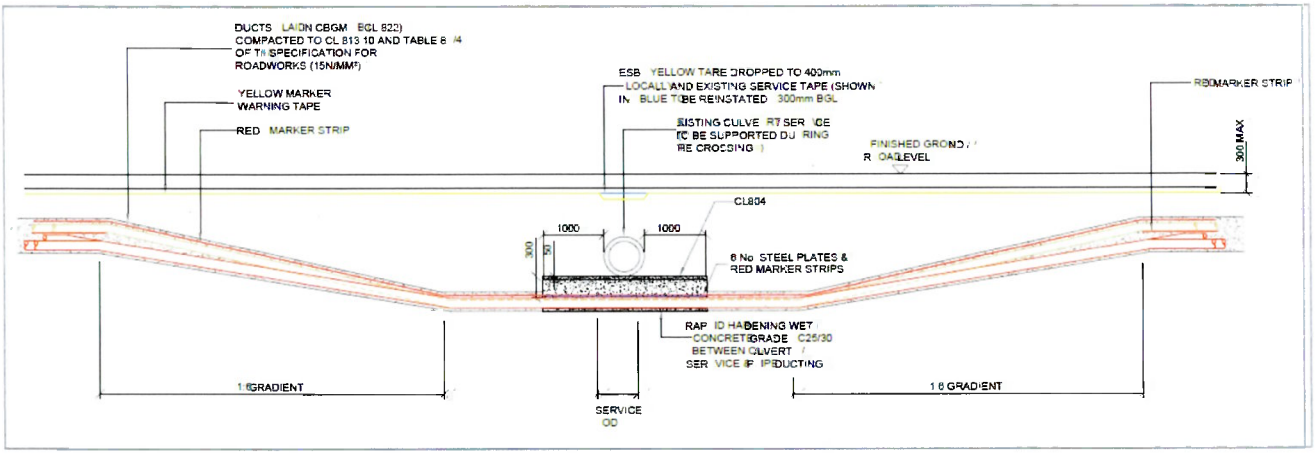


Figure 11 – Typical 110kV UGC Culvert Undercrossing

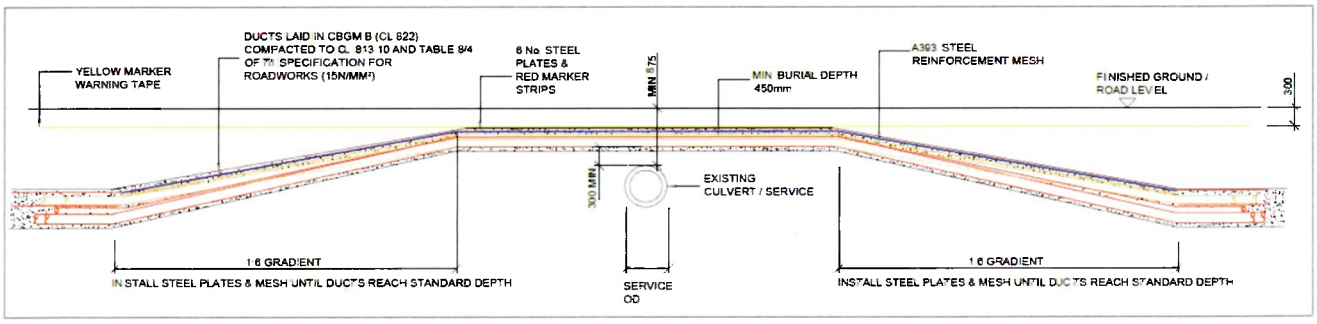


Figure 12 – Typical 110kV UGC Culvert Overcrossing

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

13.1 Bridge 1 - Horizontal Directional Drilling

ITM Coordinates: 586581.3776, 895906.2887

Bridge 1 is a flat slab bridge within the forestry access road and has insufficient room to install the cable within the bridge deck to EirGrid/ESB specification (450mm cover to top of ducts), the design of the bridge is therefore inadequate to accommodate the proposed works. It is proposed to horizontal directional drill (HDD) approximately 1500mm beneath the waterway and bridge foundations. This depth is based on locating a suitable clay/silt formation for HDD and the required depth may increase subject to geotechnical investigations. The river at this bridge crossing is part of the 'West of Ardara/Maas Road Special Area of Conservation', it is therefore proposed to setup the HDD back from the bridge in order to drill under the SAC and the bridge. The total length of the HDD will be approx. 100m.

It is proposed to align the HDD within the existing access road corridor, however some road widening works may be required to facilitate the HDD. The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber.

See Drawing 05798-DR-022 for further details.

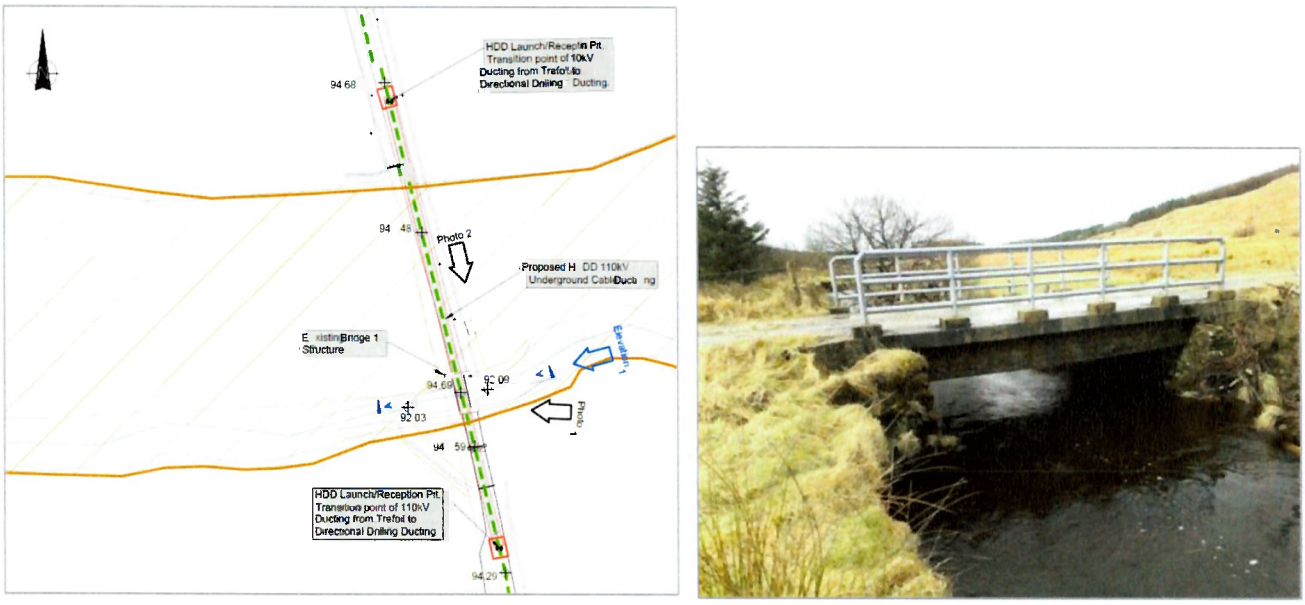


Figure 13 - Bridge 1

13.2 Bridge 2 - Horizontal Directional Drilling

ITM Coordinates: 588725.5027, 896424.7081

Bridge 2 is a flat slab bridge in the public road and has insufficient room to install the cable within the bridge deck to EirGrid/ESB specification (450mm cover to top of ducts), the design of the bridge is therefore inadequate to accommodate the proposed works. It is proposed to horizontal directional drill (HDD) approximately 1500mm beneath the waterway and bridge foundations. This depth is based on locating a suitable clay/silt formation for HDD and the required depth may increase subject to geotechnical investigations.

The total length of the proposed HDD will be approx. 40m. It is proposed to align the HDD within the existing road corridor, however some road widening works may be required to facilitate the HDD, this may include a temporary works area within the adjacent private lands. The final location of the HDD launch/reception will need to be confirmed by a specialist drilling contractor following the site investigation works. The HDD launch/reception pits will be reinstated with a transition coupler or transition chamber.

See Drawing 05798-DR-023 for further details.

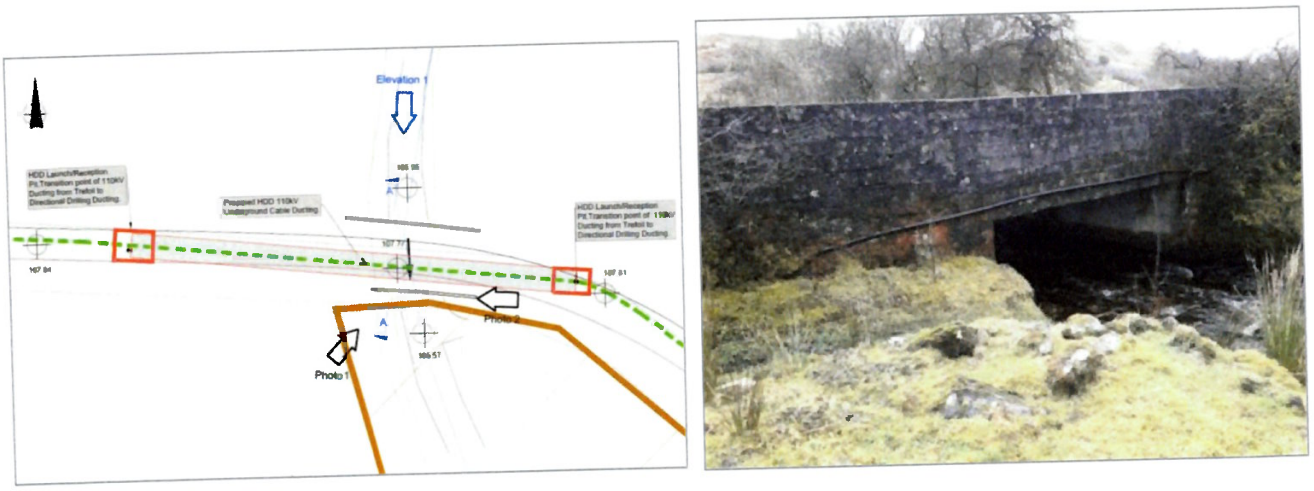


Figure 14 - Bridge 2

14.0 Reinstatement of Private Land

Once all construction works are complete, the work areas will be reinstated with excavated soil and either seeded out with native species, allowed to vegetate naturally or reinstated with excavated grass turves and will be restored to their original condition. This work will be carried out in in consultation with the landowner and in line with any relevant measures outlined in the planning application, CEMP and planning conditions.

15.0 Best Practice Design and Construction & Environmental Management Methodology

Prior to commencement of construction works the contractor will draw up detailed Method Statements which will be informed by this Outline Construction Methodology, environmental protection measures included within the planning application, measures proposed within the CEMP, and the guidance documents and best practice measures listed below. This method statement will be adhered to by the contractors and will be overseen by the Project Manager, Environmental Manager and ECoW where relevant.

The following documents will contribute to the preparation of the method statements in addition to those measures proposed below: -

- Inland Fisheries Ireland (2016) *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters*. Inland Fisheries Ireland, *Dublin,*
- *National Roads Authority (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*. National Roads Authority, Dublin;
- E. Murnane, A. Heap and A. Swain. (2006) *Control of water pollution from linear construction projects.* Technical guidance (C648). CIRIA;
- E. Murnane et al., (2006) *Control of water pollution from linear construction projects*. Site guide (C649). CIRIA.
- Murphy, D. (2004) Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin;

- H. Masters-Williams et al (2001) *Control of water pollution from construction sites. Guidance for consultants and contractors* (C532);
- Enterprise Ireland (unknown). *Best Practice Guide (BPGCS005) Oil storage guidelines;*
- Law, C. and D'Aleo, S. (2016) *Environmental good practice on site pocket book*. (C762) 4th edition. CIRIA;
- CIRIA *Environmental Good Practice on Site (fourth edition) (C741) 2015.*

The proposed works will be carried out by employing accepted good work practices during construction, and environmental management measures such as those discussed below. Please note that the following measures will be supplemented by further specific environmental protection measures that will be included in method statements prepared for specific tasks during the works and will form part of the detailed CEMP.

- All materials shall be stored at the temporary compound within the Mully Graffy Wind Farm site and transported to the works zone immediately prior to construction;
- Where drains and watercourses are crossed with underground cables, the release of sediment will be prevented through the implementation of best practice construction methodologies.
- Weather conditions will be considered when planning construction activities to minimise risk of run off from site;
- Provision of 50m exclusion zones and barriers (silt fences) between any excavated material and any surface water features to prevent sediment washing into the receiving water environment;
- If dewatering is required as part of the proposed works e.g. in trenches for underground cabling or in wet areas, water must be treated prior to discharge;
- The contractor shall ensure that silt fences are regularly inspected and maintained during the construction phase;
- If very wet ground must be accessed during the construction process bog mats/aluminium panel tracks will be used to enable access to these areas by machinery. However, works will be scheduled to minimise access requirements during winter months;
- The contractor shall ensure that all personnel working on site are trained in pollution incident control response. A regular review of weather forecasts of heavy rainfall is required, with the Contractor required to prepare a contingency plan for before and after such events;
- The contractor will carry out visual examinations of local watercourses from the proposed works during the construction phase to ensure that sediment is not above baseline conditions. In the unlikely event of water quality concerns, the Environmental Manager and ECoW will be consulted;
- Excavations will be left open for minimal periods to avoid acting as a conduit for surface water flows.
- Only emergency breakdown maintenance will be carried out on site. Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures.
- Appropriate containment facilities will be provided to ensure that any spills from vehicles are contained and removed off site. Adequate stocks of absorbent materials, such as sand or commercially available spill kits shall be available;
- Concrete or potential concrete contaminated water run-off will not be allowed to enter any watercourses. Any pouring of concrete (delivered to site ready mixed) will only be carried out in dry weather. Washout of concrete trucks shall be strictly confined to a designated and controlled wash-out area within the Wind Farm site; remote from watercourses, drainage channels and other surface water features;

- A designated trained operator experienced in working with concrete will be employed during the concrete pouring phase;
- Concrete waste water can be pumped into a skip to settle out; settled solids will need to be appropriately disposed of off-site;
- Wash-down water from exposed concrete surfaces, will be trapped to allow sediment to settle out and reach neutral pH before clarified water is released to the drain system or allowed to percolate into the ground;
- Where dust suppression is considered to be required by the Contractor, such requirements and methodology shall be subject to the agreement with the Ecological Clerk of Works;
- Entry by plant equipment, machinery, vehicles and construction personnel into watercourses or wet drainage ditches shall not be permitted. All routes used for construction traffic shall be protected against migration of soil or waste water into watercourses;
- Cabins, containers, workshops, plant, materials storage and storage tanks shall not be located near any surface water channels and will be located beyond the 50m hydrological buffer at all times.

16.0 Invasive Species Best Practice Measures

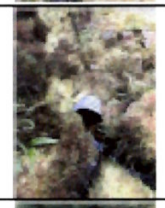
Invasive species can be introduced into a location by contaminated plant, machinery and equipment which were previously used in locations that contained invasive species. Good site organisation and hygiene management shall be maintained always on site, and best practice measures will be implemented, as follows:

- The contractor will prepare an Invasive Species Action Plan to be implemented during construction, and all personnel will be made aware of the requirements contained within;
- Plant and machinery will be inspected upon arrival and departure from site and cleaned/washed as necessary to prevent the spread of invasive aquatic / riparian species such as Japanese knotweed *Fallopia japonica* and Himalayan Balsam *Impatiens glandulifera*. A sign off sheet will be maintained by the contractor to confirm the implementation of measures;
- Site hygiene signage will be erected in relation to the management of non-native invasive material.

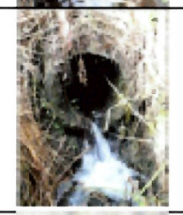
17.0 Waste Management

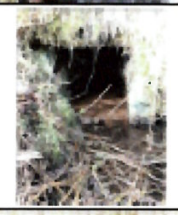
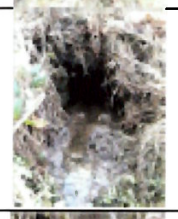
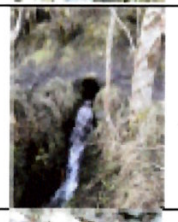
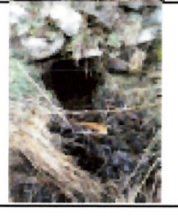
All waste arising during the construction phase will be managed and disposed of in a way that ensures the provisions of the Waste Management Act 1996 and associated amendments and regulations and the Waste Management Plan. Soil will be reinstated into trenches where possible. In the event, there is excess material with no defined purpose, it will be transported to an authorised soil recovery site.

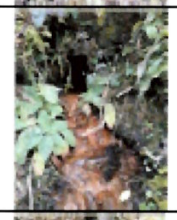
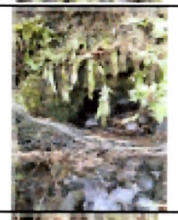
Appendix A – Culvert Crossing Schedule

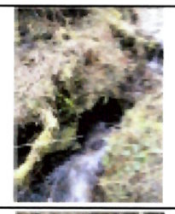
Culvert Crossing Schedule					
Culvert No	Dimensions (mm)	Material	Approx. Cover (mm)	Proposed Crossing Methodology	Photo
C-1	1000 Ø	HDPE Twinwall	920	OVERCROSSING / UNDERCROSSING - TBC	
C-2	900 Ø	HDPE Twinwall	940	OVERCROSSING / UNDERCROSSING - TBC	
C-3	600 Ø	HDPE Twinwall	1300	OVERCROSSING - TBC	
C-4	450 Ø	HDPE Twinwall	560	UNDERCROSSING	
C-5	450 Ø	HDPE Twinwall	440	UNDERCROSSING	
C-6	1000 Ø	HDPE Twinwall	330	UNDERCROSSING	
C-7	1000 Ø	HDPE Twinwall	585	UNDERCROSSING	
C-8	600 Ø	HDPE Twinwall	1000	OVERCROSSING	
C-9	600 Ø	HDPE Twinwall	540	UNDERCROSSING	

Culvert Crossing Schedule					
Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Proposed Crossing Methodology	Photo
C-10	600 Ø	HDPE Twinwall	800	UNDERCROSSING	
C11	450 Ø	Concrete Pipe	680	UNDERCROSSING	
C-12	1240 (h) x 600 (w)	Stone Built	750	UNDERCROSSING / REPLACEMENT - TBC	
C-13	TBC	TBC	TBC	CULVERT BLOCKED AND FLOODED AT TIME OF SURVEY TBC IN ADVANCE OF CONSTRUCTION	
C-14	650 (h) x 400 (w)	Stone Built	750	UNDERCROSSING / REPLACEMENT - TBC	
C-15	600 (h) x 450 (w)	Stone Built	380	UNDERCROSSING / REPLACEMENT - TBC	
C-16	480 (h) x 500 (w)	Stone Built	470	UNDERCROSSING / REPLACEMENT - TBC	
C-17	580 (h) x 450 (w)	Stone Built	240	UNDERCROSSING / REPLACEMENT - TBC	
C-18	300 Ø	Concrete Pipe	200	UNDERCROSSING	

Culvert Crossing Schedule					
Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Proposed Crossing Methodology	Photo
C-19	600 (h) x 450 (w)	Stone Built	450	UNDERCROSSING / REPLACEMENT - TBC	
C-20	400 Ø	Concrete Pipe	400	UNDERCROSSING	
C-21	600 (h) x 450 (w)	Stone Built	600	UNDERCROSSING / REPLACEMENT - TBC	
C-22	200 Ø	Concrete Pipe	600	UNDERCROSSING	
C-23	500 Ø	Concrete Pipe	550	UNDERCROSSING	
C-24	400 Ø	Concrete Pipe	385	UNDERCROSSING	
C-25	610 (h) x 350 (w)	Stone Built	620	UNDERCROSSING / REPLACEMENT - TBC	
C-26	300 Ø	Concrete Pipe	490	UNDERCROSSING	
C-27	500 Ø x3	HDPE Twinwall x3	235	HORIZONTAL DIRECTIONAL DRILL (HDD)	

Culvert Crossing Schedule					
Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Proposed Crossing Methodology	Photo
C-29	590 (h) x 480 (w)	Stone Built	560	UNDERCROSSING / REPLACEMENT - TBC	
C-29	400 (h) x 300 (w)	Stone Built	610	UNDERCROSSING / REPLACEMENT - TBC	
C-30	500 Ø x2	Concrete Pipe x2	955	OVERCROSSING - TBC	
C-31	730 (h) x 500 (w)	Stone Built	115	UNDERCROSSING / REPLACEMENT - TBC	
C-32	500 (h) x 600 (w)	Stone Built	535	UNDERCROSSING / REPLACEMENT - TBC	
C-33	650 (h) x 300 (w)	Stone Built	270	UNDERCROSSING / REPLACEMENT - TBC	
C-34	500 (h) x 500 (w)	Stone Built	365	UNDERCROSSING / REPLACEMENT - TBC	
C-35	500 Ø	Concrete Pipe	970	OVERCROSSING	
C-36	500 Ø	Concrete Pipe	565	UNDERCROSSING	

Culvert Crossing Schedule					
Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Proposed Crossing Methodology	Photo
C-37	760 (h) x 500 (w)	Stone Built	640	UNDERCROSSING / REPLACEMENT - TBC	
C-38	380 (h) x 480 (w)	Stone Built	500	UNDERCROSSING / REPLACEMENT - TBC	
C-39	550 (h) x 450 (w)	Stone Built	960	OVERCROSSING - TBC	
C-40	600 (h) x 600 (w)	Stone Built	620	UNDERCROSSING / REPLACEMENT - TBC	
C-41	500 Ø	Concrete Pipe	1720	OVERCROSSING	
C-42	650 (h) x 400 (w)	Stone Built	250	UNDERCROSSING / REPLACEMENT - TBC	
C-43	680 (h) x 500 (w)	Stone Built	650	UNDERCROSSING / REPLACEMENT - TBC	
C-44	660 (h) x 400 (w)	Stone Built	370	UNDERCROSSING / REPLACEMENT - TBC	
C-45	450 (h) x 400 (w)	Stone Built	280	UNDERCROSSING / REPLACEMENT - TBC	

Culvert Crossing Schedule					
Culvert No.	Dimensions (mm)	Material	Approx. Cover (mm)	Proposed Crossing Methodology	Photo
C-46	630 (h) x 450 (w)	Stone Built	1260	OVERCROSSING	
C-47	690 (h) x 500 (w)	Stone Built	160	UNDERCROSSING / REPLACEMENT - TBC	
C-48	500 Ø x2	Concrete Pipe x2	490	UNDERCROSSING	
C-49	450 Ø	HDPE Twinwall	420	CULVERT NOT CROSSED	
C-50	500 Ø x2	Concrete Pipe x2	860	UNDERCROSSING	

Appendix B – Sample HDD Outline Frac-Out Mitigation Plan

HDD Outline Frac-Out Mitigation Plan

All HDD personnel to be briefed and fully conversant with this **Frac-Out Mitigation Plan** prior to works commencing. There are four stages to the management of a frac-out which will be implemented as follows: -

1) Prevention **2) Containment** **3) Control** **4) Stop**

Methods for Mitigating Hydro-Fracture

1 Prevention

A hydrofracture or 'frac-out' is the unintentional return of drilling fluids to the surface during HDD. A frac-out occurs when the down hole mud pressure exceeds the overburden pressure (i.e. shallow or loose sections of the bore), or the fluid finds a preferential seepage pathway (such as fault lines and fractures, infrastructure or loose material). These fractures can be natural or induced by over-pressurising the formation. Most frac-outs are usually minor, within works easements and close to the bore entry or exit.

Drilling fluid is comprised primarily of water and approximately 1 to 3% bentonite, a naturally occurring clay mineral, so it is, in most circumstances, a non-toxic, benign fluid, except when suspended within a water body where it can harm ecology. The risk of inadvertent fluid returns should be reduced through competent design and good practices.

Annular fluid pressures are minimised by constant monitoring of the drilling fluid parameters.

- The Fluids Technician will monitor drill fluid density, viscosity and solids content on a regular basis, (half-hourly), to ensure that the fluid does not increase in viscosity, requiring additional pressure to maintain mobility.
- The Driller will monitor the drill fluid pressures, volumes, viscosities and densities of mud being pumped through the bore. Any increases in pump pressure will be investigated immediately to prevent the risk of pressure build up within the annulus.
- The Fluids Technician will monitor active fluid tank volumes and account for any unexpected changes (The drill fluid is designed to allow water loss in porous formations in order to build filter cake).
- The bore hole will be reamed on a regular basis to keep the annulus clear. Rates of Penetration and circulated cuttings volumes will be monitored to ensure that drilled cuttings are being flushed from the bore and are not building up creating pressure restrictions.
- Annular fluid velocity will be kept below critical velocity to prevent eddying and subsequent erosion caused by turbulent flow. When drilling clay based formations (which may be present), inhibitors may be used to prevent the absorption of water and subsequent swelling of the formations.
- A Frac-Watch programme will be operated at all times whilst circulating, particularly when drilling past potential pathways.
- The Frac-Watch programme will ensure that the ground surface above the drilling path will be inspected throughout the HDD process. Spotters will be responsible for the monitoring (numbers dependant on drill length and location topography etc.)

HDD drilling fluid returns to be monitored. Risk of hydro-fracture to be mitigated through monitoring and HDD fluid selection. Methods of monitoring include: -

Operational (This will be undertaken throughout HDD process)

- *Full briefing of personnel prior to HDD operation (Mitigation Plan)*
- *Personnel will be assigned to specific tasks and be fully conversant with procedures in Mitigation Plan*
- *Follow best drilling practices (HDD Design)*
- *Monitor & control mud weights*

- *Maintain effective fluid properties*
- *Monitorpressures on HDD ng*
- F rac-Watch - *Visual monitoring of returns at both launch and reception pits*
- Frac- Watch - *Spottersto be deployed*
- Frac- Watch- *Spottersto have two-way radios, along with launch and reception teams (close monitoring and direct communication ensures swift reaction)*
- Frac-Watch– Driller to informs potters of progress of drill so that they know location of drill head/reamer(i e. Joint 1,2, 3.etc)

2 Containment

Contingenciesare in place to deal with potential frac-outs when drilling operations commence. If a fracout occurs, drilling operation to be suspended temporarily and assessment of location and severitytо be carried out.

a. The rigand pumps will immediately be shut off

b. The drilling assembly will be pulled off bottom to reduce annular pressures

c. Once shut down procedureis complete,the frac-out will be contained by all site personnel as-quickly-as possible by any one of the measures listed below where applicable

Ph ysi cal(T his willbe undertaken if afr ac-outo ccurs)

T ne following is tobe s tored at the Entry Site and Exit Site.

- Sandbags– use to contain sediment, deploy at source F rac-out may occur some distance from the bore path. Sand Bags will be availableto control drill fluid at surface
- 1 x rollof Polyethylene
- Tractor& bowser
- Pumps

d. Client Site Manager to be notified as-soon-as possible

3 Control

The freshwater based bentonite suspension drill fluid systems utilisedare , essentially, low viscosity grouts.In most cases the fracture pathways will quickly seal up Frac-outis li kelyto indicate that the bore hole requires reaming to reducethe pressure required to return drillfluid to surface.

Onceth e frac-outhas been containeda swab-trip may bes ufficient to prevent further frac-outa nd re-establishmentof fluid returns. Lost Circulation Material (LCM) drill fluid additives will be available to seal fractures in the formation

Afteran assessment has been conducted followinga frac-outthe following control measures shouldbe implementedas follows: -

a) Re-Cr culation Attempt (This will be undertaken if a frac-outoccu rs)

- The pilot bore orrea ming operation will be retracted away from the frac-outto try and re-establish fluid returns. This may require the complete extraction of the drill string and a re-drill if necessary.

b) Mechanical (This will be undertaken f a frac-out occurs)

This will be carried out via fluid mixing system and pumped down drill string to frac-out.

- Physical plugging by Loss of Circulation Material (L CM), Enviro Formfilto be utilised as-soon-as possibleto manufacturers specification.

4 Stop Procedure (If sections 1, 2, & 3 are unsuccessful)

If any of the measures outlined in sections 1, 2, & 3 are unsuccessful then drilling operation will be suspended.

ATTACHMENT 8

ECoW CV – [INSERT NAME]

ATTACHMENT 9

REFUELLING TOOLBOX TALK INFORMATION SHEET

Environmental Toolbox Talk

Refuelling Procedures

Pre-refuelling

1. All fuels, oils and chemicals are to be kept in a bunded area, away (>50m) from drainage lines / watercourses and away from other environmentally sensitive areas where practical.
2. The bunded area are to be constructed in accordance with AS 1940:2004.
3. Inspect hoses and pumps, etc for breakages and/or leaks.
4. Ensure an appropriate spill kit is readily available and stocked. Spill kits should be maintained on the mobile fuel truck and at numerous locations on the Project site.

Refuelling from Mobile Fuel Truck

1. Maintain at least a 50m buffer away from drainage lines / watercourses and away from other environmentally sensitive areas where practical. It is noted that moving piling machines away from watercourses is considered to be impractical.
2. A fully maintained spill kit will be stored on the fuel truck
3. Only the driver of the fuel truck is to operate the fuel pump
4. Ensure drip trays are placed under the fuel tank to be filled
5. Wrap absorbent sausage around the opening collar of the fuel tank
6. Turn on fuel pump and ensure counter is reset
7. Refuelling operations are to be closely monitored at all times
8. The refuelling operator is to stay close to the 'stop' valve/trigger at all times
9. At the completion of refuelling, ensure the pump is switched off and nozzle is securely in the cradle.
10. The mobile fuel truck is to be parked overnight offsite or in the bunded location provided to minimise the risk of spills and leaks.

Spill Response

1. In the event of a spill follow the procedure outlined in the Spill Response Procedure.
2. The spill is to be cleaned up and reported to the Site Manger / Environmental Manager immediately.
3. The Environmental Manager will notify the relevant parties and authorities in accordance with Incident Reporting Procedure.

DO's

- Supervise all fuel and oil deliveries
- Lock containers and tanks when not in use
- Ensure a spill kit is provided adjacent to fuel storage and refuelling areas
- Ensure bulk fuel and oil storage tanks are bunded and that the bund has a capacity of 110 per cent of the tank
- Store all containers of oil and fuel in a secure, bunded area
- Regularly check tanks, containers and bunds for damage and leaks
- Place a drip tray or absorbent mat under all static plant and mobile plant during fuelling
- Clear up all minor spillages immediately
- Use a funnel when refuelling small plant
- Use an automatic shut off or pistol grip delivery system when refuelling plant
- Seek advice from a line manager before disposing of waste fuel or oil, or contaminated spill granules or absorbent mats
- Liaise with a line manager to organise removal of contaminated water from bunds and trays by an appropriate contractor.

DO NOTS

- Refuel plant or vehicles without using a drip tray
- Pour waste fuel and oil down drains8wash fuel and oil spillages down drains
- Store fuel and oil, or carry out refuelling, within 10 m of a watercourse or drain
- Allow drip trays or bunds to overflow
- Locate fuel and oil tanks/storage area near to vehicle routes
- Leave a tank to fill unsupervised
- Store oil or fuel outside a bunded container

Date:

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ATTACHMENT 10

ENVIRONMENTAL AUDIT CHECK LIST

Project:_____

Site Audit Check List

Audit No: 001

Site Audited: Graffy Wind Farm

Name of Contractor(s) Audited & Person in Charge:

_____

_____

Date: _____

Start Time: _____

End Time: _____

Visit No.: _____

Audit Team:

_____

Weather Conditions:

_____

Main construction activity since last Visit:

_____

_____

_____

Construction activity on day of site visit:

_____

_____

_____

Excavations	Required	Y	N	Comments
Is material from excavations being stored sufficient distance from open trenches to prevent contamination of water within trenches?	Yes			
Is dewatering equipment and silt control equipment available if required?	Yes			
Is all spoil being stored in the agreed locations as per CMS/CEMP?	Yes			
Is all spoil being stored away from sensitive habitats ?	Yes			
Is temporary stock piled material causing an obstruction to road traffic?	No			
Is stockpiled material battered to safe angle of repose?	Yes			
Is stockpiled material stored at an appropriate stockpile height?	Yes			
Are any existing sediment control structures damaged by excavation works?	No			
Reinstatement	**Req. 1**	**Y**	**N**	**Comments**
Are there any areas requiring revegetation works?				
Are acrotelm and catotelmb eingstored separately?	Yes			
Are acrotelm and catolem being stored in the agreed locations as per CMS / CEMP?	Yes			
Are stored turves adequately maintained and watered where required?	Yes			
Is re-seeding carried out using the correct seeding specification?	Yes			
Site Compound		**Y**	**N**	**Comments**
Are there any pollution risks at the site compound?	No			
Is sufficient storage available within waste receptacles in the site compound?	Yes			
Are all covers in place over waste receptacles to prevent wind blown wastes?	Yes			
Are mobile fuel bowser (s)stored in a bunded areas?	Yes			
Is a spill kit available to respond to major incidents?	Yes			
Are all materials stored in designated areas?	Yes			
Do themobile welfare units require maintenance (toilets etc.)?	No			
Does the wastewater holding tank need to be emptied?	No			
Plant and Equipment		**Y**	**N**	**Comments**
Are spill kits available to all machinery and mobile bowsers ?	Yes			
Are all manufacturers covers present on all equipment?	Yes			
Is machinery confined to working corridor / alignment of permitted access track?	Yes			
Is a spill traybeing used beneath pumps?	Yes			
Does the spill tray have sufficient storage capacity?	Yes			
On visual inspection are there any leaks from machinery ?	No			
Drainage		**Y**	**N**	**Comments**
Is surface water run-off present?	No			

Are there any visual indications that surface water entering watercourses is contaminated?	No			
Are all required check dams installed on drainage ditches?	Yes			
Do any silt traps require maintenance?	No			
Are additional check dams, silt fences etc required?	No			
Are discharges from sedimentation ponds 50 metres away from watercourses?	Yes			
Ecological		Y	N	**Comments**
Have any Curlews or Hen Harriers been observed by any of the works crew?				
Have any notable animal sightings and / or signs been observed by any of the works crew?				
Are there any ecological issues with the sedimentation ponds?	No			
General Observations		Y	N	**Comments**
Is dust suppression being conducted during periods of dry weather onsite.	Yes			
Are all work areas free of litter?	Yes			
Are works following all environmental requirements set out in the CMS / CEMP and Method Statements?	Yes			
Are there wind-blown dusts from excavated or stored materials?	No			
Are all oil drums etc. stored in bunded areas?	Yes			
Are concrete washout areas (locations agreed as per CMS / CEMP) being maintained?	Yes			

1. Required Response: A deviation from the required response must trigger an action item.

Actions /Comments Resulting From this Audit, Audit 001 (xx/xx/xx)

Actions/Comments	Due Date	Status

Audit Date:	
Auditor:	
Auditee:	

ATTACHMENT 11

PRELIMINARY SETTLEMENT POND SIZE CALCULATIONS

Graffy Wind Farm
Settlement Pond Calculations

ydraulic Calculations

Q (m^3/sec) = A (ha) x I (mm/hr) x R x Growth Factor / 360

Design Storm Event = 10_{year}, 1_{hour}
Rainfall Intensity (I_{10}) = 22.7 Rainfall depths taken from Met Eireann Extreme Rainfall data.
Rainfall Growth $Factor_{10}$ = 1.37

Design Storm Event = 100_{year}, 1_{hour}
Rainfall Intensity (I_{100}) = 37.4 Rainfall depths taken from Met Eireann Extreme Rainfall data.
Rainfall Growth $Factor_{100}$ = 1.96

Runoff Coefficient (R) = 0.7

Sediment Pond Calculations

Particle Size = 63µm
Settling Velocity (V_s) for a 63µm Particle = 0.002m/sec (Stoke's Law)
Factor of Safety = 1.2

Minimum Pond Area (m^2) = Q_{10year} (m^3/sec) / V_s (m/sec x FOS

Discharge Pipe Calculations

Discharge Capacity = Q (m^3/sec) = cA x Ö(2 x g x h)
Discharge Coefficient (c) = 0.6 (Sharp Crested Weir)
Area (A) = 0.071 (300mm φ pipe)
Hydraulic Head (h) = 0.3

Discharge Capacity

Discharge Capacity = Q (m^3/sec) = cA x Ö(2 x g x h)
= 0.103

Settlement Pond Sizes

ttlement Pond Location	Catchment Area	Q_{10year} (m^3/sec)	$Q_{100year}$ (m^3/sec)
Pond @ turbine T01	0.56	0.034	0.080
Pond @ turbine T02	0.53	0.032	0.076
Pond @ turbine T03	0.67	0.041	0.095
Pond @ turbine T04	0.95	0.057	0.135
Pond @ turbine T05	0.67	0.041	0.095
Pond @ turbine T06	0.57	0.034	0.081
Pond @ turbine T07	0.72	0.044	0.103
Pond @ turbine T08	0.58	0.035	0.083
Pond @Substation	0.9	0.054	0.128

Graffy Wind Farm
Settlement Pond Calculations

Settlement Pond Location	Catchment Area	Q_{10year} (m^3/sec)	Required Settlement Pond Area (m^2)	Length (m)	Width (m)	Settlement Pond Area (m^2)	Depth (m)
Pond @ turbine T01	0.56	0.034	14.1	7.5	2.5	18.8	1.5
Pond @ turbine T02	0.53	0.032	13.4	7.0	2.0	14.0	1.5
Pond @ turbine T03*	0.67	0.041	16.9	7.5	2.5	18.8	1.5
Pond @ turbine T04	0.95	0.057	23.9	8.8	2.8	24.6	1.5
Pond @ turbine T05	0.67	0.041	16.9	7.5	2.5	18.8	1.5
Pond @ turbine T06	0.57	0.034	14.4	7.0	2.2	15.4	1.5
Pond @ turbine T07*	0.72	0.044	18.1	7.5	2.5	18.8	1.5
Pond @ turbine T08	0.58	0.035	14.6	7.0	2.2	15.4	1.5
Pond @ Substation	0.9	0.054	22.7	8.8	2.8	24.6	1.5

Notes:

1. Ponds to settle out particles >63um (i.e. fine sand) with 100% efficiency.
2. Ponds to settle out particles <63um (i.e. silt and clay) with 31% efficiency.
3. Buffer zones with minimum width of 30m and maximum gradient of 6% to settle out remaining particles <63um with 97% efficiency.
4. Based on a pond inlet trigger level limit of 1,000mg/l, a concentration of 20mg/l TSS on discharge to watercourses is designed.
5. Ponds to have three chambers, separated by geotextile (silt curtail) supported by clean gravel filter stone (10mmφ).
6. Discharge from pond to be via floating intake to decant the cleanest water. Manual shut-off valve to be provided.
7. Discharge from pond to be to level spreader.
8. * - indicates that settlement pond is not proposed due to natural runoff characteristic of location.

ATTACHMENT 12

INCIDENT REPORTING FORM

SITE ENVIRONMENTAL INCIDENT REPORT

Site		Date	
Time		Weather:	

Report By:		Position:	
Client personnel present:		Position:	
Contractor Personnel Present:		Position:	

Description of incident:

Item Spilled	
Estimate of Volume of Spillage:	

List of actions followed once incident was noted	Time	Corrective Action By	
		Action	By
Who first observed incident?			
First action		-	
Next Action			
Time Pollution Hotline was contacted			
Other			

SITE ENVIRONMENTAL INCIDENT REPORT

Details of Clean-Up contractor or how contamination was removed from site:

Details of how this could be avoided in future:	
Details of review of internal procedures as result of this incident:	

DATE REPORT COMPLETED_____