4. DESCRIPTION OF THE CLEANRATH WIND FARM DEVELOPMENT

4.1 Introduction

This section of the remedial Environmental Impact Assessment Report (rEIAR) describes the Cleanrath wind farm development, including the construction methodologies employed during construction. For the purposes of the substitute consent application to be submitted to An Bord Pleanála, the full description of the Cleanrath wind farm development is as follows:

1. *9 No. wind turbines with a ground to blade tip height of 150 metres and all associated foundations and hard-standing areas.*
2. *All associated underground electrical (33kV & 38kV) and communications cabling connecting the turbines to the national electricity grid.*
3. *Upgrade of existing access junctions and roads.*
4. *Upgrade of existing and provision of new site access roads.*
5. *Borrow pit.*
6. *Temporary construction compound.*
7. *Accommodation works along the turbine delivery route*
8. *Temporary roadway to facilitate turbine delivery.*
9. *Forestry Felling*
10. *Site Drainage;*
11. *The operation of the wind farm for a period of 25 years.*
12. *The decommissioning of the wind farm, removal of turbines and restoration of the site.*
13. *All associated site development and ancillary works.*

The application for substitute consent for the Cleanrath wind farm development includes the connection to the national electricity grid. All elements of the Cleanrath wind farm development, including grid connection and any works completed on public roads to accommodate turbine delivery, have been assessed as part of this rEIAR.

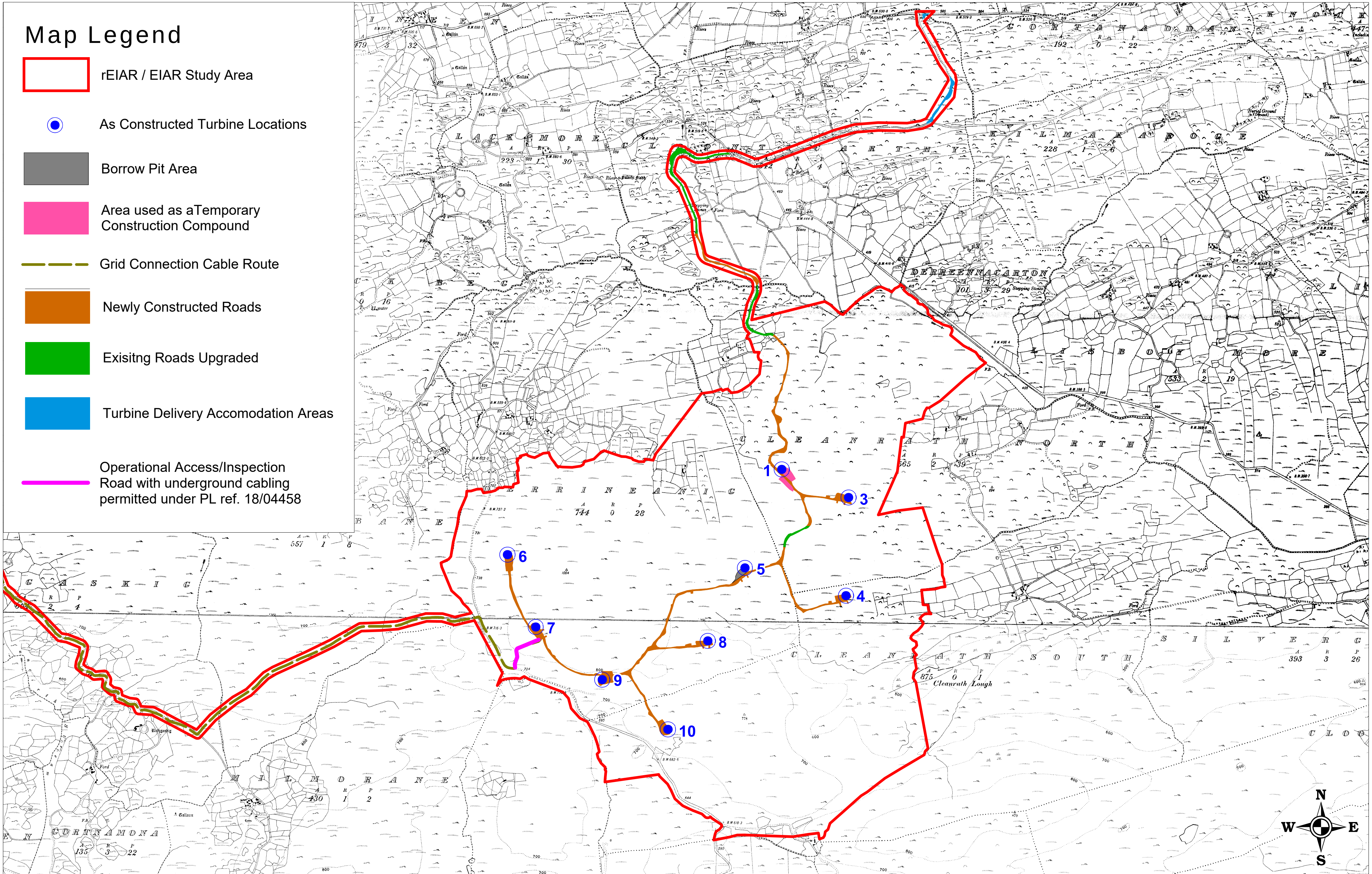
This application seeks substitute consent for 25-year operational life from the date of commissioning of the entire wind farm.

A fully detailed description of the Cleanrath wind farm development is provided below.

4.2 Development Layout

The layout of the Cleanrath wind farm development was designed to minimise the potential environmental impacts while at the same time maximising the energy yield of the wind resource passing over the site. A detailed constraints study, as described in Chapter 2 of the submitted rEIAR, was carried out in order to ensure that no turbines or ancillary infrastructure are located in the more environmentally sensitive areas of the site. The layout of the Cleanrath wind farm development makes maximum use of the existing access road and tracks within the site.

The overall layout of the Cleanrath wind farm development is shown on Figure 4-1. This map shows the current locations of the wind turbines (as previously permitted), borrow pit, internal roads layout, the main site entrance and the area used as a temporary construction compound during construction. Detailed layout drawings of the Cleanrath wind farm development are included as Appendix 4-1 to this report.



MAP TITLE: **Site Layout - Wind Farm Site**		MAP NO.: **Figure 4-1**	SCALE: **1:25,000**
PROJECT TITLE: **Cleanrath Wind Farm Development**			DATE: **12-08-2020**
DRAWING BY: **Owen Cahill**	CHECKED BY: **Michael Watson**	ISSUE NO.: **191223-a - 2020.08.12-F**	

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4.3 Development Components

4.3.1 Wind Turbines

4.3.1.1 Wind Turbine Locations

The current installed wind turbine layout was constructed in accordance with a design which was optimised using wind farm design software to maximise the energy yield from the site, while maintaining sufficient distances between the turbines to ensure turbulence and wake effects would not compromise turbine performance. The as constructed grid reference co-ordinates of the installed turbine locations and associated foundation levels are listed in Table 4-1 below. The turbine numbering of the installed turbines was altered for operational purposes, however for ease of reference, the turbine numbering used in this rEIAR corresponds to that of 2017 Permission application documentation. The corresponding installed turbine number is provided in the Table 4-1 below.

Table 4-1 Wind Turbine Locations and Elevations

Turbine Number	New Turbine Number (as per signage on site)	Irish Grid Coordinates		Top of Foundation Elevation (m OD)
		Easting	Northing	
1	15	120871	70057	209
3	14	121213	69913	213
4	13	121200	69411	190
5	12	120682	69553	208
6	7	119466	69620	260
7	8	119610	69250	253
8	11	120493	69178	222
9	9	119952	68981	228
10	10	120288	68725	229

4.3.1.2 Turbine Type

Wind turbines harness the energy from the wind and convert it into electricity. A wind turbine, as shown in Plate 4-1 below, consists of four main components:

- Foundation unit
- Tower
- Nacelle (turbine housing)
- Rotor

Plate 4-1 Wind Turbine Components.

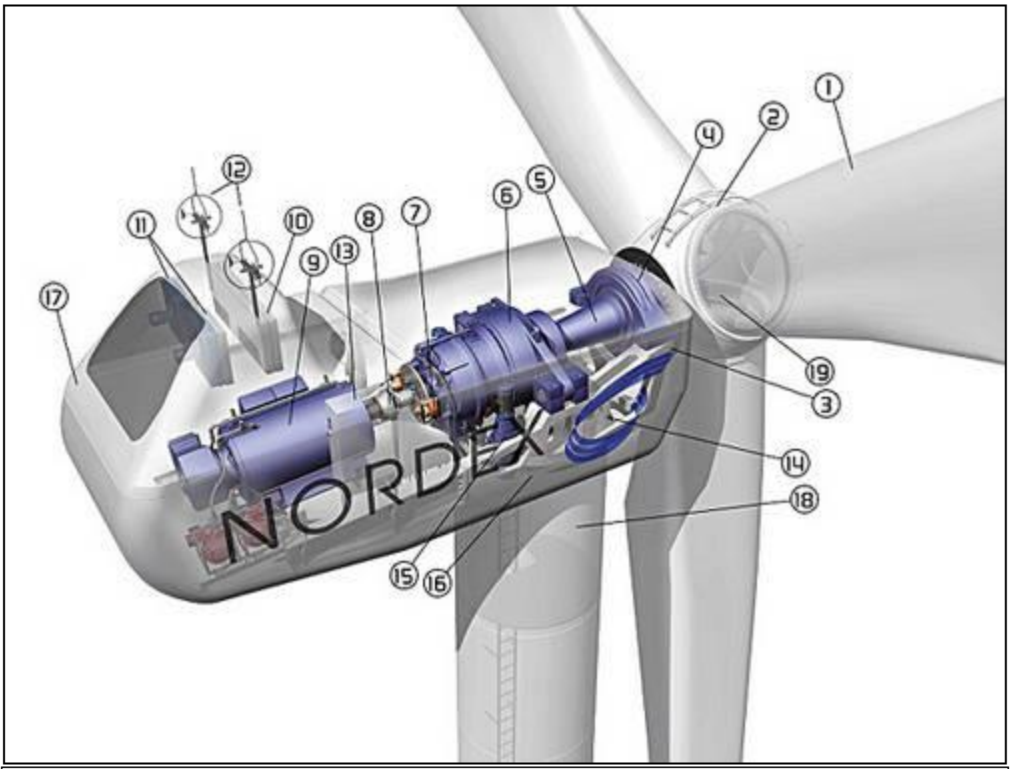
The installed wind turbines have a ground to blade tip height of approximately 150 metres.

The turbine model installed on site is the Nordex N117 which has a hub height of 91m and a rotor diameter of 117m

The wind turbines are conventional three-blade turbines and are all geared to ensure the rotors of all turbines rotate in the same direction at all times. The turbines are light grey matt colour.

Typically, various types and sizes of turbines are considered in an EIAR to assess the 'worst case scenario'. As this is a rEIAR and the turbine type and size is now known, the various assessments throughout this document have been completed using the N117 turbine. Turbine design parameters have a bearing on the assessment of shadow flicker, noise, visual impact, traffic and transport and ecology (specifically birds), as addressed elsewhere in this rEIAR. In each rEIAR section that requires the consideration of turbine parameters as part of the impact assessment, the turbine design parameters assessed are those of the installed turbines.

A drawing of the wind turbine is shown in Appendix 4-1 . The individual components of a typical geared wind turbine nacelle and hub are shown in Figure 4-2 below.



1.Rotor Blades	2.The Hub	3.The Turbine Frame
4.The Rotor Bearing	5.The Rotor Shaft	6.The Gearbox
7.The Disk Brake	8.The Generator Coupling	9.The Generator
10.The Cooling Radiator	11.The Fan Coolers	12.The Wind Measuring System
13.The Control System	14.The Hydraulic System	15.The Yaw Drive
16.The Yaw Bearing	17.The Nacelle Cover	18.The Tower
19.The Pitch system		

Figure 4-2 Turbine nacelle and hub components

4.3.1.3 Turbine Foundations

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground surface. The size of the foundations installed vary between 20.2 – 21.8 metres in diameter in a circular configuration. The turbine foundation transmits any load on the wind turbine into the ground. The horizontal and vertical extent of a turbine's foundation is shown in Appendix 4-1 .

After the foundation level of each turbine has been formed on competent strata, the bottom section of the turbine tower "Anchor Cage" is levelled and reinforcing steel is then built up around and through the anchor cage (Plate 4-2 below). The outside of the foundation is shuttered with demountable formwork to allow the pouring of concrete (Plate 4-3 below) and is backfilled accordingly with appropriate granular fill to finished surface level (Plate 4-4 below).

Plate 4-2 Turbine Base 'Anchor Cage'

Plate 4-3 Turbine Foundation Poured

Plate 4-4 Turbine Foundation Back-fill Complete

4.3.1.4 Hard Standing Areas

Hard standing areas consisting of levelled and compacted hardcore are installed around each turbine base to facilitate access, turbine assembly and turbine erection. The hard standing areas are used to accommodate cranes used in the assembly and erection of the turbine, offloading and storage or turbine components, and generally provide a safe, level working area around each turbine position. The hard standing areas are extended to cover the turbine foundations once the turbine foundation is in place. The sizes, arrangement and positioning of hard standing were installed as per turbine supplier's requirements. The installed turbine hard standing areas which have been optimised at each turbine location so that they were accommodated by the topography, position of the site access road, the turbine position and the turbine supplier's requirements are shown on the layout drawings included as Appendix 4-1 .

The hard standing areas were developed to provide levelled assembly areas within the footprint of each hard stand. This ensured an appropriately sized area for offloading turbine blades and tower sections from trucks prior to being lifted into position by cranes., These levelled areas were provided within the hard standing areas outlined in the as constructed drawings in Appendix 4-1 with an example from the Cleanrath wind farm development in Plate 4-5.

Plate 4-5 Access Road at the entrance to Turbine no. 10 with Turbine no. 9 and hardstand area arrangement in the background

4.3.1.5 Power Output

The installed wind turbines have a rated electrical power output of 2.4 megawatt (MW) and 3.6 MW depending on their siting on the wind farm site. There are 4 no. 3.6MW turbines and 5 no. 2,4MW turbines, with a combined installed capacity of 26.4MW. For the purposes of this rEIAR, the rated output of 26.4MW has been utilised in the various calculations as appropriate.

The Cleanrath wind farm development has the potential to produce up to 80,942 MWh (megawatt hours) of electricity per year, based on the following calculation:

A x B x C = Megawatt Hours of electricity produced per year

where: A = ... The number of hours in a year: 8,760 hours

B = ... The capacity factor, which takes into account the intermittent nature of the wind, the availability of wind turbines and array losses etc: 35%

C = ... Rated output of the wind farm: 26.4 MW.

The capacity factor of a wind farm takes into account the intermittency of the wind and is based on average wind speeds. A load factor of 35% is used here, based on the average figure anticipated for modern wind turbines selected to best suit the site's wind regime.

Therefore, the 80,942 MWh of electricity produced by the Cleanrath wind farm development is sufficient to supply approximately 19,272 Irish households with electricity per year, based on the average Irish household using 4.2 MWh of electricity (this latest figure is available from the March 2017 CER Review of Typical Consumption Figures Decision).

4.3.2 Site Roads

The Cleanrath wind farm development site is accessed via the existing junction between the L3402 and the local road in the townland of Cloontycarthy adjacent to the sawmill, through a new turbine delivery accommodation roadway for abnormal loads and then via an existing commercial forestry entrance off the local road and into the site as outlined in Figure 4-1 above. From this site entrance, a network of forestry tracks and a local public road traverse the northern half of the site. Maximum use was made of the existing road and tracks in accessing the turbine locations which minimised the requirement for new roadways within the site.

Straight sections of existing and new roadways were installed to a running width of c.6 metres to accommodate the transportation of large turbine components. Corners and junctions are installed wider than six metres to allow the trucks to manoeuvre around bends. All site access roads as part of the Cleanrath wind farm development, both existing and new, were installed to comply with the turbine supplier's requirements. The material used for upgrade and construction of roads within the site was obtained from an on-site borrow pit and areas where stone material was won on site as part of the cut and fill of roads and turbine areas. Plate 4-6 shows a site road under construction with a completed site road shown in Plate 4-7

Plate 4-6 Site Road Under Construction

Plate 4-7 Completed Site Road

4.3.2.1 Existing Roads for Use and Upgrade

The existing roadways through the site have been upgraded and widened where required for providing access to the turbine locations. The road upgrade involved the widening of 1.3 kilometres of existing on-site roadways to as part of the Cleanrath wind farm development to a total running width of approximately six metres, with wider section at corners and on the approaches to turbine locations, and the laying of a new surface dressing on the existing section of roadway where necessary. Widening was carried out on either side of the existing road whilst respecting the location of existing roadside drainage already in place and where necessary widening taking place on the opposite side of the road to the roadside drainage. The locations of the existing on-site roads that required upgrade are shown in Figure 4-1.

4.3.2.2 New Roads

New roadways have been installed for access to turbine locations in areas where existing roads were not already present. A total of 4.8 kilometres of new roadway was installed as part of the Cleanrath wind farm development. The extent of the new roads are shown in Figure 4-1.

4.3.2.3 Road Construction

4.3.2.3.1 *New Excavated Roads*

Where relatively shallow depths of overburden were encountered on site, new or improved existing roads were installed directly on a solid formation. This solid formation for these excavate and replace roads was bedrock or a competent stratum.

The construction methodology for excavate and replace roads is outlined as follows:

- Prior to the construction of the road commencing, peat movement monitoring posts were put in place where required and appropriate drainage measures installed upslope of the access road alignment and construction area.
- Excavation was carried out until a competent stratum was reached.
- Road construction was carried out in sections of approximately 50 metres in length.
- The competent stratum was overlain typically with 500mm of granular fill and up to 1m in places.
- A layer of geogrid/geotextile was installed where required at the surface of the competent stratum.
- A final surface layer was placed over the excavated road to provide a road profile to accommodate construction and turbine delivery traffic.

A typical section of a new excavated road is shown in Appendix 4-1 .

4.3.2.3.2 New Floating Roads

Floating roads minimise impact on the peat, particularly peat hydrology, and significantly reduce the volumes of peat requiring management as there is no excavation required and no peat arisings are generated. Floating roads were constructed where deeper peat depths were found within the site (generally above 2m).

The construction methodology of floating roads is outlined as follows:

- Prior to the construction of the floating road, movement monitoring posts were put in place where the peat depth is greater than three metres.
- Base geogrid was laid onto the existing peat surface.
- The typical make-up of the new floating road was 1m of granular fill with two layers of geogrid.
- A basal layer of tree trunks/brash saved from the tree felling phase of the Cleanrath wind farm development was used where practical.
- Stone used in the floating road construction area was end tipped over at least a ten metre stretch, on to the constructed floating road.
- Following the tipping of the stone a suitable bulldozer/excavator was used to spread and place the stone over the basal geogrid layer along the line of the road.
- A final surface layer was placed over the floating road to provide a road profile to accommodate construction and turbine delivery traffic.

At transitions between floating and excavated roads, a length of road of approximately ten to twenty metres had the peat excavated and replaced with suitable fill. The fill was graded so that the road surface transitions smoothly from floating road to excavated road and vice versa.

All new roadways were constructed with a camber to aid drainage and surface water runoff where the terrain could accommodate this. The gradient and slope of the camber depended on the site characteristics where the road is actually being constructed.

A typical section of a new floating road is shown in in Appendix 4-1 .

4.3.3 Borrow Pit and Rock Extraction Areas

One on-site borrow pit was developed as part of the Cleanrath wind farm development. The rock and hardcore material that was required during the construction of the Cleanrath wind farm development was sourced from the on-site borrow pit and areas where stone material was won on site as part of the cut and fill of turbine areas and roads. A limited amount of hardcore and other aggregate materials were imported that may not be possible to source from the on-site borrow pit, such as bedding sand for duct laying, and hardcore for initial site enabling works required before the borrow pit was accessed and developed. The location and extent of the developed borrow pit is shown on Figure 4-1 and on the detailed site layout drawings included as Appendix 4-1 to this rEIAR.

The Borrow Pit is located in the centre of the site, adjacent to Turbine No. 5. The developed area measures 2,550m^2 in area and supplied hardcore materials for the construction of turbines, construction compound and associated site access roads.

The total volume of rock and hardcore material that were extracted from the borrow pit as well as material won in other site areas as part of the cut and fill of roads and turbine areas was 51,905m^3.

Post-construction, the borrow pit area has been secured and made safe by reinstatement of the area with overburden and peat from site excavations and therefore, the provision of a perimeter stock-proof fence around the borrow pit area to prevent access to this area is not necessary. The borrow pit now blends in with the hardstanding area of Turbine no. 5 as can be seen in Plates 4-8 and 4-9 below. .

Hardcore materials were extracted from the borrow pit by means of rock breaking and blasting. Blasting was considered to be a more effective rock extraction method producing significant volumes of rock in a matter of milliseconds. Blasting was only carried out after an appropriate method of notifying local residents was submitted to and agreed with the Planning Authority. Notifying the residents involved a letter drop to each property within 1,300m of the borrow pit area which comprised 7 no. houses. Blast notifications took place 24 hours prior to each blast event

The extraction of rock from the borrow pit was a temporary operation run over a short period of time relative to the duration of the entire project. The two rock extraction methods utilised during construction are detailed below.

Plate 4-8 Borrow Pit Area adjacent to Turbine no. 5

Plate 4-9 Borrow Pit Area

4.3.3.1 Rock Breaking

Rock can typically be extracted from borrow pits or other infrastructure areas where weathered or brittle rock is encountered by means of a hydraulic excavator and a ripper attachment. This is a common extraction methodology where fragmented rock can be carefully extracted in layers by a competent operator. In areas where rock of a much higher strength is encountered and cannot be removed by means of excavating then a rock breaking methodology can be used. Where rock breaking is required, a large hydraulic 360-degree excavator with a rock breaker attachment is typically used. Given the power required to break out tight and compact stone at depth, the machines are generally large and in the 40-60 tonne size range. Even where rock might appear weathered or brittle at the surface, the extent of weathering can quickly diminish with depth resulting in strong rock requiring significant force to extract it at depths of only a few metres.

A large rock breaking excavator progressively breaks out the solid rock from the ground where necessary. The large rock breaker is typically supported by a smaller rock breaker which can often be in the 30-40 tonne size range and works to break the rocks down to a size that they can be fed into a crusher.

The extracted broken rock was typically loaded into a mobile crusher using a wheeled loading shovel and crushed down to the necessary size of graded stone required for the on-site civil works. The same wheeled loader took the stone from the crusher conveyor stockpile and stockpiled it away from the immediate area of the crusher until it was required elsewhere on the site.

4.3.3.2 Rock Blasting

Where blasting was used as an extraction method, a mobile drilling rig was used to drill vertical boreholes into the area of rock that was to be blasted. The drilling rigs used were self-propelled machines, designed for drilling blast boreholes. A drilling rig worked 4 days drilling the necessary number of boreholes required for a single blast. The locations, depth and number of boreholes were determined by the blast engineer, a specialist role fulfilled by the blasting contractor employed to undertake the works.

The blast engineer arranged for the necessary quantity of explosive to be brought to site to undertake a single blast. The management of explosives on site and the actual blasting operation was agreed in advance with and supervised by An Gardaí Siochána. The blast engineer set the explosives in place in the boreholes, set the charges, and fired the blast. Each blast took only a matter of milliseconds but may have been perceived to have taken longer as blast noise echoes around the area.

The blast generated rock of a size that could be loaded directly into a mobile crusher, using the same wheeled loader description outlined above. From that point on, the same method was used for processing the rock generated from a blast, as would be used to process rock generated by rock breaking. The drilling rig recommenced drilling blast holes for the next blast as soon one blast had been finished. A total of 4 no. blast events were completed as part of the Cleanrath wind farm development.

4.3.4 Peat and Overburden Management

4.3.4.1 Quantities

The quantity of peat and overburden that required management on the site was calculated, as 9,160m^3. The volumes are calculated based on the quantity of material generated by the cut and fill design prepared by Ionic Consulting Engineers which was deemed to be unusable for reuse as suitable construction material . This material comprised soft overburden and peat from shallow areas.

4.3.4.2 Management of Peat and Subsoils

The majority of overburden and peat was stored temporarily adjacent to the works areas for reinstatement of temporary works areas after the main construction activities had been completed. For example, the working area required around each turbine foundation was backfilled on completion of the turbine foundation. Similarly, the roadways were graded back to the level of the adjacent ground and embankments were covered with a layer of suitable material to encourage re-vegetation of the site. In both these and other cases, the necessary volumes of overburden was stored adjacent to the works areas, for reuse in reinstatement. All have been assessed by an ecologist, geotechnical engineer and hydrologist as part of this assessment the details of which is summarised in the relevant sections throughout this document. This approach of using temporary storage areas was considered more sustainable than hauling the material to the borrow pit and transporting it back from there again to where it is needed for the reinstatement works. Considering also that only one borrow pit was developed reduced the relocation options for this material as part of reinstatement. The stored material was sealed with the machine bucket and surrounded by silt fences to ensure sediment-laden run-off did not occur prior to its subsequent use for site reinstatement.

4.3.5 Derragh Wind Farm Substation

The grid connection cabling from the Cleanrath wind farm development connects to the existing 38kV Derragh Wind Farm Substation constructed as part of the Derragh Wind Farm development and is located approximately 3km west of Cleanrath Wind Farm in the townland of Rathgaskig. The cabling loops back out of this substation and runs mainly within the public road corridor on to the 110kV Coomataggart substation located in the townland of Grousemount, Co. Kerry.

The electricity substation compound includes a wind farm control building and the electrical components necessary to consolidate the electrical energy generated on Cleanrath wind farm development site and export that electricity to the national grid. Further details regarding the connection of the onsite substation to the national electricity grid are provided in Section 4.3.7 below.

The location of the Derragh Wind Farm Substation is outlined in Figure 4-4 (below) with layout and elevations of the substation shown on Layout Drawings in Appendix 4-1 of this rEIAR. The substation compound is surrounded by an approximately 2.6 metre high steel palisade fence (or as otherwise required by ESB), and internal fences also segregate different areas within the main substation. The layout of electrical equipment in the electricity substation has been constructed to Eirgrid/ESB networks specifications.

4.3.6 Site Cabling

The electricity and fibre optic cabling from each turbine passes through the various site access roads in the direction of Turbine no. 7. Within Turbine no. 7, the power was combined for export off site. The electricity and fibre-optic cable ducting is approximately 1.2 metres below the ground surface as outlined on the layout drawings included as Appendix 4-1 to this report. Figure 4-3 below shows a typical 33kV cable trench.

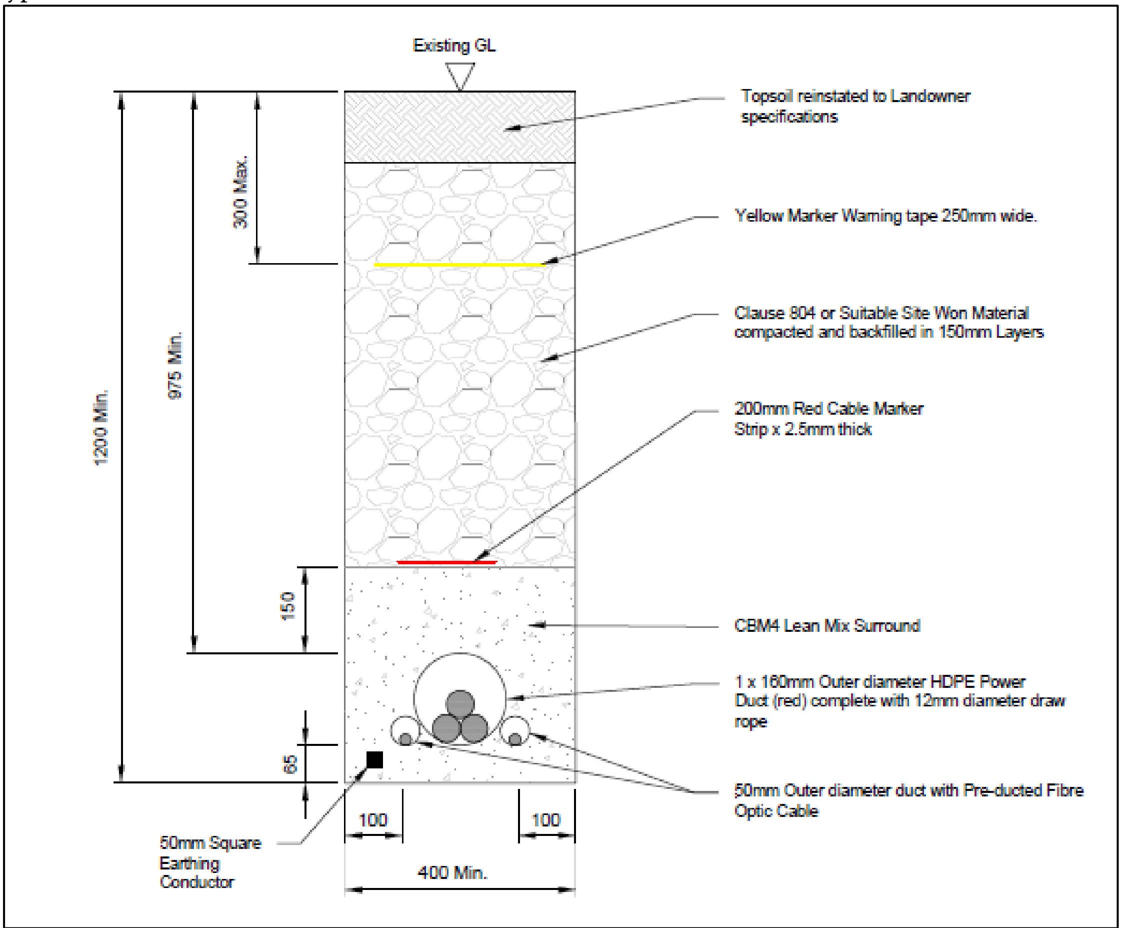


Figure 4-3 Typical 33kV Cable trench cross section detail

Cable trenches have been developed and ducting installed to ESB Networks specifications.

4.3.7 Grid Connection

The grid connection cable route comprises electricity cabling (33kV) from Turbine no. 7 within cable ducting as detailed in Figure 4-3 above along the permitted Operational Access/Inspection Road (Pl Ref. 18/04458) southwest of Turbine no. 7 and on to the local public road until it turns onto the access track of the constructed Derragh Wind Farm development and connects to the constructed 38kV electricity substation. The grid connection is approximately c15km in length. The cabling loops back out of the Derragh Wind Farm Substation (38kV) and runs mainly within the public road corridor on to the 110kV Coomataggart substation located in the townland of Grousemount, Co. Kerry. The 38kv trench detail is included in Figure 4-3(a) The final 1.5km of the cable route within Co. Cork and the 2km of the cabling in Co. Kerry is located on existing private access tracks. The entire grid connection route passes through the townlands listed in Table 1-1 of this rEIAR. A description of the grid connection works is presented in Section 4.8 below. The grid connection route is illustrated in Figure 4-4.

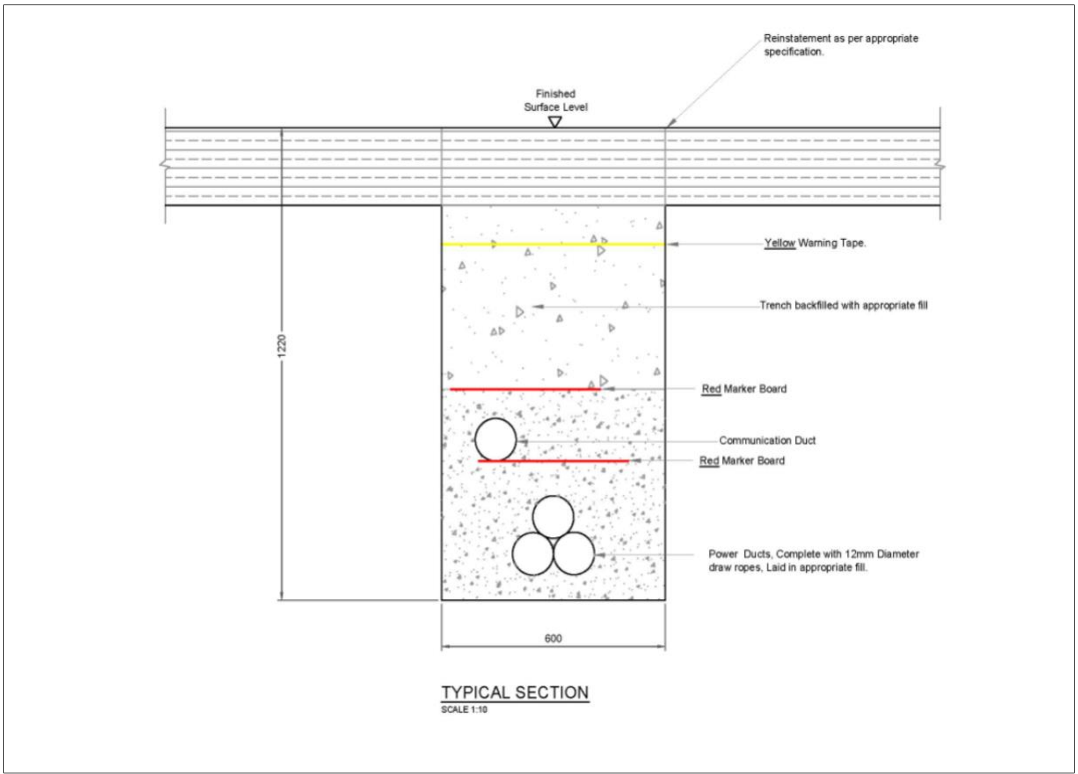


Figure 4-4a Typical 38kV Cable trench cross section detail

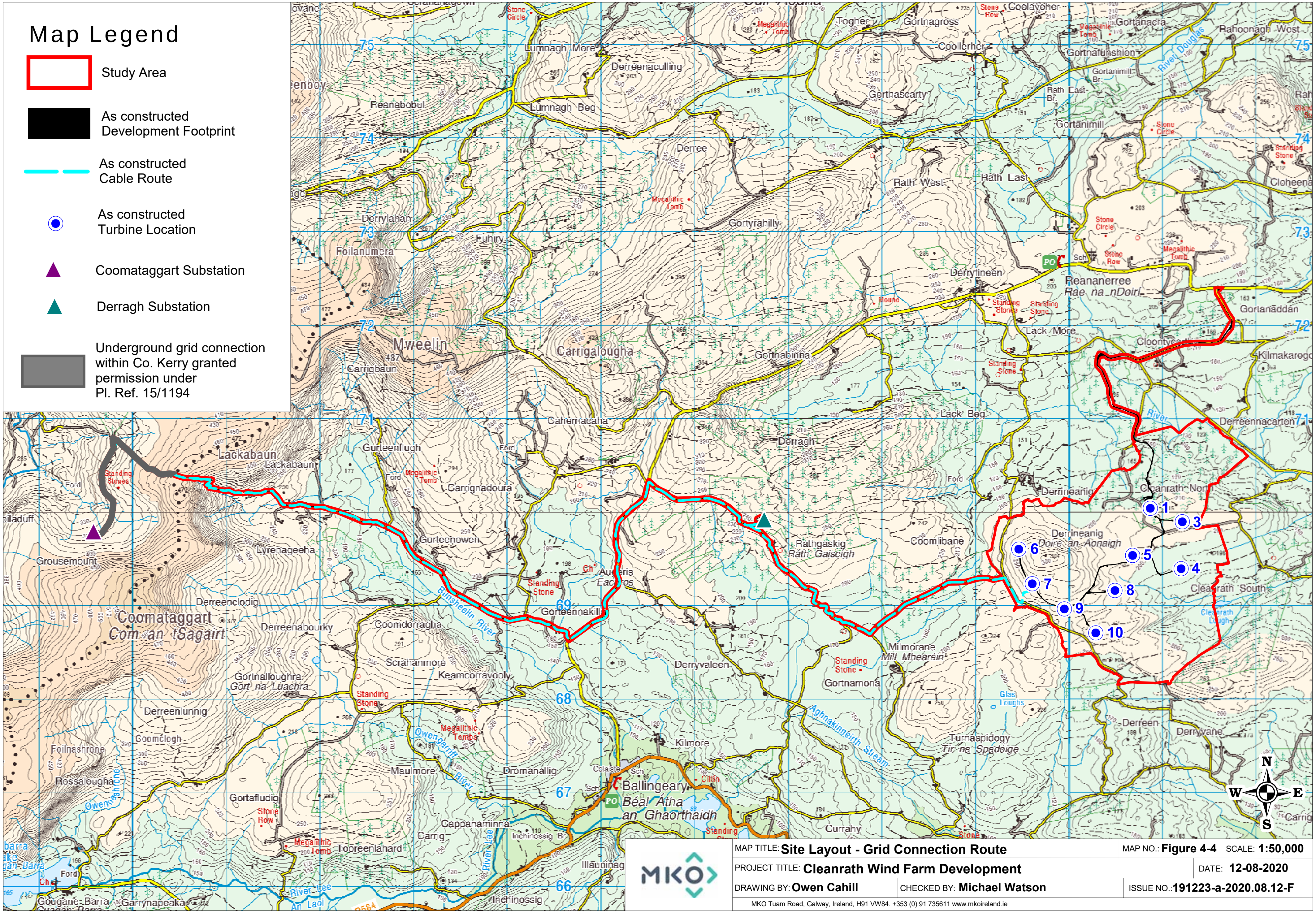
4.3.8 Temporary Construction Compound

A Site Office/Canteen and storage container was temporarily located along the access road west of Turbine no. 7 at the outset of construction works. As the works progressed into the site, these facilities were relocated to the access road South West of Turbine no. 8 as outlined in Figure 4-1. These were the only facilities required at this stage the construction. As the works progressed, a temporary construction compound measuring approximately 80 metres by 40 metres was installed in the north of the site adjacent to Turbine No. 1 and located along a section of new road. An additional area of temporary construction compound was also provided on the south side of the access road adjacent to Turbine no. 1 which was used mainly by the turbine supplier as their compound during turbine installation The location and extent of the construction compound is shown on the site layout drawing in Figure 4-1 and layout drawings of the Cleanrath wind farm development in Appendix 4-1.

During construction, the compound included the provision of temporary site offices, staff facilities and car-parking areas for staff and visitors. The layout of the construction compound is shown in Appendix 4-1. Construction materials and turbine components were brought directly to the turbine locations following their delivery to the site.

Temporary port-a-loo toilets located within a staff portakabin were used during the construction phase. Wastewater from staff toilets were directed to a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants.

Since the completion of construction, all offices, welfare facilities and equipment has been removed and the area repurposed as the hardstanding for Turbine No. 1. The area of temporary construction compound on the south side of the access road has been decommissioned with all offices, containers and welfare facilities removed from site. The stoned area that remains will be allowed to revegetate naturally over time.



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4.3.9 Associated Works

4.3.9.1 Peatland Habitat Restoration

The construction of the Cleanrath wind farm development has resulted in the permanent loss of 4.13ha of the peatland habitat mosaic within the site. The development was specifically designed to avoid the larger areas of blanket bog that are mapped separately from the overall peatland mosaic (see Figure 6-6, Habitat Map, Chapter 6 of this rEIAR). It has also led to the temporary physical disturbance of peatland habitats adjacent to the development footprint during the construction of the wind farm. A habitat restoration and enhancement plan has been prepared to mitigate for this habitat loss. This plan is included in Appendix 6-8 and summarised below in Section 4.9.1

4.3.9.2 Tree Felling

A portion of the Cleanrath wind farm development site comprises a commercial coniferous forestry plantation, with approximately 32.5% of the site originally under forestry. As part of the Cleanrath wind farm development, permanent tree felling was required within and around the development footprint to allow the construction of turbine bases, access roads and the other ancillary infrastructure. Along sections of access road in forested areas, an area of approximately three times the width of the access road was felled. Temporary felling was also required in the vicinity of turbine locations, the purpose of which is to achieve the required setback between the trees and the turbines for the protection of bats.

A total of 8.14 hectares of forestry was felled within and around the development footprint. An additional 4.18 hectares of trees were temporary felled around the turbine locations. The total amount of tree felling completed as part of the Cleanrath wind farm development was 12.32 hectares. Figure 4-5 shows the extent of the area that was felled as part of the Cleanrath wind farm development. Tree felling licences were obtained for the area of trees that was felled for the construction of the Cleanrath wind farm development.

The tree felling activities required as part of the Cleanrath wind farm development were carried out under Limited Felling Licences (LFL) granted by the Forest Service. One LFL was granted for permanent felling required around the development footprint, for example along access roads and at turbine bases. The second LFL was granted to cover temporary felling. All associated Felling Licences are in included in Appendix 4-2

An additional hectare of immature forestry will be removed to provide an area of enhanced peatland which is intended to offset the permanent loss of Peatland Habitat due to the permanent footprint of the Cleanrath wind farm development. This area will be restored to peatland habitat and further details on the restoration plan are outlined in Chapter 6 of this rEIAR. Any further felling proposed for the site will be the subject of a Limited Felling Licence (LFL) application to the Forest Service.

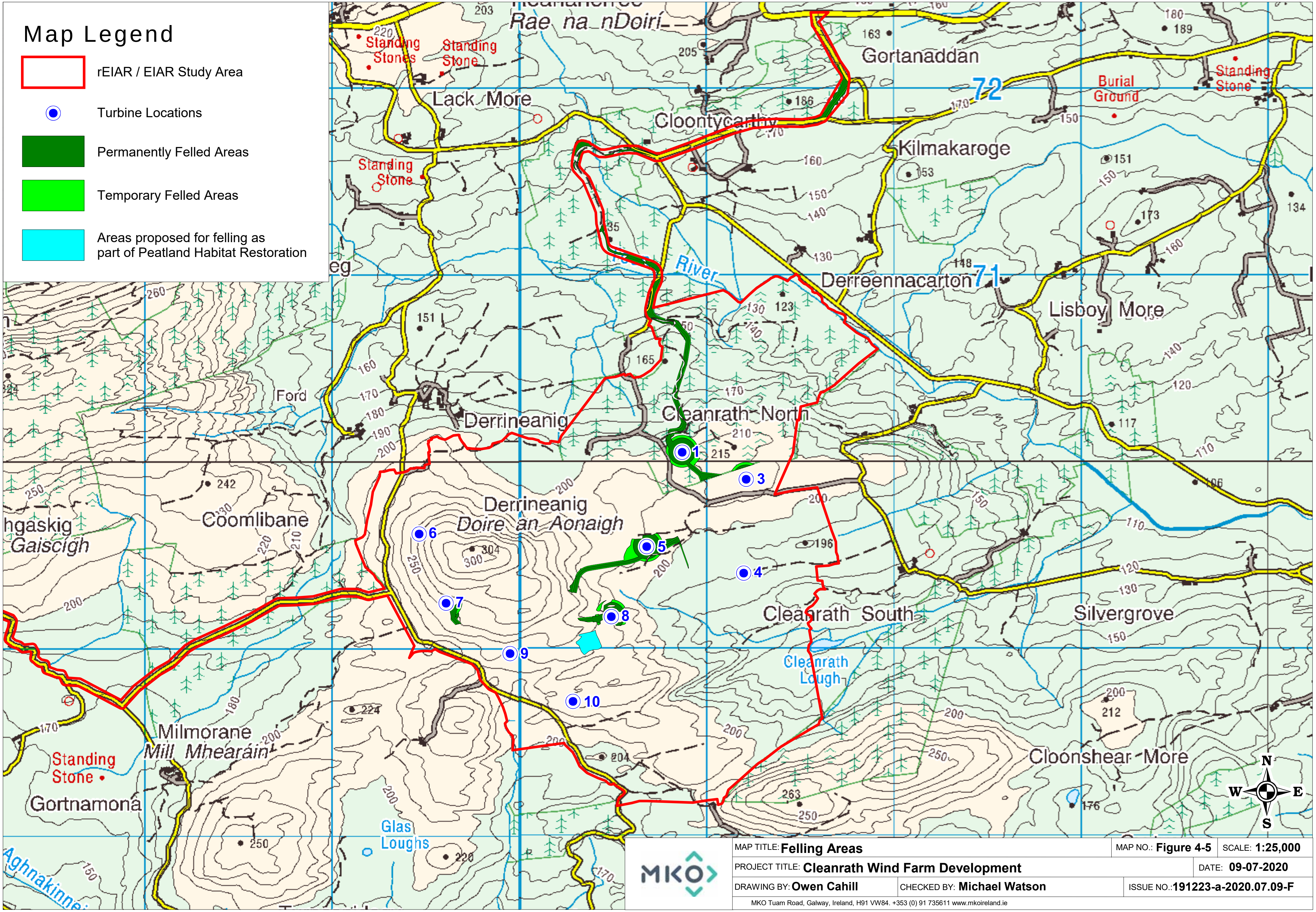
4.3.9.3 Tree Planting

In line with the Forest Service's published policy on granting felling licences for wind farm developments, areas cleared of forestry for turbine bases, access roads, and any other wind farm-related uses are to be replaced by replanting at an alternative location.

The Forest Service policy requires replanting on a hectare for hectare basis and states that where turbulence or temporary felling is necessary, a 'short rotate//on forestry' (SRF) approach is generally made a condition of the felling licence. The SRF approach recommends the use of lodgepole pine or another suitable species as the replanting choice. The north coastal variety of lodgepole pine is preferred because it is unlikely to reach ten metres in height, the height at which the trees would again have to be felled to prevent turbine turbulence effects or interfere with the vegetation setback requirement for bats, over the 25-year lifetime of the wind farm project.

A total of 12.32 hectares of new forestry will therefore be replanted as a condition of the felling licences that have been issued in respect of the Cleanrath wind farm development. Replanting is a requirement of the Forestry Act and is primarily a matter for the statutory licensing processes that are under the control of the Forest service. The replacement replanting of forestry can occur anywhere in the State subject to licence. Some replanting will take place on the site of the Cleanrath wind farm development. It is standard practice to maximise the allowed 2 years fallow period between felling and replanting where replanting is due to take place on site, therefore this replacement planting of temporary felled areas will be due to occur before 31/03/2022. In addition, two replanting area were identified and assessed as part of the replacement of permanent felling with an availability of 2.95 hectares and 5.38 hectares located in the townlands of Glantane Beg and Claraghatlea, Co. Cork respectively. The lands proposed as part of the replacement of permanent felling required for the areas of Peatland Habitat Restoration are located in the townland of Sheehaun in Co. Roscommon. All these lands were granted Forest Service Technical Approval for afforestation and the planting of these areas has been completed.

A description of the replanting land and an assessment of the actual impacts including cumulative impacts associated with afforestation at these locations along with Technical Approvals from the Forest Service are provided in Appendix 4-3 of this rEIAR.



MAP TITLE: **Felling Areas**

MAP NO.: **Figure 4-5**

SCALE: **1:25,000**

PROJECT TITLE: **Cleanrath Wind Farm Development**

DATE: **09-07-2020**

DRAWING BY: **Owen Cahill**

CHECKED BY: **Michael Watson**

ISSUE NO.: **191223-a-2020.07.09-F**

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4.3.10 Site Activities

4.3.10.1 Environmental Management

All site activities completed as part of the Cleanrath wind farm development are provided for in a Construction Environmental Management Plan (CEMP). A CEMP was prepared in advance of construction and is included in Appendix 4-4 of this rEIAR. The CEMP includes all mitigations and monitoring measures necessary to ensure that the construction of Cleanrath wind farm development did not cause significant impacts on the receiving environment. The CEMP was informed by conditions and or alterations to the EIS and application documents that emerged during the course of the planning process of the 2017 Permission. The document was also updated to include the requirements of conditions attached to the planning permission for the Operational Access/Inspection Road and underground cabling, granted by Cork County Council under Pl Ref. 18/04458.

4.3.10.2 Refuelling

Wherever possible, vehicles were refuelled off-site, particularly for regular road-going vehicles. On-site refuelling of machinery was carried out at designated refuelling areas at various locations throughout the site. Heavy Plant and Machinery was refuelled on site by a fuel truck that came to site as required on a scheduled and organised basis. Other refuelling was carried out using mobile double skinned fuel bowser. All plant and machinery were equipped with fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser was parked on a level area on site when not in use. All refuelling was carried out outside designated watercourse buffer zones.

Only designated trained and competent operatives were authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats were used during refuelling operations as required. There was no evidence from the daily visual inspections of the site and surrounding watercourse network of any significant impact on watercourse quality from refuelling operations on site.

4.3.10.3 Concrete Deliveries

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

The small volume of water generated from washing of the concrete lorry's chute were directed into a temporary lined impermeable containment area

Two examples of typical washout areas are shown in Plates 4-10 and 4-11 below.

Plate 4-10 Concrete washout area

Plate 4-11 Concrete washout area

The concrete washout areas were generally covered when not in use to prevent rainwater collecting. In periods of dry weather, the areas were uncovered to allow much of the water to be lost to evaporation. Any solid contents that had been cleaned down from the chute had solidified and were broken up and disposed of along with other construction and demolition waste the details of which are outlined in the Waste Management plan with the CEMP for the site (Appendix 4-4).

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

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

- Concrete trucks not being washed out on the site but directed back to their batching plant for washout.
- Site roads were constructed to a high standard to allow transport of the turbine components around the site, and hence, concrete delivery trucks were able to access all areas where the concrete was required. No concrete was transported around the site in open trailers or dumpers and thus avoiding any spillage while in transport. All concrete used in the construction of turbine bases was pumped directly into the shuttered formwork from the delivery truck.
- The arrangements for concrete deliveries to the site were agreed with suppliers before any deliveries, agreeing routes, prohibiting on-site washout and discussing emergency procedures
- Clearly visible signage were placed in prominent locations close to concrete pour areas specifically stating washout of concrete lorries is not permitted on the site.

4.3.10.4 Concrete Pouring

Because of the scale of the main concrete pours required to construct the Cleanrath wind farm development, the main pours were planned days or weeks in advance with special procedures adopted in advance of and during all concrete pours to minimise the risk of pollution. These include:

- Using weather forecasting to assist in planning large concrete pours and avoiding large pours where prolonged periods of heavy rain is forecast.
- Restricting concrete pumps and machine buckets from slewing over watercourses while placing concrete.
- Ensuring that excavations were sufficiently dewatered before concreting begins and that dewatering continued while concrete sets.
- Ensuring that covers were available for freshly placed concrete to avoid the surface washing away in heavy rain.
- Disposing of surplus concrete after completion of a pour in agreed suitable locations away from any watercourse or sensitive habitats.

4.3.10.5 Dust Suppression

In periods of extended dry weather, dust suppression was undertaken along haul roads and around the borrow pit area to ensure dust did not cause a nuisance. Where necessary, water was taken from the site's drainage system and pumped into a bowser or water spreader to dampen down haul roads and site compounds to prevent the generation of dust. Silty or oily water was not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser movements were carefully monitored, as the application of too much water may lead to increased runoff.

4.3.10.6 Vehicle Washing

Wheels or vehicle underbodies are often washed before leaving sites to prevent the build-up of mud on public (and site) roads. It was not considered necessary that vehicle or wheel washing was required as part of the construction phase of the Cleanrath wind farm development because site roads were already formed using on-site materials before other road-going trucks begin to make regular or frequent deliveries to the site (e.g. with steel or concrete). The site roads were well finished with compacted hardcore, and so the public road-going vehicles did not travel over soft or muddy ground where they might have picked up mud or dirt.

A road sweeper was available if any section of the public roads was dirtied by trucks associated with the Cleanrath wind farm development but the requirement for this road sweeper never materialised during construction.

4.4 Access and Transportation

4.4.1 Site Entrances

The site of the Cleanrath wind farm development has one main site entrance via an existing forestry road which was used during the construction phase. This forestry road is located in the townland of Cloontycarthy and accessed off the local public road. The entrance is located to the north of the site serving the entire footprint of the Cleanrath wind farm development. The location of the entrance is shown on the site layout drawing in Figure 4-1. Upgrade works have been completed to the existing entrance in order to accommodate access and egress of construction and turbine delivery vehicles. The layout of the site entrance is shown in Appendix 4-1.

There is a secondary entrance which was the subject of a separate planning permission to facilitate a more efficient cable route exiting the site and operational access. This entrance was not used for the main construction of the Cleanrath wind farm development however it did facilitate the construction of the export cable route. This entrance is controlled by a locked barrier for use by operation/ maintenance personnel only.

4.4.2 Turbine and Construction Materials Transport Route

The turbine transport route to the Cleanrath wind farm development saw turbine components transported from the port at Ringaskiddy via the N40 National Primary Road and N22 National Primary Road to the townland of Lackaneen, east of the village of Lissacressig, before travelling onwards toward the site via a network of local roads to the existing site entrance in the townland of Cloontycarthy. The route had been the subject of a full route survey and swept path analysis survey prior to construction.

Deliveries to site such as concrete, steel and construction materials used the same transport route as the wind turbines to the wind farm site of the Cleanrath wind farm development as outlined in Figure 4-6. Deliveries to the grid connection works used additional routes to access the various works areas. The number of construction vehicles generated during the construction phase of the Cleanrath wind farm development are outlined as part of the traffic and transport assessment in Chapter 14 of this rEIAR.

4.4.3 Works Along Transport Route

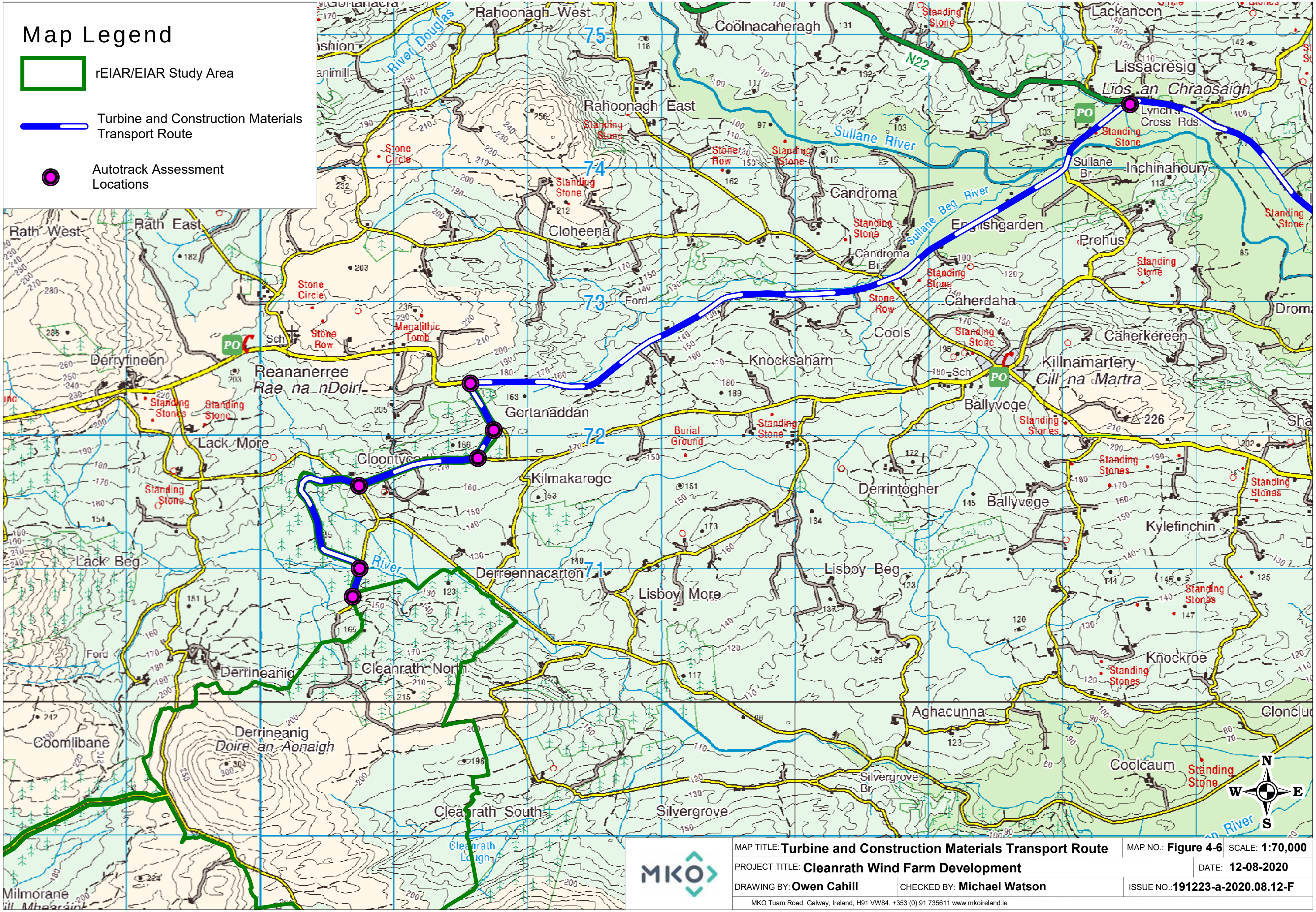
4.4.3.1 Road Widening

Road widening was required along 1.6km of the turbine transport route to accommodate the large vehicles used to transport turbine components to the wind farm site. The widening works carried out is outlined in Figure 4-7 and Appendix 4-1. The road upgrade works were carried out under Road Opening Licence (ROL) granted by Cork County Council (2019CO0648). The ROL was accompanied by and Environmental Report and an Appropriate Assessment Screening Report, the findings of this assessment is considered in this rEIAR.

4.4.3.2 Construction of Temporary Junction Accommodation Works

Junction accommodation works were completed at the exiting junction between the L3402 and the local road in the townland of Cloontycarthy adjacent to an existing sawmill operational. The works comprised a new section of road on the eastern site of the junction to reduce the turning area required by abnormal loads. The temporary junction accommodation works were only be used by the turbine delivery/abnormal load vehicles and other vehicles associated with the delivery process. The extent of this junction upgrade is outlined within the Layout Drawings in Appendix 4-1. The construction methodology of the temporary turbine delivery accommodation works is outlined below and as outlined in the CEMP which is included in Appendix 4-4:

- Overburden within the required areas for the accommodation works was excavated and temporarily stockpiled adjacent to the works area, where possible, until a competent stratum was reached.
- Any excess excavated overburden was removed from the works area to the on-site peat management areas or a licenced tip or, if suitable, stockpiled and reused for backfilling where appropriate.
- A layer of geogrid/geotextile was used where required at the surface of the competent stratum to provide further structural formation.
- The competent stratum was overlain with granular fill sourced from local quarries.
- A final surface running layer was placed over the granular fill to provide a suitable surface to accommodate the turbine delivery/abnormal load vehicles.
- The temporary accommodation works when not in use was cordoned off from the public road to prevent access using bollards.
- Since the completion of the turbine delivery phase, the temporary accommodation works areas have had a roadside berm reinstated and hardcore areas have been left to vegetate over time


Map Legend
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MAP TITLE: Turbine and Construction Materials Transport Route
MAP NO.: Figure 4-6
SCALE: 1:70,000
PROJECT TITLE: Cleanrath Wind Farm Development
DATE: 12-08-2020
DRAWING BY: Owen Cahill
CHECKED BY: Michael Watson
ISSUE NO.: 191223-a-2020.08.12-F
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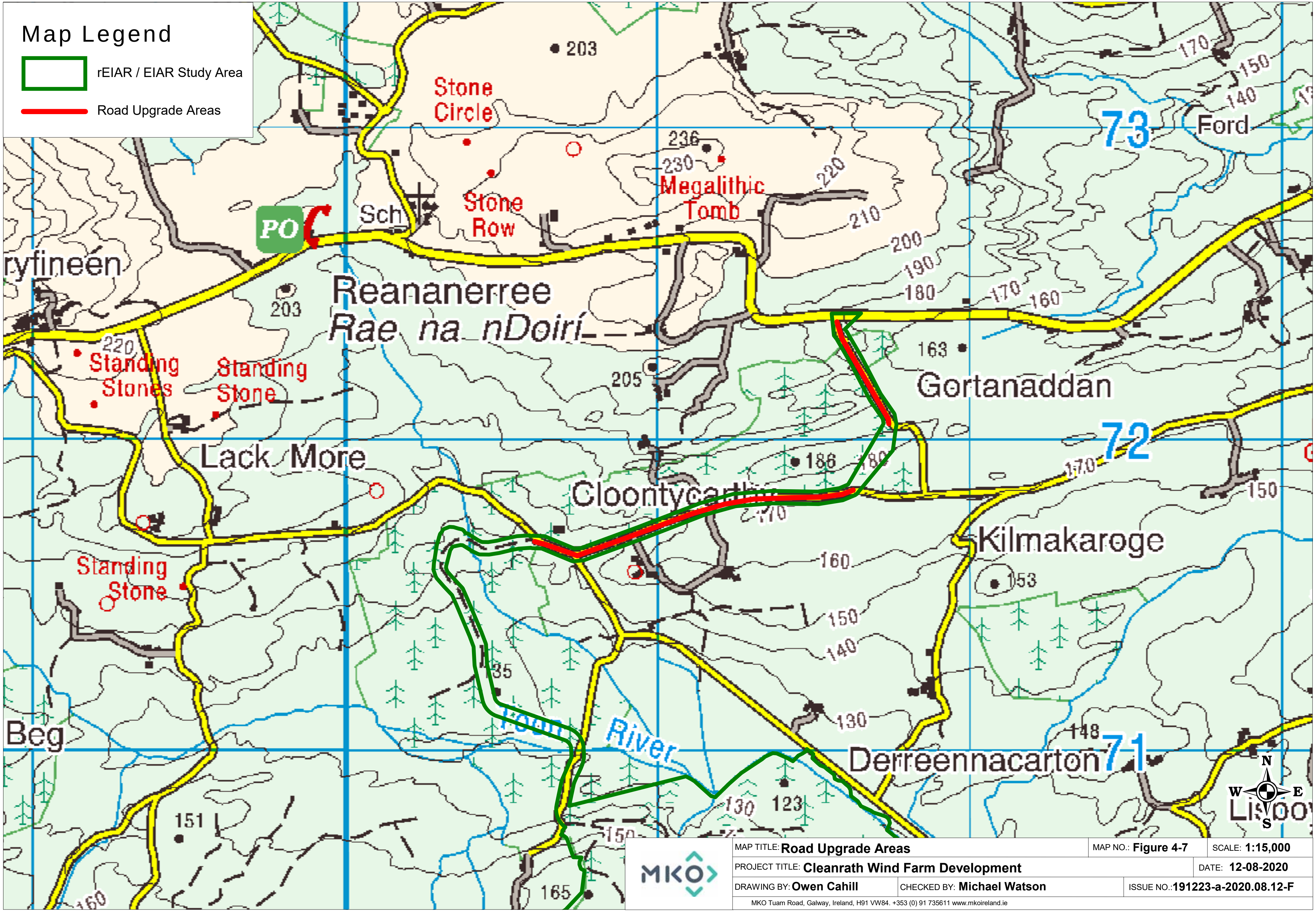

MAP TITLE: **Road Upgrade Areas**

MAP NO.: **Figure 4-7**

SCALE: **1:15,000**

PROJECT TITLE: **Cleanrath Wind Farm Development**

DATE: **12-08-2020**

DRAWING BY: **Owen Cahill**

CHECKED BY: **Michael Watson**

ISSUE NO.: **191223-a-2020.08.12-F**

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The granular fill and final surface running layer within the accommodation areas will be left in place to allow these to be used again in the future should it become necessary (i.e. at decommissioning stage for turbine removal, or in the unlikely event of having to swap out a blade component during the operational phase). Should this be required the boundary treatments and roadside berm will be temporarily removed and managed as set out above.

4.4.3.3 Turbine Delivery Accommodation Roadway

A turbine delivery accommodation roadway of approximately 280m in length was constructed in the townland of Cloontycarthy along with the section of road which was widened which is also located in the townland of Cloontycarthy. The roadway was constructed as per the methodology outlined in Section 4.3.2.3 above. The extent of the works area for this turbine delivery accommodation roadway is shown in Plate 4-12 below.

The section of road which was widened was confined to the curtilage of the existing public road corridor throughout its entire length. Given the landcover adjacent to the existing road, the upgrade of the road utilised a solid road construction methodology where the verge was excavated to a competent stratum on to which a granular road sub-base was installed prior to the application of a finished road surface to the entire road width. The excavation and road widening methodology is summarised as follows:

- Using a 13-tonne rubber tracked 360-degree excavator, the road verge was excavated to a competent subgrade to provide the running width of 4.5m.
- The area where excavations are planned was surveyed and all existing services identified.
- All relevant bodies i.e. ESB, Gas Networks Ireland, Eir, Cork County Council etc. were contacted and all drawings for all existing services sought.
- All plant operators and general operatives were inducted and informed as to the location of any services.
- A Traffic Management Plan was set up prior to any works commencing.
- The excavated material was set aside for re-use as part of road verge re-instatement and any surplus material removed to an authorised waste recovery facility.
- The road verge was excavated to a competent subgrade to provide the running width of 4.5m.
- The excavation was infilled Cl 804 stone material was laid on suitable formation
- The road verge reinstatement and roadside landscaping was completed as the excavations were backfilled with the stone material.
- A finished road layer of double tar and chip surface finish was installed as agreed with Cork County Council.

It is proposed that this temporary roadway will remain in place with the junctions with the public closed off on either end to prevent use by the general public. This roadway may also be required in the future to transport replacement components for turbines over the lifetime of the Cleanrath wind farm development. It may also be required during the decommissioning at the end of the 25-year lifetime of the Cleanrath wind farm development or pending the outcome of this substitute consent process where early decommissioning could be required.

Plate 4-12 Temporary Turbine Delivery Accommodation Roadway. View from the south during construction

4.4.4 Traffic Management

Prior to construction, the turbine delivery vehicles were modelled accurately in the Autotrack assessments for the site, as detailed in Chapter 14 of this rEIAR.

The need to transport a wind turbine blade measuring up to 58.5 metres on the public roads is not an everyday occurrence in the vicinity of the site of the Cleanrath wind farm development. However, the procedures for transporting abnormal size loads on the country's roads are well established and were implemented in full to ensuring all the required turbine components were successfully delivered to site.

The actual turbine delivery methodology adopted for the site was developed by Martrain, the specialist haulage company that was appointed by the turbine manufacturer, Nordex.

A Traffic Management Plan was prepared in accordance with the findings of the traffic impact assessment set out in Chapter 14 and is included in the CEMP (Appendix 4-4). Prior to the construction of the Cleanrath wind farm development, a Transport Management Plan and Route Survey Plan was prepared by Martrain and is included as Appendix 4-5. The plan included:

- A delivery schedule.
- Details of temporary works or any other minor alteration identified.
- A dry run of the route using vehicles with similar dimensions.

The deliveries of turbine components to the site were made in convoys of three to four vehicles at a time, and mostly at night when roads are quietest. Convoys were accompanied by escorts at the front and rear operating a "stop and go" system. Although the turbine delivery vehicles are large, they did not prevent other road users or emergency vehicles passing, should the need arise. The delivery escort vehicles ensured the turbine transport was carried out in a safe and efficient manner with minimal delay or inconvenience for other road users.

No section of the local road network was closed during transport of turbines, although there was some delays to local traffic at pinch points. All deliveries comprising abnormally large loads were made outside the normal peak traffic periods to avoid disruption to work and school-related traffic.

Prior to the Transport Management Plan being finalised, a full dry run of the transport operation along the route was completed using vehicles with attachments to simulate the dimensions of the wind turbine transportation vehicles. The Transport Management Plan was submitted to Cork County Council as part of a permit application for the delivery of abnormal loads using the local roads under the Road Traffic (Special Permits for Particular Vehicles) Regulations 2007. The Transport Management Plan provided for all necessary safety measures, including a convoy and Garda escort as required, off-peak turning/reversing movements and any necessary safety controls.

An updated Traffic Management Plan has been prepared for the decommissioning phase and is included in the Decommissioning Plan (Appendix 4-9)

4.5 Site Drainage

4.5.1 Introduction

The protection of the watercourses within and surrounding the site, and downstream catchments that they feed was of utmost importance in considering the most appropriate drainage proposals for the site of the Cleanrath wind farm development. The drainage design proposed prior to construction was prepared with the intention of having no negative impact on the water quality of the site and its associated natural watercourses, and consequently no impact on downstream catchments and ecological ecosystems. No routes of any natural drainage features were altered as part of the Cleanrath wind farm development. Turbine locations and associated roadways were originally selected to avoid natural watercourses as much as possible, and existing roads were used where possible. There was no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows or directly into artificial drainage ditches following the installation of silt traps, check dams and/or stilling ponds to these ditches as well as an extensive network of silt fencing. All discharges, over land, from the works areas were made over vegetation filters or through silt fencing at a minimum of 50 metres distance from natural watercourses. Buffer zones around the existing natural drainage features informed, wherever possible, the layout of the Cleanrath wind farm development. Where infrastructure existed within 50 metres of a natural watercourse, appropriate buffer were maintained between the watercourse and the works area where possible to ensure the protection of the water quality of the natural watercourse.

4.5.2 Existing Drainage Features

The routes of any natural drainage features were not altered as part of the Cleanrath wind farm development. Turbine locations were selected to avoid natural watercourses. The Cleanrath wind farm development has also been constructed to require only one new watercourse crossings. Some new or extended culverts were required under existing roadways to manage drainage waters and were sufficiently sized to accommodate peak flows from storm events.

There were no direct discharges to natural watercourses. All discharges from the works areas or from interceptor drains are made over vegetated ground at a minimum of 50 metres distance from natural watercourses, or directly into artificial drainage ditches but only after silt traps, check dams and/or stilling ponds have been added to these drainage ditches along with silt fencing running adjacent. Buffer zones around the existing natural drainage features informed the layout of the Cleanrath wind farm development and are indicated on the drainage design drawings.

Where artificial drains were in place in the vicinity of works areas, some drain diversions around the works areas were required to minimise the amount of water in the vicinity of works areas will have been installed. Where it was not be possible to divert artificial drains around the works areas, the drains were blocked to ensure potentially sediment laden water from the works areas had no direct route to other watercourses. Where drains were blocked, the blocking only took place after an alternative drainage system to handle the same water had been put in place.

Existing artificial drains in the vicinity of existing site roads were maintained in their original location where possible. Where these artificial drains received drainage water from works areas, check dams were added where necessary (as specified below) to control flows and sediment loads in these existing artificial drains. Where road widening or improvement works were necessary along the existing roads, the works took place on the opposite side of the road to the drain, where possible.

4.5.3 Drainage Design Principles

The key principles of drainage design that were implemented and adhered to as part of the Cleanrath wind farm development are as follows:

- Keep clean water clean by intercepting it where possible, upgradient of works areas, and divert it around the works areas for discharge as diffuse overland flow or for rewetting of land.
- Collect potentially silt-laden runoff from works areas via downgradient collector drains and manage via series of avoidance, source, in-line, treatment and outfall controls prior to controlled diffuse release as overland flow or for rewetting of land.
- No direct hydraulic connectivity from construction areas to watercourses, or drains connecting to watercourses.
- Maintain 50-metre watercourse buffer zones for the wind turbines and associated infrastructure where no works-related activities will take place, except in case of existing watercourse crossings or the single new watercourse crossing, where additional mitigation measures were installed.
- No alteration of natural watercourses.
- Maintain the existing hydrology of the site.
- Blocking of existing manmade forestry drainage as appropriate.
- Daily inspection and recording of surface water management system by on-site clerk of works and immediate remedial measures to be carried out as required and works temporarily ceased if a retained stormwater/sediment load is identified to have the potential to migrate from the site.
- Use of siltbuster & flocculants if required

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

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

A schematic line drawing of the drainage design is presented in Figure 4-8 below.

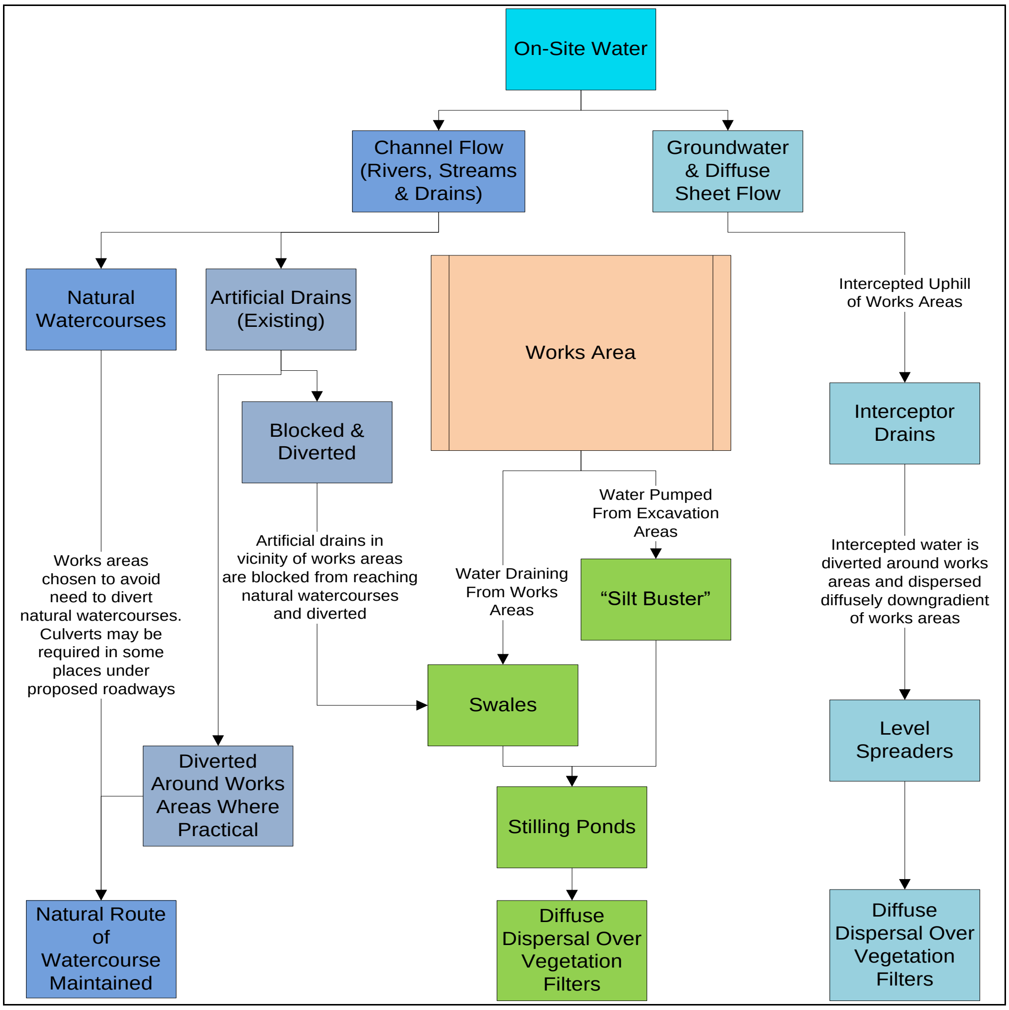


Figure 4-8 Cleanrath wind farm development Drainage Process Flow

4.5.4 References

The drainage design was been prepared based on experience of the project team of other wind energy developments and sites in similar environments, and the best practice guidance documents outlined in Chapter 9 of this rEIAR.

4.5.5 Drainage Design

A detailed drainage design for the Cleanrath wind farm development has been prepared and is included in Appendix 4-1 to this rEIAR. The drainage design employed includes various combinations/adaptations of the run-off control and drainage management measures at the site depending on the local conditions and topography which are further described below.

4.5.5.1 Interceptor Drains

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

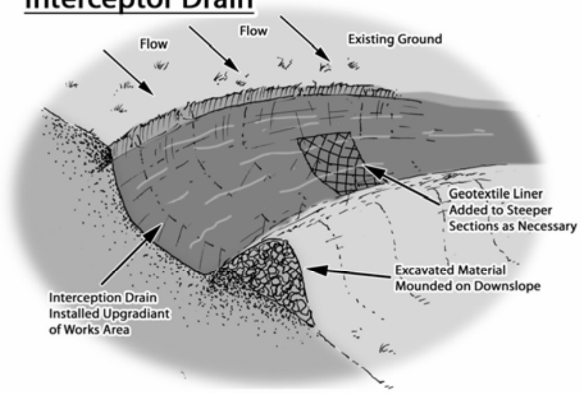
The interceptor drains were installed in advance of any main construction works commencing. The material excavated to make the drain was compacted on the downslope edge of the drain to form a diversion dike. Any areas in which works were carried out to construct roads, turbine bases or hardstands, were built up with large grade hardcore, which even when compacted in place, will retain sufficient void space to allow water to infiltrate the subsurface of these constructed areas. Roadways or other installed site infrastructure did not intercept ground-conveyed surface water runoff to any significant extent that would result in scouring or over-topping or spill over. Interceptor drains have been retained in certain locations, for example where roadways were installed on slopes, to prevent the roadways acting of conduits for water that might infiltrate the roadway sub-base. In these cases, interceptor drains were maintained in localised areas along the roadway with culverts under the roadway, which allows the intercepted water to be discharged to vegetation filters downgradient of the roadway.

Figure 4-9 below shows an illustrative drawing of an interceptor drain.

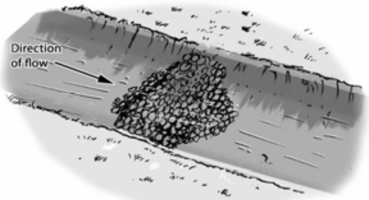
The velocity of flow in the interceptor drains was controlled by check dams (see Section 4.6.5.3 below), which were installed at regular intervals along the drains to ensure flow in the channel is non-erosive. On steeper sections where erosion risks are greater, a geotextile membrane was added to the channel.

Interceptor drains were installed horizontally across slopes to run in parallel with the natural contour line of the slope. Intercepted water travelled along the interceptor drains to areas downgradient of works areas, where the drain terminates at a level spreader (see Section 4.6.5.4 below). Across the entire length of the interceptor drains, the design elevation of the water surface along the route of the drains was not be lower than the design elevation of the water surface in the outlet at the level spreader.

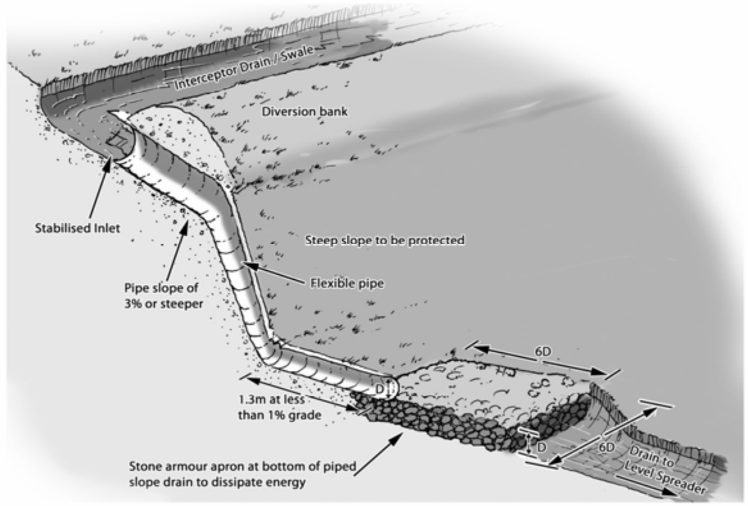
Interceptor Drain



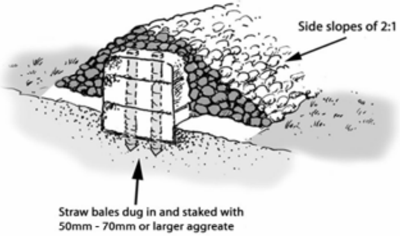
Check Dam (Stone Dam in Drain)



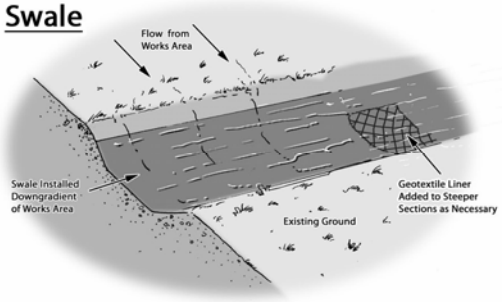
Slope Pipe Drain



Check Dam
(Straw Bale & Stone Dam - Cross Section)

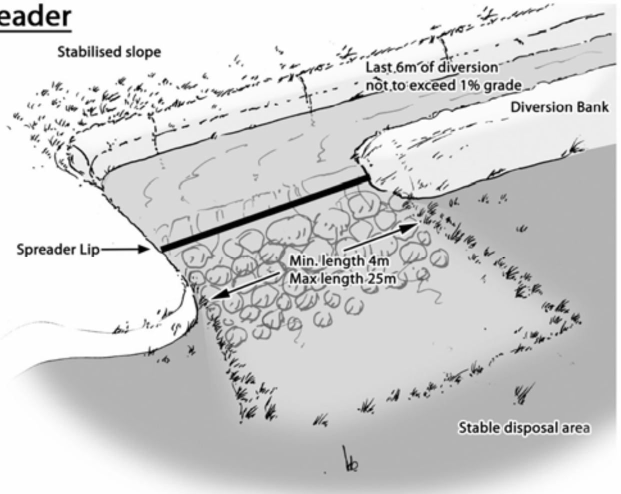


Swale

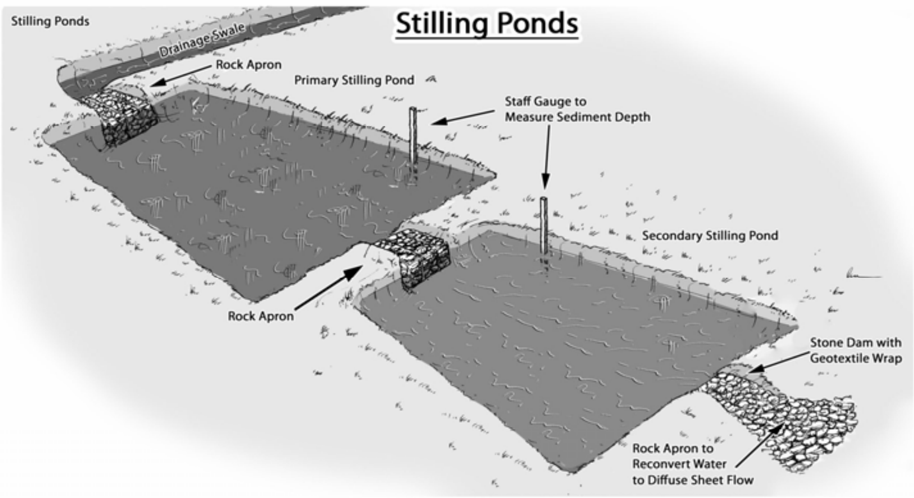


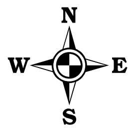
Drainage Design Measures

Level Spreader



Stilling Ponds





MAP TITLE: Drainage Design Measures		MAP NO.: Figure 4-9	SCALE: n/a
PROJECT TITLE: Cleanrath Wind Farm Development			DATE: 12-08-2020
DRAWING BY: Owen Cahill	CHECKED BY: Michael Watson	ISSUE NO.:191223-a-2020.08.12-F	

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4.5.5.2 Swales

Drainage swales are shallow drains that were used to intercept and collect run off from construction areas of the site during the construction phase. Drainage swales remain in place to collect runoff from roads and hardstanding areas of the Cleanrath wind farm development during the operational phase. A swale is an excavated drainage channel located along the downgradient perimeter of construction areas, used to collect and carry any sediment-laden runoff to a sediment-trap and stabilised outlet. Swales are proven to be most effective when a dike is installed on the downhill side. They are similar in design to interceptor drains and collector drains described above. Figure 4-9, below, shows an illustrative example of a drainage swale.

Drainage swales were installed downgradient of any works areas to collect surface flow runoff where it might have come into contact with exposed surfaces and picked up silt and sediment. Swales intercepted the potentially silt-laden water from the excavations and construction areas of the site and prevented it reaching natural watercourses.

Drainage swales were installed in tandem with the road construction works. The material excavated to make the swale was compacted on the downslope edge of the drain to form a diversion dike where appropriate.

4.5.5.3 Check Dams

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

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

The check dams were made up of straw bales or stone, or a combination of both depending on the size of the drainage swale it was installed in. Where straw bales are to be used, they were secured to the bottom of the drainage swale with stakes. Clean 4-6 inch stone were built up on either side and over the straw bale to a maximum height of 600mm over the bottom of the interceptor drain. In smaller channels, a stone check dam was installed and pressed down into place in the bottom of the drainage swale with the bucket of an excavator.

Plate 4-13 shows an example of check dams on site during construction.

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

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

Check dams are designed to reduce velocity and control erosion and are not specifically designed or intended to trap sediment, although sediment is likely to build up. Excess sediment build up behind the dams was removed where necessary. Check dams were inspected and maintained regularly to ensure adequate performance. Maintenance checks also ensured the centre elevation of the dam remained lower than the sides of the dam.

Plate 4-13 Check Dam constructed with stone, straw bales and terram forming a long stilling pond

4.5.5.4 Level Spreaders

A level spreader was constructed at the end of each interceptor drain to convert concentrated flows in the drain, into diffuse sheet flow on areas of vegetated ground where required. The levels spreaders were located downgradient of any works areas in locations ensuring that they did not contribute further to water ingress to construction areas of the site.

The water carried in interceptor drains did not have come in contact with works areas of the site, and therefore was free of silt and sediment. The level spreaders distributed clean drainage water onto vegetated areas where the water was not be reconcentrated into a flow channel immediately below the point of discharge. The discharge point was on level or only very gently sloping ground rather than on a steep slope so as to prevent erosion. Figure 4-9, above, shows an illustrative example of a level spreader.

The slope in the channel leading into the spreader was less than or equal to 1%. The slope downgradient of the spreader onto which the water dissipated had a grade of less than 6%. The topography of the site determined the locations of level spreaders.

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

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

4.5.5.5 Vegetation Filters

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

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

Vegetation filters were not used in isolation for waters that were likely to have higher silt loadings. In such cases, silt-bearing water had already passed through stilling ponds or silt fencing prior to diffuse discharge to the vegetation filters via a level spreader.

4.5.5.6 Stilling Ponds

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

Stilling ponds were excavated/constructed at each required location as two separate ponds in sequence, a primary pond and a secondary pond. The points at which water enters and exits the stilling ponds was stabilised with rock aprons, which trapped sediment, dissipated the energy of the water flowing through the stilling pond system, and prevented erosion. The primary stilling pond reduced the velocity of flows to less than 0.5 metres per second to allow settlement of silt to occur. Water then passed from the primary pond to the secondary pond via another rock apron. The secondary stilling pond reduced the velocity of flows to less than 0.3 metres per second. Water flowed out of the secondary stilling pond through a stone dam, partially wrapped in geo-textile membrane, which controlled flow velocities and trapped any sediment that had not settled out. Plate 4-13, above, shows an example of a long stilling pond system from site during construction with installed check dams.

Water flowed by gravity through the stilling pond system. The stilling ponds were sized according to the size of the area they were receiving water from but were sufficiently large to accommodate peak flows storm events. The stilling ponds were dimensioned so that the length to width ratio was greater than 2:1, where the length is the distance between the inlet and the outlet. Where ground conditions allowed, stilling ponds were constructed in a wedge shape, with the inlet located at the narrow end of the wedge. Each stilling pond was a minimum of 1-1.5 metres in depth. Deeper ponds were used to minimise the excavation area needed for the required volume.

The embankment that formed the sloped sides of the stilling ponds were stabilised with vegetated turves, which had been removed during the excavation of the stilling ponds area.

Stilling ponds were located towards the end of swales, close to where the water was reconverted to diffuse sheet flow. Upon exiting the stilling pond system, water was immediately reconverted to diffuse flow via a fan-shaped rock apron where there was adequate space and ground conditions. Alternatively, a swale was used to carry water exiting the stilling pond system to a level spreader to reconvert the flow to diffuse sheet flow.

4.5.5.7 Silt Bags

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

Dewatering silt bags are an additional drainage measure that were used downgradient of the stilling ponds at the end of the drainage swale channels and were located, wherever it was deemed appropriate, throughout the site. The water flows via a pipe from the stilling ponds into the silt bag and through the geotextile fabric and traps any of the finer silt and sediment remaining in the water after it will have gone through the previous drainage measures. The dewatering silt bags ensured that there was no loss of peaty silt into the stream.

The dewatering silt bags used were approximately 3 metres in width by 4.5 metres (see Plate 4-14 and Plate 4-15 below) in length and capable of trapping approximately four tonnes of silt. The dewatering silt bag, when full, was removed from site by a waste contractor with the necessary waste collection permit, who then transported the silt bag to an appropriate, fully licensed waste facility.

Plate 4-14 Silt Bag with water being pumped through

Plate 4-15 Silt bag under inspection

4.5.5.8 Watercourse Crossings

The Cleanrath wind farm development works included some bridge upgrade/strengthening works for two bridges. The existing bridge over the Toon river along the access road in the north of the site in the townland of Cleanrath North required strengthening to accommodate the heavy loads that would traverse the bridge during construction. The strengthening works involved the provision of precast concrete slabs spanning across the deck of the bridge. Steel rods were also installed through the parapet walls to increase the load capacity of the bridge. On the cable route, upgrade works were required at the existing bridge in the townland of Gurteenflugh. The works included the provision of two precast concrete panel parapets to replace the existing parapet walls. These works were completed to accommodate the installation of cabling across the bridge and the associated excavations required the details of which are summarised in Section 4.8 below. The works were completed from a scaffolding deck which spanned across the watercourse. The decking of the scaffolding was sealed with a plastic covering to collect all dust and debris and prevent it from entering the watercourse thereby ensuring that water quality was not impacted during these bridge works

A number of new culverts and existing culvert upgrades were required for the Cleanrath wind farm development. Some culverts were installed to manage drainage waters from works areas of the Cleanrath wind farm development, particularly where the waters had to be taken from one side of an existing roadway to the other for discharge and were suitably sized for the expected peak flows in the watercourse. The size of culverts was influenced by the depth of the track or road sub-base. In some cases, two or more smaller diameter culverts were used where this depth is limited, though this was avoided as they have a higher associated risk of blockage than a single, larger pipe. In all cases, culverts were oversized to allow mammals to pass through the culvert.

Culverts were installed with a minimum internal gradient of 1% (1 in 100). Smaller culverts used a polyethylene pipe which had a smooth internal surface. Large stone was used downstream side of culverts where required to interrupt the flow of water to help dissipate its energy and help prevent problems of erosion. Smaller water crossings consisted of an appropriately sized pipe buried in the sub-base of the road at the necessary invert level to ensure ponding or pooling does not occur above or below the culvert and water can continue to flow as necessary.

All culverts were inspected regularly during the construction phase to ensure they were not blocked by debris, vegetation or any other material that may impede conveyance.

4.5.5.9 Silt Fences

Silt fences were installed as an additional water protection measure around existing watercourses in certain locations, particularly where works were within the 50-metre buffer zone of a stream or 100m buffer zone of a lake, which was inevitable where existing roads in proximity to watercourses were to be upgraded as part of the Cleanrath wind farm development. These areas included around existing culverts, around the headwaters of watercourses. The locations are indicated on the detailed drainage design drawings included in Appendix 4-1 with examples from site in Plates 4-16 & 4-17. Silt fencing was also used as a means of run-off control in areas where a drainage swale could not be excavated due to the rocky outcrops or unsuitable terrain. In these areas, the embedding of the silt fence was replaced by sandbagging. The sandbags acted as a barrier to direct water run-off through the silt fence.

All silt fencing was formed using Terrastop Premium or equivalent silt fence product.

Site fences were inspected regularly to ensure water continued to flow through the fabric, and the fence was not coming under strain from water backing up behind it.

Plate 4-16 Embedded Silt Fence installed down slope of works area

Plate 4-17 Silt Fence adjacent to site road

4.5.6 Forestry Felling Drainage

The Cleanrath wind farm development only required the felling of a very small area of forestry, relative to the overall area of the site. Tree felling to facilitate the Cleanrath wind farm development was not be undertaken simultaneously with construction groundworks. Keyhole felling to facilitate construction works took place prior to groundworks commencing. Some further felling took place after all groundworks had been completed.

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

- Attend the site for the setup period when drainage protection works were being installed and be present on site during the remainder of the forestry keyhole felling works.
- Prior to the commencement of works, review and agree the positioning by the Operator of the required Aquatic Buffer Zones (ABZs), silt traps, silt fencing (see below), water crossings and onsite storage facilities for fuel, oil and chemicals (see further below).
- Be responsible for preparing and delivering the Environmental Toolbox Talk (TBT) to all relevant parties involved in site operations, prior to the commencement of the works.
- Conduct daily and weekly inspections of all water protection measures and visually assess their integrity and effectiveness in accordance with Section 3.4 (Monitoring and Recording) and Appendix 3 (Site Monitoring Form (Visual Inspections)) of the Forestry & FPM Requirements.
- Where appropriate, take representative photographs showing the progress of operation the integrity and effectiveness of the water protection measures as necessary.
- Collect water samples for analysis by a third party accredited laboratory, adhering to the following requirements:
    - Surface water samples shall be collected upstream and downstream of the keyhole felling site at suitable sampling locations.

- Sampling shall be taken from the stream / riverbank, with no in-stream access permitted.
- The following minimum analytical suite shall be used: pH, EC, TSS, BOD, Total P, Ortho-P, Total N, and Ammonia.

- Review of operator's records for plant inspections, evidence of contamination and leaks, and drainage checks made after extreme weather conditions.
- Prepare and maintain a contingency plan.
- Suspend work where potential risk to water from siltation and pollution is identified, or where operational methods and mitigation measures are not specified or agreed.
- Prepare and maintain a Water Protection Measure Register. This document is to be updated weekly by the ECoW.

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

- Works overseen by an ECoW as described above.
- The extent of all necessary tree felling was identified and demarcated with markings on the ground in advance of any felling commencing.
- All roads and culverts were inspected prior to any machinery being brought on site to commence the felling operation. No tracking of vehicles through watercourses occurred. Vehicles only used existing road infrastructure and established watercourse crossings.
- Existing drains that drained an area to be felled towards surface watercourses were blocked, and temporary silt traps constructed to ensure collection of all silt within felling areas. These temporary silt traps were cleaned out and backfilled once felling works were complete. This ensured there was no residual collected silt remaining in blocked drains after felling works were completed. No direct discharge of such drains to watercourses occurred from within felling areas.
- New collector drains and sediment traps were installed during ground preparation to intercept water upgradient of felling areas and divert it away. Collector drains were excavated at an acute angle to the contour (0.3%-3% gradient), to minimise flow velocities.
- All silt traps were sited outside of buffer zones and have no direct outflow into the aquatic zone. Machine access was maintained to enable the accumulated sediment to be excavated. Sediment was carefully disposed of away from all aquatic zones.
- All new collector drains were tapered out before entering the aquatic buffer zone to ensure the discharging water gently fanned out over the buffer zone before entering the aquatic zone.
- Machine combinations were chosen which are most suitable for ground conditions at the time of felling which minimised soils disturbance;
- Mechanised operations were suspended during and immediately after heavy rainfall.
- Where brash was required to form brash mats, it was laid out at harvesting stage to prevent soil disturbance by machine movement.
- Brash which had not been pushed into the soil was moved within the site to facilitate the creation of mats in more demanding locations.
- Felling of trees was pointed directionally away from watercourses.
- Felling was planned to minimise the number of machine passes in any one area.
- Extraction routes, and hence brash mats, were aligned parallel to the ground contours where possible.
- Harvested timber was stacked in dry areas, and outside any 50-metre watercourse buffer zone. Straw bales and check dams were emplaced on the down gradient side of timber storage sites.

- Branches, logs or debris were not be allowed to build up in aquatic zones. All such material was removed when harvesting operations were completed but removing of natural debris deflectors was avoided.

4.5.7 Borrow Pit Drainage

The borrow pit excavation on the site did not extend significantly below the adjacent access road level. Rock was excavated similar to the cut operations completed throughout the site as part of the cut and fill for access roads and turbine hardstand areas. While surface water run-off will have originated from the borrow pit areas, it was collected and managed by the drainage system installed to captures run off from the adjacent access road i.e. drainage swale and subsequent treatment in a stilling pond.

Interceptor drains were also installed upgradient of the borrow pit area before extraction commenced to control ingress of clean water into the borrow pit area.

4.5.8 Cable Trench Drainage

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

To efficiently control drainage runoff from cable trench works areas, excavated material was stored on the upgradient side of the trench. Where rainfall caused runoff from the excavated material, the material was contained in the downgradient cable trench. Excess subsoil was removed from the cable trench works area immediately upon excavation and used for landscaping and reinstatement of other areas elsewhere on site. Excess material was transported off site to an appropriately licensed facility.

On steeper slopes, silt fences, as detailed in Section 4.6.5.9, above, were installed temporarily downgradient of the cable trench works area, or on the downhill slope below where excavated material was being temporarily stored to control run-off.

4.5.9 Site and Drainage Management

4.5.9.1 Preparative Site Drainage Management

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

4.5.9.2 Pre-emptive Site Drainage Management

The works programme for the groundworks element of the construction phase of the Cleanrath wind farm development also took account of weather forecasts, and predicted rainfall in particular. Large excavations, large movements of overburden or large scale overburden or soil stripping was suspended or scaled back if heavy rain was forecast. The extent to which works were scaled back or suspended related directly to the amount of rainfall forecast.

4.5.9.3 Reactive Site Drainage Management

The final drainage design prepared for the Cleanrath wind farm development prior to commencement of construction provided for reactive management of drainage measures. The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas were monitored continuously by the ECoW or supervising hydrologist on-site who responded to changing weather, ground or drainage conditions. This often resulted in a requirement for the installation of additional check dams, interceptor drains or swales as deemed necessary on-site. The drainage design was modified on the ground as necessary as outlined above in whatever combinations were deemed to be most appropriate to the situation on the ground at that particular time.

4.5.9.4 Drainage Maintenance

An inspection and maintenance plan for the drainage system onsite was prepared in advance of commencement of any works on the Cleanrath wind farm development. Regular inspections of all installed drainage features were necessary, especially after heavy rainfall, to check for blockages, and ensure there was no build-up of standing water at parts of the systems where it is not intended. The inspection of the drainage system was the responsibility of the ECoW and the supervising hydrologist.

If necessary, any excess sediment build up behind check dams was removed. For this reason, check dams were inspected and maintained weekly during the construction phase of the Cleanrath wind farm development and following significant rainfall events to ensure adequate performance. Maintenance checks also ensured the centre elevation of the dam remained lower than the sides of the dam.

Any scouring around the edges of the check dams or overtopping of the dam in normal flow conditions was rectified by reinforcement of the check dam.

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

Silt traps were inspected weekly during the construction phase of the Cleanrath wind farm development and following significant rainfall events. Inlet and outlets were checked for sediment accumulation and anything else that may have interfered with flows.

The frequency of drainage system inspections was reduced following completion of the construction phase of the Cleanrath wind farm development. The project hydrologist inspected and reviewed the drainage system after construction had been completed to provide guidance on the requirements of an operational phase drainage system the details of which are provided in Chapter 9 and the Operation and Environmental Management Plan (Appendix 4-8).

4.6 Construction Management

4.6.1 Construction Timing

Construction commenced on the Cleanrath wind farm development took approximately 16 months from stating on site to the commissioning of the electrical system.

4.6.2 Construction Sequencing

The construction phase can be broken down into three main phases, 1) civil engineering works including grid connection works - 8 months, 2) electrical works including grid connection cabling - 4 months, and 3) turbine erection and commissioning - 4 months. The main task items under each of the three phases are outlined below.

Civil Engineering Works

- Clear and hardcore area for temporary site offices. Install same.
- Install drainage infrastructure, culverts etc. integral to road construction.
- Construct new site roads and hard-standings and crane pads.
- Excavate for turbine bases. Store soil locally for backfilling and re-use. Place blinding concrete to turbine bases. Fix reinforcing steel and anchorage system for tower section. Construct shuttering. Fix any ducts etc. to be cast in. Pour concrete bases. Cure concrete. Remove shutters after 1-2 days.
- Excavate and install cable ducting and joint bays on the grid connection route.

Electrical Works

- Construct bases/plinths for transformer.
- Excavate trenches for site cables, lay cables and backfill. Provide ducts at road crossings.
- Erect transformers at compound.
- Erect fencing at transformer compound.
- Install cabling in the ducting on the grid connection route.

Turbine Erection and Commissioning

- Erect towers, nacelles and blades.
- Backfill tower foundations and cover with previously stored topsoil.
- Complete electrical installation.
- Grid connection.
- Commission and test turbines.
- Complete site works, reinstate site.
- Remove temporary site offices. Provide any gates, landscaping, signs etc. which may be required.

The phasing and scheduling of the main construction task items are outlined in Figure 4-10 below, where 1st September 2018 being the start date for construction activities.

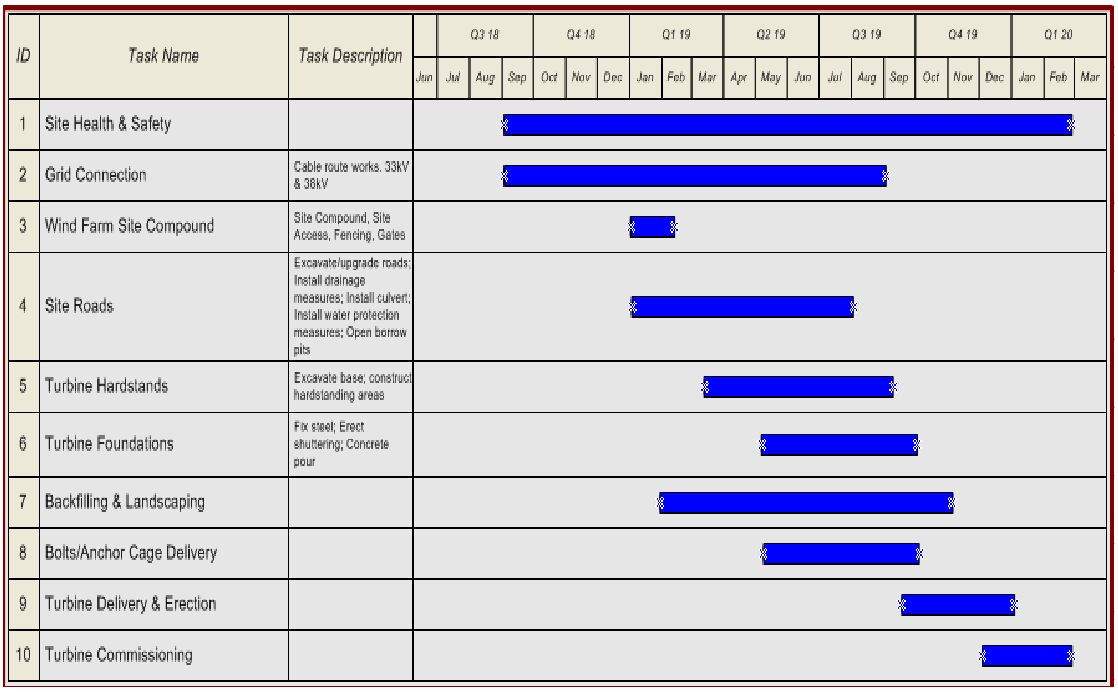


Figure 4-10 Construction Schedule

4.6.3 Construction Phase Monitoring & Oversight

A Construction and Environmental Management Plan (CEMP) was prepared in advance of any construction works commencing on the Cleanrath wind farm development and submitted for agreement to the Planning Authority. The procedures for the implementation of the mitigation measures are outlined in the CEMP and their effectiveness and completion was typically monitored by the Environmental Clerk of Works.

The on-site construction staff were responsible for implementing the mitigation measures specified in the CEMP. Their implementation was overseen by supervising hydrogeologists, environmental scientists, ecologists or geotechnical engineers, depending on who was best placed to advise on the implementation. The system of auditing outlined in the CEMP ensures that the mitigation measures were maintained for the duration of the construction phase, and into the operational phase where necessary.

4.7 Construction Methodologies

4.7.1 Turbine Foundations

Each of the turbines erected on site has a reinforced concrete base. Overburden was stripped off the foundation area to a suitable formation using a 360°excavator. A five metre wide working area was required around each turbine base, with the sides of the excavated areas sloped sufficiently to ensure a safe working area can be provided. Material excavated to create the working area was stored locally for later reuse in backfilling the working area around the turbine foundation.

The formation material was approved by an engineer as meeting the turbine manufacturer's requirements. Where the formation level was reached at a depth greater than the depth of the foundation, the ground level was then raised with clause 804 hardcore material, compacted in 250 millimetres (mm) layers, with sufficient compacted effort (i.e. compacted with seven passes using 12 tonne roller). Drainage measures were installed to protect the formation by forming an interceptor drain around the perimeter of the turbine base which outfalled out at the lowest point level spreader or stilling pond as deemed necessary in line with what the site terrain could accommodate.

An embankment approximately 600 mm high was constructed around the perimeter of each turbine base and a fence erected to prevent construction traffic from driving into the excavated hole and to demarcate the working area. All necessary health and safety signage was erected to warn of deep excavations etc.

There was a minimum of 100 mm of blinding concrete laid on the formation material positioned using concrete skip and 360° excavator to protect ground formation and to give a safe working platform.

A 360° excavator with suitable approved lifting equipment were used to unload sections of the anchor cage and reinforcing steel to required areas. The anchor cage was positioned in the middle of the turbine base and assembled accordingly. When the anchor cage was in its final position it is checked and levelled by using an appropriate instrument. The anchor cage was positioned 250mm – 300mm from formation level by use of adjustable legs. Reinforcement bars are then placed around the anchor cage, first radial bars, then concentric bars, shear bars and finally the superior group of bars. Earthing material is attached during the steel foundation build up. The level of the anchor cage was checked again prior to the concrete pour and during the concrete pour

Formwork to concrete bases was propped/supported sufficiently so as to prevent failure. Concrete for bases was poured using a concrete pump. Each base was poured in three stages. Stage 1 saw the outside perimeter of the foundation being poured and this was brought up to a level of approximately one metre up the formwork. Stage 2 saw the concrete being poured into the can to bring the concrete up to the required level inside the can. Stage 3 saw the remaining concrete being poured outside the can to bring it up to the required level. After a period of time when the concrete has set sufficiently the top surface of the concrete was finished with a power float.

Once the base had sufficient curing time it was filled with suitable fill up to existing ground level. The working area around the perimeter of the foundation was backfilled and finish material to provide suitable terrain for access around the turbine area.

A formation approval report for the turbine foundations was prepared by the Project Engineers, Ionic Consulting is included in Appendix 4-6

4.7.2 Site Roads and Hardstand Areas

Site roads constructed to each turbine base and at each base a crane hard standing were constructed to the turbine manufacturer's specifications. Tracked excavators completed the excavation for roads with appropriate attachments. The excavations followed a logical route working away from the borrow pit location. A two to three metre wide working area was required around each hard standing area, with the sides of the excavated areas sloped sufficiently to ensure that a safe working area can be provided. Material excavated to create the working area was stored locally for later reuse in backfilling the working area around the turbine foundation and hardstands.

When the formation layer was reached, stone was placed to form the road foundation. The sub grade was compacted with the use of a roller. The final wearing course was not installed until all bases were poured. This prevented damage to the wearing course from stone and concrete trucks movements. The road was upgraded prior to the arrival of the first turbine. All roads were maintained throughout the construction phase of the project.

4.7.3 Derragh Wind Farm Substation

The substation was constructed by the following methodology:

- The area of the substation was marked out using ranging rods or wooden posts.;
- The wind farm control building was also be built within the substation compound;
- The foundations were excavated down to the level indicated by the project engineer. The foundations were shuttered and poured with reinforced concrete. An anti-bleeding admixture was included in the concrete mix;
- The substation was constructed with masonry blockwork. The block work walls were built up from the footings to DPC level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors;
- The block work was then be raised to wall plate level and the gables & internal partition walls formed. Scaffold was erected around the outside of the building for this operation;
- Concrete roof slabs were lifted into position using an adequately sized mobile crane;
- The timber roof trusses will then be lifted into position using a telescopic load all or mobile crane depending on site conditions. The roof trusses were then be felted, battened, tiled and sealed against the weather.
- A rainwater harvesting system was installed to provide the small volume of water required for the operation of the substation and control building.
- The electrical equipment was then installed and commissioned.
- Steel palisade fencing was erected around the substation and control building compound area.

- All wastewater from the staff welfare facilities in the control buildings will pass to a sealed storage tank. The wastewater was transported off site by a waste management contractor holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007 (as amended).

4.7.4 Temporary Construction Compound

The temporary construction compounds was constructed as follows:

- The area to be used as the compound was marked out at the corners using ranging rods or timber posts. Drainage runs and associated settlement ponds were installed around the perimeter as required;
- The compound platform was established using a similar technique as the construction of the site roads as discussed above;
- A layer of geo-grid was installed and compacted layers of well graded granular material was spread and lightly compacted to provide a hard area for site offices and storage containers;
- Areas within the compound were constructed as site roads and used as vehicle hardstandings during deliveries and for parking; and,
- Upon completion of the construction, the temporary construction compound was decommissioned and will be allowed to vegetate naturally.

4.7.5 Grid Connection Ducting

The following construction methodologies were used in the installation of the ducting required to install the grid connection cables between the Cleanrath wind farm development and the Coomataggart ESB Networks substation in the townland of Grousemount Co. Kerry.

4.7.5.1 In Road or Grass Margin Ducting Works

The following methodology was used for the installation of cable ducts within the public road corridor.

- The area where excavations were planned was surveyed and all existing services identified.
- All relevant bodies i.e. ESB, Eir, Cork County Council etc. were contacted and all drawings for all existing services sought.
- A Traffic Management Plan was set up prior to any works commencing.
- A road opening licence was obtained where required and all plant operators and general operatives inducted and informed as to the location of any services.
- A rubber tracked 360-degree excavator was used to excavate the trench to the dimensions specified in the ESB Networks "Specification for the Installation of Ducts and Structures for Underground Power Cables and Communications Cables".
- All excavated material was either removed off-site or if suitable, stockpiled and reused for backfilling where appropriate.
- The trench depth was specified at 1220mm and trench support was not be required, however where depths exceeded 1250mm trench support was installed or the trench sides benched or battered back where appropriate.
- Once the trench was excavated a base layer of 15 N CBM4 concrete was installed and compacted. All concrete was offloaded directly from the concrete truck directly into the trench.
- Ducting was then placed in the trench as per specification, approved cable ties used where required to secure the trefoil ducts together (at 3 meter centres).
- Once the trefoil ducts were installed, couplers were fitted and capped to prevent any dirt etc. entering the duct. In poor ground conditions the end of the trefoil ducts were

shimmed up off of the bed of the trench to prevent any possible ingress of water dirt. The shims were removed once the next length was connected.

- Extreme care was taken to ensure that all duct collars (both ends) were clean and in good condition prior to ducts being joined.
- 15 Newton CBM4 concrete was carefully installed so as not to displace the ducting to the underside of the communications duct and compacted as per approved detail.
- Spacers were used to ensure that the correct cover was achieved at both sides of the trefoil ducting. See Plate 4-18
- ESB marker board was fitted above the trefoil ducting.
- The Communication duct was fitted and kept to one side of the trench ensuring that the minimum cover was achieved and 15 Newton CBM4 concrete was placed to the specified cover and compacted, see Plate 4-18.
- ESB red marker board was installed and the remainder of trench was backfilled in two compacted layers with approved material (lean mix concrete/clause 804).
- Yellow marker tape was installed as per approved detail specifications, 300 mm maximum below finished road/ground level.
- Where the cable route runs along grass margin topsoil was permanently reinstated where required or Clause 804 stone used to finish the trench on grass margins where appropriate to give a more trafficable surface.
- Road finish: Where the cable route runs within the carriageway of a road, the excavated area was resurfaced and finished to the requirements of the Roads Authority.

Plate 4-18 Cable Trench with Trefoil Ducting Arrangement

4.7.5.2 Road Crossing

The following methodology was used for the installation of cable ducts require a road crossing within the public road corridor.

- A Traffic Management Plan was set up prior to any works commencing.
- The area where excavations were planned were surveyed and all existing services identified
- A road opening licence was obtained where required and any conditions complied with.
- The road was cut to the required width of trench using road saw.
- A truck was used to remove excavated material from work area.
- A rubber tracked 360-degree excavator was used to excavate the trench to the dimensions specified in the ESB Networks manual for the ''Specification for the Installation of Ducts and Structures for Underground Power Cables and Communication Cables''.
- Trench support was installed where required.
- All excavated material from road crossing was removed off site to an approved tip or if suitable stored for reuse.

- A base layer of 15 Newton CBM4 concrete was installed and compacted.
- Ducting was then be placed in the trench as per specification and approved cable ties used where required to secure trefoil ducts together (at 3 meter centres).
- Extreme care was taken to ensure that all duct collars (both ends) were clean and in good condition prior to ducts being joined.
- The ducting was then surveyed for both level and grid location using a total station/GPS.
- 15 Newton CBM4 concrete was carefully installed to the underside of the communications ducts and compacted.
- ESB marker board was then be placed at this level in the trench.
- Communication ducts was then be fitted and backfilled to the correct level with 15 Newton concrete and spacer boards to ensure correct cover is achieved.
- ESB marker board was installed again at this level and the remainder of trench backfilled in two compacted layers of 15 Newton CBM4 concrete / Clause 804 material.
- Yellow marker tape was installed at a maximum of 300 mm from the finished road level.
- The road surface was temporarily reinstated with a blinding layer/cold mix tarmacadam.
- The road surface was then be permanently reinstated at a later date (typically 2 – 3 weeks but may have been longer as determined by cold weather).
- Marker Posts denote all changes in cable direction.

4.7.5.3 Existing Underground Services

Any underground services encountered along the cable route were surveyed for level and the ducting passed over the service provided adequate cover was available. The methodology as outlined above for the laying of grid connection ducting may have been amended slightly where existing services were encountered and had to be passed over or under with the cable ducting. A minimum clearance of 300mm was required between the bottom of the ducts and the service in question. If the clearance could not be achieved then the ducting passed under the service ensuring 300 mm clearance between the top of the communications duct and bottom of the service. Plate 4-19 shows an example of the cable duct passing under an existing service/piped culvert. In deeper excavations an additional layer of marker tape was installed between the communications duct and top level yellow marker tape. Where the required separation distances could not be achieved then a number of alternative options such as using steel plates laid across the width of the trench and using 15N concrete surrounding the ESB ducts where adjacent services were within 600mm, with marker tape on the side of the trench. Back fill around any utility services was completed with dead sand/pea shingle where appropriate. All excavations were kept within the roadway boundaries, i.e. in road or grass margin.

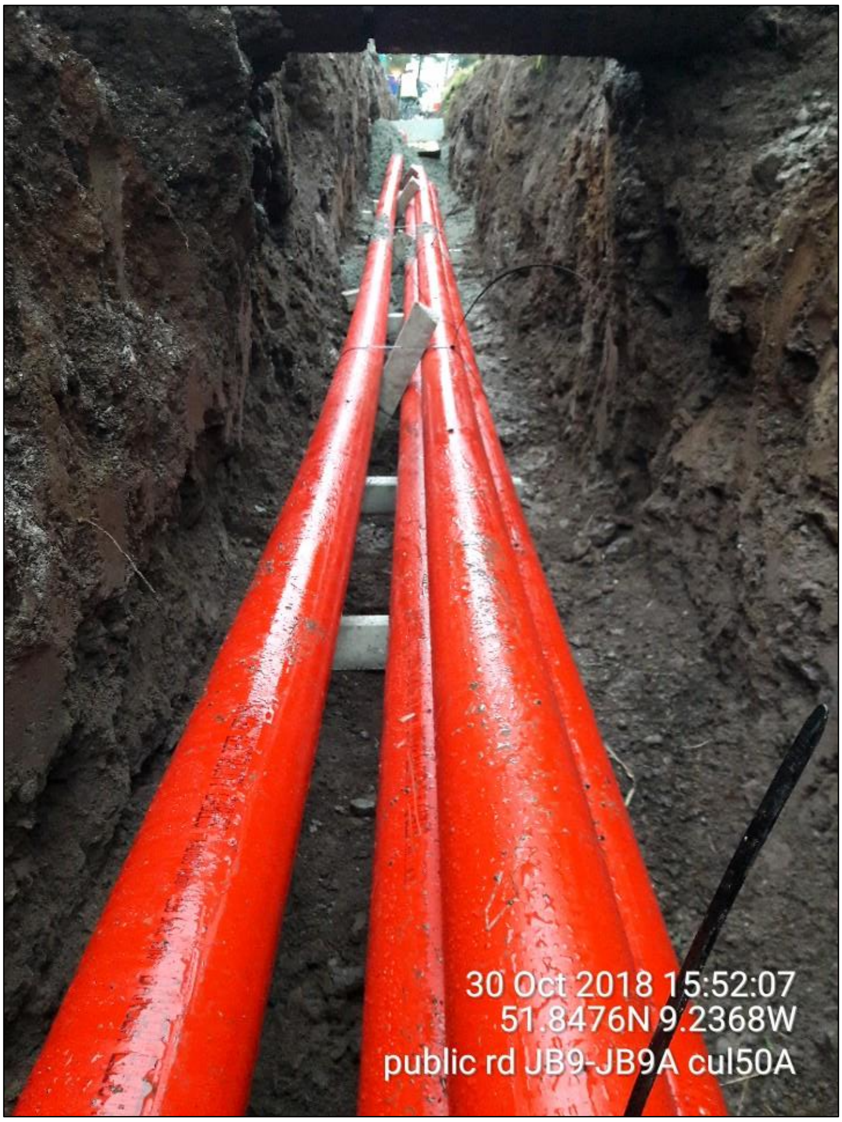


Plate 4-19 Cable ducting passing under existing services in the trench

4.7.5.4 Joint Bays

Joint bays are pre-cast concrete chambers where lengths of 38kV cable were joined to form one continuous cable. They are located at various points along the ducting route approximately every 600-1,000 metres. Where possible, joint bays were located in areas where there is a natural widening/wide grass margin on the road in order to accommodate easier construction, cable installation and create less traffic congestion. During construction the joint bay locations were completely fenced off and were incorporated into the traffic management system. Once constructed they were backfilled temporarily until cables were installed.

On the 33kV section of cabling, an alternative to pre-cast joint bays were used for cable joint due to the ducting arrangement. The sections along the cable route where jointing was completed were excavated to expose the ducting. The excavation was large enough to accommodate the operatives undertaking the cable jointing with their works area protected by sandbags. On completion of the jointing, the excavation was backfilled and the road surface and verge restored to its original condition.

4.7.5.5 Watercourse/Drain Crossings

There are a total of 13 no. natural watercourse crossings along the grid connection cable route, and a further 113 no. artificial drain crossings. The construction methodology was designed to eliminate the requirement for in-stream works at all stream crossings.

Prior to construction, the grid connection route was assessed in terms of watercourse crossings with a view to establishing the location and type of all existing crossings and allow for an appropriate crossing methodology to be selected. Where watercourses or drain culverts were encountered along the grid connection route, a number of crossing methodologies were considered. The locations are mapped in Figure 4-11. Where the crossing comprised a stone culvert where the structural integrity of the culvert was likely compromised, works to replace these culverts was undertaken in consultation with the Area Engineer, Cork County Council. This involved replacing the culvert with a suitably sized polyethylene pipe. Where this was undertaken, the works were completed by damming and overpumping any water within the drainage channel to avoid sedimentation of the water channel, many of the drains were dry during the ducting installation.

The methodologies used for the installation of the cabling at these locations is set in Appendix 4-7, which provides a summary of the culvert survey and description of works completed at the culvert crossings. It is further summarised below and outlined in the CEMP, included as Appendix 4-4 of this rEIAR.

4.7.5.5.1 *Crossings over Culverts using Standard Trefoil Formation – Option 1*

In the majority of watercourse crossings, the watercourse was not disturbed because no instream works or bridge/culvert alterations were required. Where there was adequate cover above a culvert, the standard ESB approved trefoil arrangement was used where the cable ducts passed over a culvert without any contact with the existing culvert or water course. The cable trench passed over the culvert in a standard trench as outlined in Appendix 4-1 .

4.7.5.5.2 *Trefoil Formation under Piped Culvert Crossings – Option 2*

Where the culvert consisted of a socketed concrete or sealed plastic pipe without adequate cover over the pipe to allow a trench pass over the crossing then a trench was excavated beneath the culvert and cable ducts passed under the sealed pipe as outlined in Appendix 4-1 .

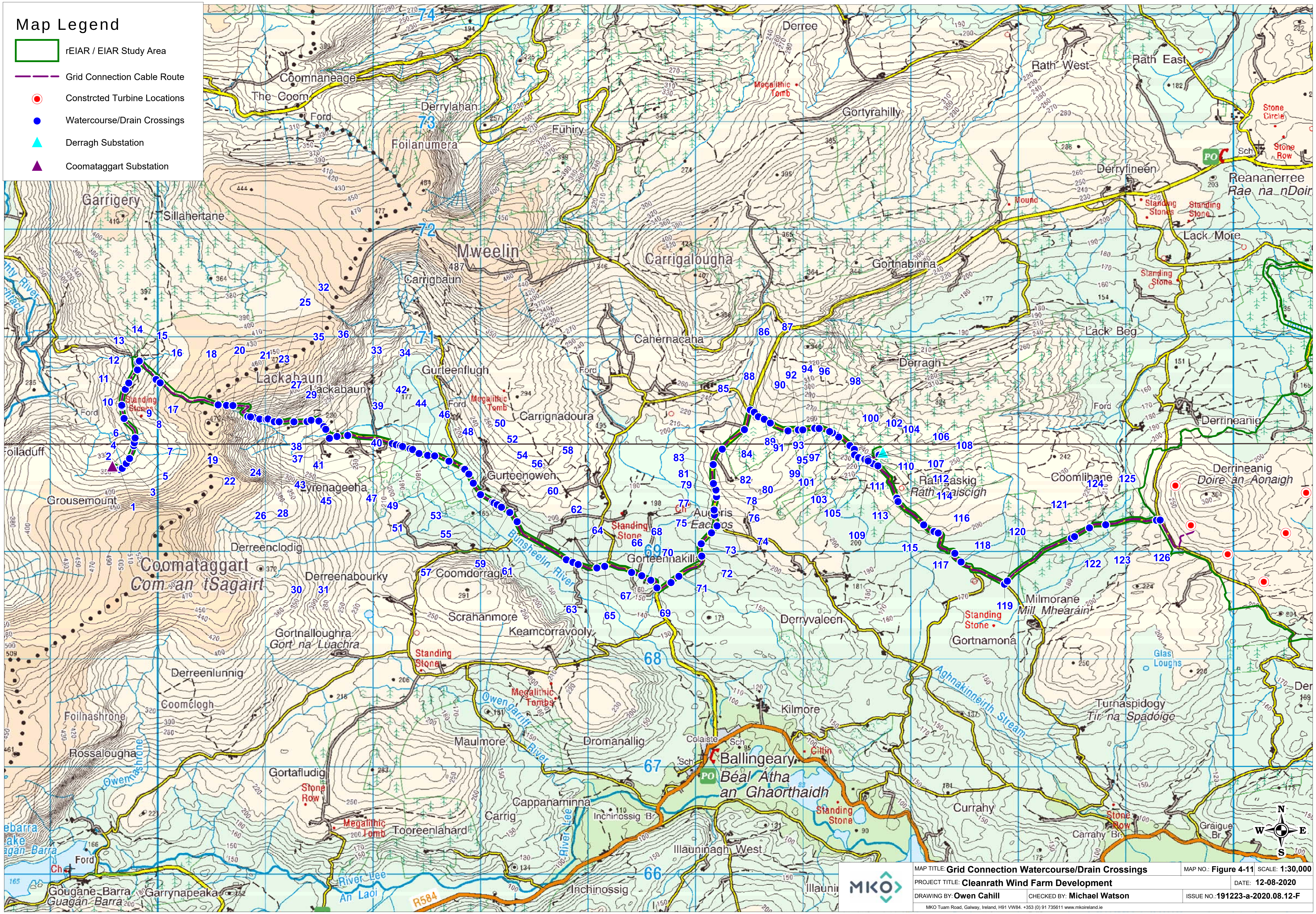
If this duct installation method could not be achieved due to the invert level of the existing culvert or due to the composition of the culvert e.g. stone culverts then the ducts were installed by an alternative means as set out in the following sections.

4.7.5.5.3 *Flatbed Formation over Culverts – Option 3*

Where cable ducts were installed over an existing culvert where sufficient cover could not be achieved by installing the ducts in a trefoil arrangement, the ducts were laid in a much shallower trench, the depth of which was determined by the position of the top of the culvert. The ducts were laid in this trench in a flatbed formation over the existing culvert and encased in 6mm thick steel galvanized plate with a 15N concrete surround as per ESB Networks specification.

After the crossing over the culvert had been completed, the ducts resumed to the trefoil arrangement within a standard trench. This method of duct installation is further detailed in in Appendix 4-1 .

Where a bridge or culvert had insufficient deck cover to fully accommodate the required ducts, the ducts were laid in a flatbed formation partially within the existing road make up. Where this option was employed, the ducts were also encased in steel with a concrete surround as per Eirgrid and/or ESB Networks specifications. In order to achieve cover over these ducts and restore the carriageway of the


Map Legend
rEIAR / EIAR Study Area
Grid Connection Cable Route
Constrcted Turbine Locations
Watercourse/Drain Crossings
Derragh Substation
Coomataggart Substation
Mweelin
Lackabaun
Coomataggart
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Carrigalougha
Derragh
Ballingeary
Beal Atha an Ghaorthaidh
Derrineanig
Doire an Aonaigh
Rath Caisciigh
MAP TITLE: Grid Connection Watercourse/Drain Crossings
MAP NO.: Figure 4-11
SCALE: 1:30,000
PROJECT TITLE: Cleanrath Wind Farm Development
DATE: 12-08-2020
DRAWING BY: Owen Cahill
CHECKED BY: Michael Watson
ISSUE NO.: 191223-a-2020.08.12-F
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road it was necessary to locally raise the pavement level to fully cover the ducts. The increased road level was achieved by overlaying the existing pavement with a new wearing course as required. Any addition of a new pavement was tied back into the existing road pavement at grade.

After the crossing over the culvert was achieved, the ducts resumed to the trefoil arrangement within a standard trench. This method of duct installation is further detailed in Appendix 4-1

4.7.5.5.4 *Cable Ducting Bridge Attachment – Option 4*

Where the bridge deck could not accommodate ducts crossing over in trefoil or flatbed formation as outlined above, the ducts crossed the bridge in a steel galvanised pipe. This was required at one location along the cable route (No. 69, Figure 4-11 & Appendix 4-1) The Circular Hollow Section (CHS) galvanised pipe was fixed to the existing bridge. The ducts were then passed through the galavanised pipe to a transition chamber located either side of the bridge crossing where ducts then transitioned to standard trefoil formation. The works were completed from a scaffolding deck which spanned across the watercourse. The decking of the scaffolding was sealed with a plastic covering to collect all dust and debris and prevent it from entering the watercourse thereby ensuring that water quality was not impacted during these bridge works

4.8 Community Gain Proposal

4.8.1 Background

The Cleanrath wind farm development has the potential to have significant benefits for the local economy, by means of investment, employment and the generation of economic activity in the local surrounding area. The Cleanrath wind farm development also creates an opportunity to generate real tangible benefits for the local community who may not have a direct involvement in the project. It is proposed to deliver these benefits through a Community Gain Initiative.

The applicants have given careful consideration to the issue of community gain arising from the Cleanrath wind farm development, if permitted and constructed. Community gain from significant development proposals, including wind farms, whilst a relatively recent approach, is now a common consideration for developers and, indeed, planning authorities. This approach recognises that, with any wind farm proposal, the locality in which the project is situated is making a significant contribution towards helping achieve national renewable energy and climate change targets, and the local community should derive some benefit from accommodating such a development in their locality.

Community gain proposals can take a number of forms, generally depending on the nature and location of the Cleanrath wind farm development and the nature and make-up of the local community. In some instances, funds are paid by the developer, either annually or as a one-off payment, to a community fund that is administered by a voluntary body. These funds may then be used for a variety of projects, such as environmental improvements, local amenities and facilities, educational projects and energy efficiency improvement works.

4.8.2 The Proposal

The community gain proposal for the Cleanrath wind farm development is to contribute to a Community Gain Fund to support local social or community amenities and initiatives in the locality of the Cleanrath wind farm development. The Community Gain Fund will be administered by the wind farm developers and will be implemented following consultation with stakeholders in the local community, subject to the project being permitted and proceeding to construction.

4.8.2.1 Qualifying Projects & Initiatives

The types of projects and initiatives that could be supported by such a Community Gain proposal could include youth, sport and community facilities, schools, educational and training initiatives, and wider amenity, heritage, and environmental projects.

The local community will be consulted when the Community Gain Fund is being established on the proposed qualifying criteria for projects and initiatives seeking funding from the Community Gain Fund.

4.8.2.2 Financial Contributions

The community benefit scheme has been funded as follows:

- An initial contribution of €150,000 has been made available to the local community. The project has been constructed and did operate for a short period and over €100,000 in funds have already been distributed to the community.
- The annual contribution to the community is estimated at c€30,000 each year for the lifetime of the project, when it is in full operational mode.

The number and size of grant allocations will be decided by the administrators of the Community Fund. The input and suggestions of the local community will be sought during the establishment of the fund, on the types of groups and projects that should benefit, and to what degree they should benefit depending on their funding requirement.

Suggestions are invited from interested groups or individuals regarding the future stewardship of the fund, the system of awarding funding as well as expressions of interest in funding. These can be made to info@enercoenergy.ie.

4.9 Operation

On the 12th December 2019, the first turbine began to generate electricity from the Cleanrath wind farm development with the commencement of testing and commissioning of the turbines. The remaining turbines began to come on to the network on a phased basis until 28th February 2020 when all nine turbines were capable of generating electricity and continued to operate until 1st May 2020 (142 days). By agreement with the Supreme Court, the turbines were put into "Sleep Mode" from that date. This controlled mode is maintained by the turbine manufacturer. When the turbines are in this mode generally electricity is not produced however on various occasions checks and tests are carried out by the turbine manufacturer as required by Eirgrid which will necessitate the generation of electricity. In normal circumstances however, the blades are allowed to rotate facing the wind without generation of electricity.

The impact assessment within this rEIAR considers all the initial operational period and the Sleep Mode period and any future operation of the Cleanrath wind farm development as a collective operational phase.

The future operation is expected to have a lifespan of approximately 25 years. During this period, on a day-to-day basis the wind turbines will operate automatically, responding by means of meteorological equipment and control systems to changes in wind speed and direction.

The wind turbines are connected together and data relayed from the wind turbines to an off-site control centre. Each turbine will also be monitored off-site by the wind turbine supplier. The monitoring of turbine output, performance, wind speeds, and responses to any key alarms are monitored at an off-site control centre 24-hours per day.

Any future operation of the Cleanrath wind farm development will continue in accordance with Operation and Environmental Management Plan which is included as Appendix 4-8

4.9.1 Peatland Habitat Restoration

The restoration of peatland habitat as discussed in Section 4.3.9 above and in Chapter 6 of this rEIAR will be undertaken during the future operation of the site and will be determined by the outcome of the substitute consent process. The restoration will comprise the management of an area of forestry that was felled during construction along with an additional hectare of immature forestry will be felled to establish suitable peatland habitat. The works will involve felling, chipping and removal of brash and restoring the peatland habitat to its original condition prior to planting which will include the blocking of drains with no further drainage to be installed around the area. Further details are included in Appendix 6-8 of this rEIAR. The impacts associated with these restoration works are further assessed in Soils and Geology (Chapter 8) and the impact of the traffic volumes are assessed in Material Assets (Chapter 14).

4.9.2 Maintenance

Each turbine would be subject to a routine maintenance programme involving a number of checks and changing of consumables, including oil changes. In addition there is often a requirement for unscheduled maintenance, which could vary between resetting alarms to major component changes requiring a crane. Typically maintenance traffic will consist of four-wheel drive vehicles or vans. The electricity substations components and site tracks will also require periodic maintenance.

The replacement of major component could include the replacing of a turbine blade. A blade is the largest component that may need replacing on a turbine at any time during the operational life of the Cleanrath wind farm development. For this reason, the works undertaken along the transport route (Section 4.4.3 above) and in particular, the temporary junction accommodation works and the turbine delivery accommodation roadway will remain in place. These areas are currently secured to prevent public access with temporary fencing and soil berm. This soil berm will be removed temporarily removed using an excavator which will temporarily set aside the soil material to allow access to site. The berm will be restored after the works on site have been completed.

Although the level of activity required for the maintenance of the Cleanrath wind farm development is not significant, the impacts associated with traffic volumes for this period are assessed in Chapter 14.

4.9.3 Monitoring

The assessment completed prior to construction of the Cleanrath wind farm development sets out a programme of monitoring required for the operational phase of the project as set out in Section 8 of the CEMP. This monitoring programme was cognisant of the conditions of but not confined to the permission previously granted for the Cleanrath wind farm development by An Bord Pleanála in 2017 (2017 Permission). The required monitoring includes:

- Post-construction bird monitoring which includes breeding bird surveys, winter roost surveys and corpse searching on the site determine the level of fatalities for the site as a result of collisions with the installed turbines. These surveys will be completed in accordance with guidelines issued by the Scottish Natural Heritage (SNH, 2009)
- Post-construction surveys for badger and otter will be completed on the site for five years.
- A Kerry Slug Management Plan will be implemented in full, in accordance with the derogation licence granted. This provides for post-construction surveys for a five year period

- Monitoring for shadow flicker at properties where any exceedance of the shadow flicker limit has been predicted as outlined in Chapter 5.
- Post turbine commissioning noise monitoring.

4.9.3.1 Operational Monitoring Ongoing

Post Construction Bird Monitoring

The programme of Post Construction Bird Monitoring commenced in 2020 as site has operated for a period and it is considered that the Sleep Mode has the same characteristics as an operational phase in terms of potential impacts on birds. Breeding bird surveys and corpse searching to determine the level of bird collision with the rotating turbines has been ongoing and the early stage findings are outlined in Chapter 7 of this rEIAR

Ecological Surveys

The operational phase otter and badger surveys for Year 1 have been completed for 2020 as part of this rEIAR site walkover. The requirements of the Kerry Slug Management Plan have been completed for Year 1 of operation in 2020 also. The findings are outlined in Chapter 6 of this rEIAR

Shadow Flicker

The initial ground truthing and confirmation of lines of sight between relevant properties and turbines has been completed in 2020 and further monitoring will be undertaken when turbines resume normal operations. Details of the assessment completed to date is outlined in Chapter 5 of this rEIAR

Noise

The programme of Post Construction Noise Monitoring commenced in 2020 This has been completed for the site and the findings are summarised in Chapter 11 of this rEIAR.

Water Monitoring

A programme of water quality monitoring which naturally transitioned from the construction phase to the operational phase continues to be implemented on site. This included a review of the drainage system after construction was completed by the project hydrologist to provide guidance on the requirements of an operational phase drainage. This was also informed by the water quality monitoring data collected during construction and is summarised in Chapter 9 of this rEIAR.

4.10 Decommissioning

The wind turbines installed as part of the Cleanrath wind farm development are expected to have a lifespan of approximately 25 years. Following the end of their useful life, the wind turbines may be replaced with new turbines, subject to planning permission being obtained, or the site may be decommissioned, with the exception of the 38kV grid connection cabling which will be an ESB networks asset and will be part of the national electricity grid. Should early decommissioning be required the same process as outlined below will be followed.

Upon decommissioning of the Cleanrath wind farm development, the wind turbines would be disassembled in reverse order to how they were erected. The turbines will be disassembled with the same model of cranes that were used for their erection. The turbine will be removed from site using the same transport methodology adopted for delivery to site initially. The turbine materials will be transferred to a suitable recycling or recovery facility. The soil berm at the temporary junction accommodation works and the turbine delivery accommodation roadway will also need to be removed during decommissioning to provide access to and from the site with abnormal loads. The impacts associated with turbine removal as part of decommissioning is further assessed in Landscape (Chapter 13) and the impact of the traffic volumes are assessed in Material Assets (Chapter14).

All above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in environment emissions such as noise, dust and/or vibration.

The covering of the foundation will be completed using material imported to site as the required quantity of material does not currently exist at the site. This will require 1,547m^3 of soil to be imported to the site which will be sourced locally. The impacts associated with this element of reinstatement as part of decommissioning is further assessed in Soils and Geology (Chapter 8) and the impact of the traffic volumes are assessed in Material Assets (Chapter14).

Site roadways will be required by the ongoing farming and forestry operations, and therefore would be left in situ for future use.

The electrical cabling connecting the Cleanrath wind farm development to the substation in the townland of Rathgaskig will be removed from the underground cable ducting at the end of the useful life of the Cleanrath wind farm development or should early decommissioning be required. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance for an underground element that is not visible.

The removal of 33 kV cabling will be undertaken at each of the joint bays where the cables will be broken at each joint bay and removed by a winch which will both extract and roll the cabling on to cable drums for removal off site. The cables will be taken to an appropriate recycling facility. As outlined above, it is common practice that the 38kV grid connection cabling to remain in place as it will be an ESB networks asset and will serve the exiting 38kV substation. In the event that the 38kV cabling needs to be removed the same methodology will be employed as outlined for the 33kV cable.

A Decommissioning Plan has been prepared (Appendix 4-9) for an early decommission of the Cleanrath wind farm development the detail of which will be agreed with the local authority prior to any decommissioning. Should the Cleanrath wind farm development continue operation for the intended lifespan of approximately 25 years, the Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will agreed with the competent authority at that time

The Traffic Management Plan (included within Appendix 4-9) provides details of the traffic management arrangements that will be implemented during the removal of cabling within public roads