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61253

Environmental Impact Assessment Report

Cummeennabuddoge Wind Farm

Chapter 4: Description of Development

Cummeennabuddoge Wind (DAC)

September 2024

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Glossary of Terms

Term	Definition
The Applicant	Cummeennabuddoge Wind Designated Activity Company (DAC)
The Agent	Atmos Consulting Limited
Environmental Advisors and Planning Consultants	Atmos Consulting Limited
Environmental Impact Assessment	A means of carrying out, in a systematic way, an assessment of the likely significant environmental effects from a development
Environmental Impact Assessment Regulations	Schedule 6 of the Planning and Development Regulations 2001(as amended)
Environmental Impact Assessment Report	A document reporting the findings of the EIA and produced in accordance with the EIA Regulations
The Proposed Development	Cummeennabuddoge Wind Farm
The Proposed Development Site	The land enclosed by the red line shown on Figure 1-1a
The Planning Act	Directive 2011/92/EU (as amended by Directive 2014/52/EU, the EIA Directive).

List of Abbreviations

Abbreviation	Description
AEP	Annual Equivalent Probability
CEMP	Construction Environmental Management Plan
DO	Dissolved Oxygen
EC	Electrical Conductivity
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
HGV	Heavy Goods Vehicles
LFL	Limited Felling Licence
NIS	Natura Impact Statement
NGR	National Grid Reference
NTU	Nephelometric Turbidity Units
OPW	Office of Public Works
SCADA	Supervisory Control and Data Acquisition
SuDS	Sustainable Drainage Systems
UGC	underground cabling
WMP	Waste Management Plan

4 Description of Development

4.1 Introduction

This Chapter presents a description of the Proposed Development and describes an overview of construction methodologies the Proposed Development. Further detail on construction practices are presented in the Construction Environmental Management Plan (Appendix 4-1).

The Proposed Development has been subject to an iterative design process in order to minimise the potential environmental effects of the wind farm, while maximising the energy yield of the wind resource passing over the site.

That process is described in Chapter 3: Design Evolution and Consideration of Alternatives.

4.1.1 Proposed Development Site

The Proposed Development is located approximately 6km north of Ballymakeery town, in the Derrynasaggart Mountains, Co. Kerry. It encompasses the townlands of Cummeennabuddoge and Clydaghroe and is approximately 709 ha in size. The proposed access route passes through the townlands of Cummeenavrick and Glashacormick, Co. Kerry. The majority of the grid connection runs through Co. Cork, running eastwards towards the existing Ballyvouskill substation.

The Proposed Development site is connected to the N22 national road by an access track connected to the main site body. Land use at the Proposed Development Site currently consists of coniferous plantation with existing forestry tracks traversing the Proposed Development site, and localised areas of cut forest. The grid connection route follows an existing track before diverting through undeveloped hillside and into agricultural fields, alongside an existing farm track before entering the Ballyvouskill 220kV substation site.

The land use/activities on the site consist of active commercial planted forestry and historical small scale peat extraction.

Existing wind farms are present to the north, south and east of the Proposed Development. In addition, the study area is surrounded by other forestry sites and areas of historic and active peat cutting activities, with evidence of peat harvesting located adjacent to the south-west of the main Proposed Development site.

A summary of the land use and the areas of land use within the red line boundary of the Proposed Development are outlined in Table 4-1.

Table 4-1: Summary of Proposed Development land use changes

Land Use	Area (Ha)
Proposed Development Boundary	709
Existing land use	
Forestry	702
Agricultural	7
Proposed land use changes	
Proposed Development footprint	30.3

Land Use	Area (Ha)
Keyhole felling area (including development footprint)	152
Forestry	557
Agricultural	7

4.2 Development Outline

The Proposed Development assessed within this EIAR comprises the following:

- 17 wind turbines and associated hardstand areas;
- The turbine dimensions are as follows:
  - a total tip height in the range of 199.5m minimum to 200m maximum inclusive;
  - hub height in the range of 118m minimum to 125.5m maximum inclusive; and
  - rotor diameter in the range of 149m minimum to 163m maximum inclusive.
- One 110kV permanent electrical substation including a control building with welfare facilities, electrical plant and equipment, security fencing, underground cabling, wastewater holding tank and ancillary structures and associated works;
- Underground electrical and communication cabling connecting the wind turbines to the proposed on site substation and associated ancillary works;
- 110kV Underground cabling between the new permanent substation and the existing 220/110kV Ballyvouskill Substation to facilitate export of electricity to the National Electricity Grid;
- One Meteorological Mast of 110m in height and associated hardstand area to be removed at the end of the operational period;
- New permanent access tracks and permanent upgrades to existing tracks, site access;
- Four borrow pits;
- Six permanent peat repository areas;
- Permanent placement of peat along sections of site access roads within the restrictions outlined in Technical Appendix 10-3 peat management plan for the site;
- Three temporary construction compounds;
- Site drainage;
- Keyhole forestry felling to accommodate the construction and operation of the proposed development;
- Localised temporary works along the turbine delivery route in County Cork to facilitate the delivery of turbine components (namely temporary street furniture removal and vegetation clearance);
- Upgrading of existing site entrance at the local access road adjacent to the N22, Healthy and safety signage, information signage, and direction signage;
- All other associated site development works including necessary earthworks to facilitate the construction and operation of the Proposed Development over an operational lifespan of 35 years; and
- 10 year planning permission is being applied for.

The Proposed Development component parameters (length/area) are summarised in Table 4-2.

Table 4-2: Proposed Development Components

Proposed Development Components- Parameters	
Turbine	
17 wind turbines and associated hardstand areas with the following parameters: A total tip height in the range of 199.5m minimum to 200m maximum inclusive; Hub height in the range of 118m minimum to 125.5m maximum inclusive; Rotor diameter in the range of 149m minimum to 163m maximum inclusive; and Power output in the range of 6.0MW minimum to 7.2MW maximum, per turbine.	
Component	Length /Area
New Access Tracks (Founded)	19.04km
Upgrade Of Existing Access Tracks	6.99km
Turning Heads (5 No.)	2,945m2
Turbine Foundation (17 No.)	22m diameter foundation 6,461m2 total
Crane Hardstanding (17 No.)	185,842m2
Met Mast Height	110m
Met Mast Hardstand Area	625m2
Length of Internal Grid Connection Cables	89.7km (laid within access tracks), based on 4 arrays with 4 cables each.
Grid Connection Route to National Grid	3.6 km
Onsite Substation	8,411m2
Peat Repository 1	30,586m2
Peat Repository 2	19,948m2
Peat Repository 3	32,264m2
Peat Repository 4	10,254m2
Peat Repository 5	16,333m2
Peat Repository 6	17,460m2
Borrow Pit 1	16,952m2
Borrow Pit 2	45,357m2
Borrow Pit 3	35,832m2
Borrow Pit 4	38,866m2
Temporary Construction Compound 1	7,500m2
Temporary Construction Compound 2	7,500m2
Temporary Construction Compound 3	4,878m2

4.3 Development Components

4.3.1 Wind Turbine

The wind turbine is a three bladed, horizontal axis electrical generator.

The generator is mounted on a tapered tubular steel tower and is housed in a nacelle attached to a hub and rotor assembly with three glass/carbon fibre-reinforced polyester blades.

The turbines are a variable speed type with the turbine rotor speed varying according to wind speed, typically generating in wind speeds between 4 and 25 meters per second (m/s).

The turbines will stop during periods of high wind speed, when the exponential mean wind speed averaged over 100 seconds is greater than 25m/s (i.e. over storm force 10).

Turbines are computer controlled and contain wind sensors to determine when there is sufficient wind speed for operation. The turbines are pitch regulated to ensure the blades are pitched in the optimum angle during production and standby situations. The rotor blades of all turbines rotate in the same direction.

When operating, the rotational speed of the wind turbine blades is transferred and increased to drive the generator. This produces a three-phase power output typically of 690 Volts (V) which is transferred from the generator to the internal turbine transformer.

The final choice of turbine will be within the parameters assessed in this EIAR and be subject to a selection process which considers technical and commercial aspects of the turbine after all necessary consents have been secured. The turbines will be based on models which are commercially available at the time of construction.

The final turbine will be chosen in a competitive tendering process as part of the Project financing process, after all necessary consents have been secured.

The location of the turbines are shown in Figure 1-2 and provided in Table 4-3. The proposed turbine dimension range is shown on Table 4-2 and in Figure 4-1.

Table 4-3: Proposed Turbine Locations

Turbine number	ITM X	ITM Y	Grid Ref
1	521909	583645	OV2190983645
2	521820	584122	OV2182084122
3	521304	583200	OV2130483200
4	521164	583642	OV2116483642
5	521201	584214	OV2120184214
6	520493	583186	OV2049383186
7	520532	583692	OV2053283692
8	520312	584085	OV2031284085
9	519746	582997	OV1974682997
10	519828	583554	OV1982883554
11	519030	582721	OV1903082721
12	519079	583259	OV1907983259
13	518641	583554	OV1864183554
14	518274	582399	OV1827482399
15	518326	582965	OV1832682965
16	517622	581933	OV1762281933
17	517644	582502	OV1764482502

4.3.2 Power Output

At an installed capacity of between 102MW and 122.4MW inclusive, the Proposed Development will have the potential to produce between 312,732MWh (megawatt

hours) and 375,278MWhca of electricity per year. This is based on an estimated capacity[1] factor of 35% (Baringa, 2018).

The average domestic electricity consumption per household in Ireland is approximately 4.2MWh annually (CRU, 2017). Accordingly, the Proposed Development would generate enough electricity to power a minimum of 74,460 and a maximum of 89,351 households in Ireland annually.

The preliminary findings from the 2022 Census of Ireland recorded a total of 1,841,152 households in the Republic of Ireland (CSO, 2022). Based on the range of the installed capacity, the Proposed Development can therefore produce sufficient electricity for the equivalent of between 4.0% and 4.8% of all households in Ireland.

4.3.3 Turbine Foundation

The foundation for the turbine will comprise a standard concrete gravity foundation constructed on poured concrete with steel reinforcement.

Each foundation will require in the order of 970m³ of concrete and 115 tonnes of steel reinforcement. Concrete will be imported. No batching is to be undertaken on site. The foundation size is 380m² in area for each turbine, and 5m deep (Figure 4-2).

4.3.4 Crane Hardstanding

Each wind turbine will be erected using a set of large all-terrain cranes with a crane set consisting of a main lifting crane and the tail crane. Operation of the cranes will require the construction of a hardstanding to provide a solid operating base for lifting operations.

The two cranes will lift turbine tower sections and blades from the delivery vehicles into their assembly position. The larger crane will be used to lift the tower sections, turbine nacelle and the hub and blade assembly into their final positions. The tail crane will assist with alignment and position the components whilst being installed.

The proposed hardstanding areas and blade storage area are shown as part of the detailed layout drawings (Figures 1-2c to 1-2d).

The blade storage areas do not require to be covered by hardstanding, rather it will comprise two engineered blade fingers of suitable bearing capacity levelled placed in an obstruction free working area suitable for pedestrian access, free of tree stumps etc.

The crane hardstand and blade storage dimensions are shown on Figure 4-3.

4.3.5 Temporary Construction Compound

Three temporary construction compounds are proposed to support the construction phase for the Proposed Development (See Figures 1-2c to 1-2d).

The temporary construction compounds will be set up upon commencement of the construction phase. The compounds will be used as a secure storage area for

[1] Capacity factor is the ratio of the actual energy produced in a given period, to the hypothetical maximum possible, i.e. running full time at rated power.

construction materials and contain cabins for office spaces, meeting rooms, canteen area, a drying room, parking facilities as well as welfare facilities.

4.3.6 Site Access

Access to the Site, for construction (including Heavy Goods Vehicles (HGV) and abnormal loads (turbine components such as the blades) and operation will be via the existing Coillte CGA site entrance currently used for forestry operations. A new access track will initially lead from this existing access point into the site, before joining a stretch of upgraded existing track, which will then lead into new founded access tracks. The entrance to the Site is located in the western area of the Site (NGR W 14106 81485), off a local access road which in turn is accessed from the National Road, N22. This is shown in Figure 1-2b and Figure 1-2c.

The port of entry for large turbine components will be Ringaskiddy Port. The route is provided in Figure 1-3. Vehicles delivering large turbine components and other abnormal loads to the Proposed Development will depart from here and travel along the N28 before continuing on the N40 to the N22.

From here, the turbine delivery route will follow the Macroom Bypass which ends northwest of Ballyvourney. The delivery vehicles will continue on the N22 and use the local road which leads to the existing Coillte Site entrance.

Works will be required to facilitate the delivery of turbine components along the proposed turbine delivery route at 6 locations (Table 4-3). Some of these will be relatively minor in nature, for example, temporary removal of street furniture and signage while other works will be more extensive, such as upgrading the road surface at one location as it currently serves as a bicycle path. None of these works extend beyond the confines of the existing road corridors, or into private land.

The extent of works has been determined by an abnormal loads assessment (Appendix 7-1) and the results of a swept path analysis (Appendix 7-2) and are summarised in Table 4-4 below.

Table 4-4: Junctions Along the Turbine Delivery Route for Works

Junction ID*	Townland(s)	Temporary street furniture dismantling	Vegetation clearance	Temporary stone placement on splitter island/verge	Road Surface Upgrade
1	Loughbeg	X	X	X	
1B	Barnahely	X		X	
2	Ballintaggart & Barnahely	X	X	X	X
5	Shanbally	X	X	X	
13	Hilltown & Shannonpark	X	X	X	
38	Cummeenavrick		X	X	

*Refer to the Location ID in Appendix 8-1

Delivery during the construction phase is considered further in Chapter 7 Traffic Impact and Access Route Assessment.

4.3.7 Access Track

New Access Track

19.04km of new access track is proposed. The design has a 5m wide running surface, extending up to 6m as necessitated locally, e.g. at tighter corners. The track layout is shown in Figure 1-2.

The track design has provided sufficient radii at road junctions / turning heads to enable turning of the construction vehicles, abnormal loads and plant. The access tracks have also been designed to avoid sensitive features such as archaeological features, areas of deep peat, etc. (See Chapter 3 Design Evolution and Consideration of Alternatives).

The access tracks will be constructed using 'cut track' design: Topsoil is stripped to expose a suitable rock or sub-soil horizon on which to build the track. The track is then built up on a geotextile layer by laying and compacting crushed rock to a depth dependent on ground conditions and topography.

An assessment for the use of floated roads was undertaken, however because of site constraints, watercourse crossing locations and topography the use of floated roads was deemed not viable.

The proposed track construction design for founded track is shown in Figure 4-4.

The methodology for the construction of new track is detailed in Appendix 4-1 Construction Environment Management Plan.

Upgrade to existing tracks

The existing forestry track within the Proposed Development Site shall be upgraded to a suitable standard for general construction worker traffic (i.e. utility vehicles, vans, etc). This track will be upgraded to enable turbine delivery or use by heavy goods vehicles, and plant. The width and make-up of the existing forestry track is unsuitable for such vehicle movements and will need to widened and the road make up improved, with establishment of a running layer to enable passage of the proposed plant and machinery associated with the Proposed development.

The methodology for the construction of upgraded roads is detailed in the CEMP (Appendix 4-1).

Access Track & Hardstanding Drainage

The Proposed Development adopts a surface water management plan / site drainage design using the principles of Sustainable Drainage Systems (SuDS), promoting the principles of onsite retention of flows and use of buffers and silt removal techniques. All drainage related mitigation measures have been encompassed by a robust and proven SuDS design proposed as part of the Proposed Development which will be used to control drainage and silt management on the site. The SuDS design proposed on-site drainage design minimises modification and disruption of the existing natural hydrology, and reduces the chemical, silt and other suspended pollution transport within surface water drainage systems. All details related to drainage design and mitigation measures are outlined in Chapter 11 of this EIAR Hydrology, Water Quality and Flood Risk and Technical Appendix 11-4 Surface Water Management Plan.

Surface water will be managed using SuDS to treat and attenuate track runoff, promoting the principles of onsite retention of flows and use of buffers and silt removal techniques. A Surface Water Management Plan, including drainage layouts showing permanent and temporary drainage measures, is included at Appendix 11-4.

The proposed track and hardstand surfacing shall be formed from unbound aggregate and is therefore permeable, with permeability affected by compaction under trafficking. Rainfall falling on track will flow across the track surface into swales (ditches) at the track edge. Rainfall that infiltrates vertically through the permeable track makeup will flow laterally across the track formation to the swales which will be lower than the track formation surface. Hardstand surface shall be constructed with a level crossfall to enable flow of surface water into adjacent track drainage swales or into adjacent hardstand swales which will be lower than the hardstand lower formation surface.

Track and hardstand drainage will be designed to cater for runoff up to a 100 year storm including the effect of climate change. Frequent cross drainage culverts will be supplied to allow for redundancy in the drainage network. "Breakouts" from track drainage will generally coincide with cross-drainage outlets, where water will be encouraged to discharge out of the drainage swale and disperse overland, naturally attenuating peak flows. Dispersal of discharges at breakouts at low velocities will ensure settlement of solids and filtration in vegetation and reduce scour.

Track and hardstand drainage discharges from main outlets at watercourses and other low points will be attenuated in settlement ponds and attenuation basins. Outlets from the basins will be limited by flow controls which limit discharge to a greenfield equivalent rate ("Qbar"), in order that there is no increased rate of runoff into downstream watercourses that could affect downstream flooding. Limited outflows will discharge to watercourses via attenuation ponds or be dispersed overland in a level spreader.

Breakouts and attenuation basin will have a dual function in treating runoff by settling and filtering suspended solids. Attenuation basins are sized to ensure removal of solids and include forebays and lateral gravel bars as check dams to encourage settlement. Swales will include frequent gravel check dams to encourage settlement "at source". Check dams will also have an attenuating function.

"Clean" runoff from lands upgradient of the Proposed Development will be separated from excavations by providing clean cutoff drainage. Cutoff drains will be planned and installed prior to main earthworks, and clean drainage will be culverted through the works.

Drainage associated with the existing track which is subject to upgrade as part of the Proposed Development shall be inspected, repaired where necessary, and maintained to ensure effective drainage.

Additional temporary drainage features including temporary settlement basins will be provided to manage and treat runoff from significant earthworks excavations.

Potential impacts on watercourses and other surface water features have been assessed as part of this EIA and reported in Chapter 11 of this EIAR.

Turning Heads

There are a 5 turning heads within the Proposed Development. The locations of the turning head can be seen on Figure 1-2c and Figure 1-2d. Turning heads are included in the Proposed Development to facilitate safe access and egress to and from the turbine hardstands for delivery vehicles. These spaces can also be utilised as passing places for other construction traffic if required.

4.3.8 Watercourse Crossings

A total of 14 watercourses will be crossed by the proposed development. 5 minor existing crossings are proposed along section of existing access tracks for which no upgrade of the existing structure is proposed, 8 new crossing structures are proposed along new access tracks, and one crossing location on the grid connection route.

A total of 8 new water course crossing are proposed over mapped watercourses are proposed along the new access tracks. The proposed grid connection route also crosses one mapped watercourse, but no in-channel works are proposed and the cable is to be laid under or over and existing culvert at that location.

The locations of these crossings are shown on Figures 1-2a to 1-2e. Watercourse crossings have been designed and are scheduled at Annex E to the Surface Water Management Plan included at Appendix 11-4.

Watercourse crossings have been designed to comply with Office for Public Works (OPW) design guidelines in relation to hydraulic performance and guidance provided in CIRIA C689 "Culvert Design and Operation Guide.

The form of the watercourse crossing is informed by aquatic surveys to determine the need to preserve watercourse substrate to ensure that fisheries and habitat objectives are maintained. The hydraulic design for watercourse crossings allows for clear span crossings (by bottomless culverts or similar) at all eight watercourse crossings. The finalised form and design shall be informed by prior consultation with Inland Fisheries Ireland Environmental prior to implementation.

Watercourse crossings are sized to convey the "100-year" / 1% Annual Equivalent Probability (AEP) flood with free-inlet conditions, and so meet OPW Section 50 requirements for culverts in rural areas, and do not affect flooding elsewhere. All watercourse crossings will be subject to OPW approval under Section 50 of the Arterial Drainage Act, 1945, prior to construction.

Confirmatory inspections of each proposed watercourse crossing location will be carried out by the project civil/structural engineer and the project hydrologist and an aquatic ecologist prior to the construction of each crossing.

4.3.9 Borrow Pits

Four on-site borrow pits are included in the Proposed Development. The borrow pits will provide the majority of all rock and hardcore material required during construction of the wind farm development. The remaining rock volume will be sourced from Keim Quarry, Gortnadiha Quarry, Roadstone Killarney and Kilmichael Quarry. Usable rock will also be won from other infrastructure construction, including the turbine base excavations. Details of the borrow pits are shown in Figures 4-8a to 4-8d.

The use of on-site borrow pits will very substantially reduce the need to transport material to the Site.

The locations of the borrow pits and maximum volume of rock for extraction is shown in Table 4-5. The borrow pits will be worked to extract the specified stone volume, when the stone volume has is retrieved no further excavation will be undertaken i.e. when the required stone volume has been successfully retrieved there shall be no further excavation.

Allowing for 20% of the rock to be unsuitable as construction material, a total of 271,086m^3 rock is estimated to be available from the borrow pits.

Table 4-5: Proposed Borrow Pits

Borrow Pit ID	Grid Reference	Area (m2)	Maximum Depth (m)	Estimated Volume of Rock (m3)
Borrow pit 1	517875, 581934	16,137m2	5	80,685
Borrow pit 2	518634, 582571	37,819m2		189,095
Borrow pit 3	520353, 583496	29,132m2		145,660
Borrow pit 4	522200, 583314	30,291m2		151,455

Borrow pits will be stepped, a rock buttresses will be left in place to enable to sufficient and safe reinstatement of excavated peat and spoil. Given construction practicalities, sequencing, and logistics, it is proposed that the borrow pits be backfilled with surplus inert material such as peat and subsoil to 60% of their capacity, plus any unsuitable excavated rock. The borrow pits will be allowed to restore naturally and made secure using permanent stock proof fencing. Further details, including borrow pit cross sections, are provided in Technical Appendix 10-3: Peat Management Plan.

Temporary drainage will be installed prior to opening of borrow pits. Temporary settlement basins will be provided to manage and treat runoff from significant excavations at borrow pits. The approach to drainage ensures that clean runoff flowing toward or over the borrow pit is diverted either in cutoff drainage and bunds formed from cutoff ditch excavation to the top of the cut slope, prior to commencement of clearing of overburden.

Settlement features are planned at the low point or adjacent to borrow pits, and internal drainage (or pumping) of accumulated water on the borrow pit floor shall discharge to settlement features. Settlement features treat runoff to an acceptable standard before discharging overland or discharging into proposed trackside drainage.

Rock Breaking

Hardcore materials will be extracted from the borrow pits principally by means of rock breaking with weaker rock extracted using a hydraulic excavator and a ripper. Where stronger rock is encountered and cannot be extracted using an excavator, then rock breaking equipment will be employed.

This will involve the use of a 40-60 tonne 360-degree hydraulic excavator with a rock breaker. The rock breaker is supported by a smaller 30-40 tonne rock breaker which breaks the rock down further for feeding into the rock crusher machine.

The larger rock breaker breaks out the rock in a progressive manner from the borrow pit and the smaller rock breaker breaks it down further.

The broken-down rock is loaded into a mobile crusher using a wheeled loading shovel machine and crushed down into the correct grade for use in the construction of Site Access Roads and Turbine Hardstands.

Rock Blasting

Where very strong rock is encountered, blasting may be required. This involves using a mobile drilling rig to drill vertical holes into the rock area with extraction facilitated by the use of explosives.

The management of explosive delivery and storage on-site will be agreed with An Garda Síochána in advance. The rock generated from blasting will usually be the correct size to be loaded directly into the mobile crusher without further breaking.

The effects of blasting noise is assessed Chapter 13: Noise.

4.3.10 Peat Repositories

Six peat repositories are included within the Proposed Development. These are presented in Figure 1-2c and Figure 1-2d, and further detail shown in Figures 4-9a to 4-9f. Peat repositories have been situated at locations where the topography, peat depth, resulting stability assessment and other environmental constraints have allowed. The six peat repositories are located in areas throughout the site to avoid long transportation of the excavated peat, limiting internal traffic volumes and reducing disturbance of the peat material by handing and transportation. The design of six peat repository areas enables sufficient permanent storage volume of excavated peat materials to a maximum height of 1m, including consideration of bulking factors, and controls excessive peat loading conditions or instabilities.

Placed peat thickness shall not exceed 1m. A stone berm of 1.25m height will be placed around the downhill portion of the repositories to prevent the flow of saturated peat material. The stone berm will be constructed with a sufficiently coarse granular material or rock to enable the drainage of the stored peat material and prevent any occurrence of instabilities within the storage area.

The surface of the placed peat shall be shaped to allow efficient run-off of surface water from the peat storage areas.

Silting ponds will be placed as required at the lower side/outfall location of the storage areas.

The upper acrotelm layers shall be placed on the surface right way up to promote vegetation growth. This growth will aid in stabilising the stored peat material and help in preventing it from becoming saturated following heavy period of rain.

4.3.11 Electrical Connections

Substation

The onsite 110kV electricity substation will contain the electrical components necessary to consolidate the electrical energy generated by each wind turbine and export that electricity to the national grid. The substation compound will also include a wind farm control building.

The substation will be located within the Site boundary in an area of forestry adjacent to an existing access track as shown in Figure 1-2e.

The substation layout is shown on Figure 4-5. The substation compound will have a perimeter steel palisade fence 2.6m in height. Internal fences will also segregate different areas within the main substation. The construction and exact layout of electrical equipment in the onsite electricity substation is to EirGrid specifications (XDS-GFS-00-001-R4 (Eirgrid, 2019)). The configuration of the substation layout is designed to cater for EirGrid's future expansion requirements, should it be required by EirGrid to make provision for future grid connections.

The Applicant is aware that the substation in its proposed location is the same as Enerco's recently consented Knocknamork Wind and Solar Array substation (Bord Pleanála Case reference: ABP-314275-22). The Applicant can confirm that only a single substation will be constructed at this location and is included as part of this Proposed Development as Enerco's consented substation may not actually be constructed.

The proposed electrical connection infrastructure included as part of this Proposed Development is proposed for the connection of the proposed windfarm solely.

Grid Connection

Export of electricity from the Proposed Development to the national electricity grid will be via a permanent 110kV 3.6km long underground cable from the onsite substation to the existing Ballyvouskill 220/110kV substation. The grid connection route is shown in Figure 1-2e.

The grid connection cabling route serves and forms part of the Proposed Development, the subject of the planning application, and has been assessed as part of the EIA.

The underground cabling (UGC) will comprise 3no. power cables, 2no. fibre communication cables and 1no. earth continuity conductor, within 6no. ducts.

The UGC route initially begins within the townland of Caherdowney, Co. Cork where from Ballyvouskill 220kV substation compound, the UGC departs the substation on the southwestern boundary, converging onto an existing access track within agricultural lands and traverses on an upward trajectory for 1050m prior to entering into forested plantations propertied by Coillte.

The majority of the UGC is within an existing forestry/agricultural access tracks and will traverse adjacent to existing ESB utility infrastructure that reside within these forestry tracks. The UGC crosses the existing existing 110kV UGC infrastructure at an existing track crossing location. The watercourse crossing on the proposed grid connection route will require no in-channel works are proposed and the cable is to be laid under or over and existing culvert at that location.

1.27km of the cable length is within existing trackway traversing mapped blanket peat deposits, however peat probing has shown that peat is very thin/largely absent along the route.

To facilitate placement of the UCG, a trench 1315mm deep and 825mm wide is required. The 6no. ducts will be placed at between 750mm and 1250mm depth.

At the existing Ballyvouskill 220kV substation, the cable will be connected to the existing infrastructure within the confines of the substation and its compound. The 110kV gas insulated switchgear building which has a spare bay and sufficient space internally for

the Proposed Development connection. The grid connection will be constructed to requirements and specifications of EirGrid (CDS-GFS-00-001-R1).

Details of the UCG works are included in Appendix 4-3: Construction Methodology- 110kV Underground Cable Connection.

Joint bays

The joint bay locations are presented on the planning drawings and within Appendix 4-3: Construction Methodology- 110kV Underground Cable Connection. The construction methodology is also contained in Appendix 4-3.

Joint Bays are pre-cast concrete chambers along the grid connection route where individual lengths of cables will be joined to form one continuous cable. A joint bay is constructed in a pit. Each joint bay will be 6m long x 2.5m wide x 2m deep. A reinforced concreted slab will be constructed on top of the bay.

Communication chambers are required at every joint bay location to facilitate links between the proposed wind farm substation and the existing 220kV node at Ballyvouskill. Earth sheath link chambers are also required at each joint bay, which are used for earthing and bonding cable sheaths of underground power cables. The earth sheath link chambers and communication chambers will be located adjacent to the joint bays, and comprise pre-cast concrete structures with an access cover at finished ground level.

Marker posts will be used on non-roadway routes to delineate the duct route and joint bay positions. As per the Eirgrid standards a 3m wide gravel service corridor will need to be reinstated at the ground service to enable access for cable servicing, demarcation of the cable route, and control of vegetation cover.

Internal Cabling

The electrical power produced by the individual turbines will be fed to the onsite substation via underground cables.

On site cabling will consist of array cables, predominantly rated at 33KV. The cables will be installed at a depth of 1.3m via a trench of 0.5m width. These cables will be sited within the footprint of the proposed and existing access tracks and will be suitably marked on the surface using marker posts.

SCADA System

A Supervisory Control and Data Acquisition (SCADA) system will be installed to gather information from the turbines and to enable the turbines to be controlled from an external location. A fibre optic communications cable will be laid adjacent to the power cables in the same cable trench to link the turbines to the SCADA system.

4.3.12 Meteorological Mast

One meteorological (met) mast is proposed as part of the Proposed Development. The met mast will be equipped with wind monitoring equipment. The mast will be located E643538 N930891 as shown on the site layout drawing in Figure 1-2.

The mast will be a free-standing metal lattice structure, 110m in height. A hardstanding 25m x 25m in area will be installed in association with the mast, to accommodate the

crane that will be used to erect it. The foundation will be 10m by 10m with a depth of 5m. Foundations are similar to those of the turbines, comprising a cast in-situ insert or bolts which are then connected to the met mast base and reinforced bars. Crushed rock will be used to backfill the foundation area.

The met mast elevation drawing is shown in Figure 4-6.

4.3.13 Tree Felling and Replanting

Tree Felling

As the majority of the Site comprises commercial coniferous forestry plantation; tree felling will be required within and around the proposed development components. A Forestry Management Plan is provided in Appendix 4-2 which provides details on the methodology for felling, a breakdown of the felling with regards infrastructure components, and an impact assessment of the forestry on development and vice versa.

A total of 152 hectares of forestry will be felled within and around the footprint of the Proposed Development in order to facilitate the proposed infrastructure and turbine erection. Figure 4-7 shows the extent of the areas to be permanently felled as part of the Proposed Development. The temporary compound areas shall be replanted following completion of the Proposed Development construction, totalling 3.93Ha. The remainder of the felling is considered to be permanent (148.07Ha), although the felled areas around the turbines and turbine hardstanding shall be allowed to naturally revegetate and create a more natural habitat (in comparison to the surrounding commercial forestry).

The tree felling activities required as part of the Proposed Development will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017). The policy requires that a copy of the planning permission for the Proposed Development be submitted with the felling licence application; therefore, the felling license will not be applied for until such time as planning permission is obtained for the Proposed Development.

Replanting

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.

Areas permanently felled for the Proposed Development will be replaced by replanting on a hectare for hectare basis at an alternative site or sites.

Detailed consideration of the approach to afforestation requirements associated with the project is attached in Appendix 4-4. It should be noted that the clearfelling of trees in the State requires a felling licence.

The associated afforestation of alternative lands equivalent in area to those lands being permanently clearfelled is also subject to licensing ('afforestation licensing'). The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing.

In light of the foregoing and for the purposes of this project, the developer commits that the location of any replanting (alternative afforestation) associated with the project will

be greater than 10km from the wind farm site and also outside any potential hydrological pathways of connectivity ie. outside the catchment within which the proposed project is located.

On this basis, it is reasonable to conclude that there will be no more than imperceptible indirect or in-combination effects associated with the replanting. In addition, the developer commits to not commencing the project until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.

4.3.14 Site Signage

The Proposed Development will have suitable signage to provide directions, contacts and health and safety information. There will be signs at the site entrance providing the operator's name, the name of the development, and an emergency contact telephone number.

Surface cable markers (metallic plates) will be placed along the route where grid connection cable depth is unavoidably shallow, due to constraints such as existing services, to indicate the precise location of the cable. Marker posts will be used on non-roadway routes to delineate the cable route and joint bay positions.

4.4 Construction

4.4.1 Construction Programme and Working Hours

Construction works are anticipated to commence in 2028 with a total duration estimated at 24 months. The work will proceed in four phases as summarised in Table 4-6.

Table 4-6: Construction Programme

Phase	Summary of Works
Phase 1 (month (1 to 3) Felling	Keyhole felling
Phase 2 (month 4 to 7) Enabling/Access Works	Construction of new access routes from existing access tracks to the turbine locations
Phase 3 (month 8 to17) Development (Main Site)	Establishment of site facilities, turbine foundation and turbine cabling. Delivery of turbine components & installation with cranes.
Phase 4 (month 18 to 21) Testing and Commissioning	Testing and commissioning equipment and turbines.
Phase 5 (month 22 to 24) Reinstatement and Restoration	Removal of temporary facilities and re-instatement of temporary working areas. Restoration of working areas as set out in the Schedule of Mitigation and CEMP.

The proposed normal hours of operations for construction activity are between 07:00 - 19:00 Monday to Saturday, with deliveries on a Saturday and during public holidays restricted to the hours of 07:00 to 14:00. During the installation phase, there may be a requirement for extended working hours as some critical elements of installation cannot be stopped once started such as concrete pouring, this will be agreed in advance with the Planning Authority.

4.4.2 Construction Methods

A live Construction Environmental Management Plan (CEMP) is provided in Appendix 4-1. The project CEMP document will be maintained in accordance with good industry practice.

The CEMP includes an Emergency Response Plan, Surface Water Management Plan, Surface Water Quality Management Plan, Water Quality Monitoring Plan, Waste Management Plan, and Traffic Management Plan. A Peat Management Plan is provided in Appendix 10-3. The CEMP includes all the mitigation measures proposed within the EIAR and NIS related to the Construction Phase. A schedule of all the mitigation measures of the EIAR is provided in Chapter 19.

The CEMP provides a commitment to mitigation and monitoring and reduces the risk of pollution whilst detailing the sustainable management of resources. The environmental commitments of the Proposed Development will be managed through the CEMP and will be secured in contract documentation and arrangements for construction and later phases, such that there will be a robust mechanism in place for their implementation. The CEMP addresses the construction phase and will be continued through to the commissioning, operation and final decommissioning phases.

An Environmental Manager / Ecological Clerk of Works (ECoW) with appropriate experience having completed a similar role will be appointed for the duration of the construction phase so that the CEMP is effectively implemented.

4.4.3 Construction Materials

The key materials required for the construction of the track, turbine foundation, hardstanding areas and cable trenches are as follows:

- Crushed stone;
- Geotextile;
- Cement;
- Sand;
- Concrete quality aggregate;
- Steel reinforcement; and
- Electrical cable.

Materials will be sourced and transported to the site from local suppliers, where possible. The majority of the crushed stone will be sourced from the on-site borrow pits, with the remainder sourced from appropriate quarries, to be sourced locally if aggregate is suitable for development.

Concrete

There will be no concrete batching on the Site. Rather, it will be transported to the Site as it is required. A total of 16,625m^3 of concrete has been estimated by calculation to facilitate the proposed development. A dedicated, bunded area will be created to cater for concrete wash-out which will be located within the three construction compounds. This will be for the wash-out of the chutes only after the pour. Concrete trucks will then exit the Site and return to the supply plant to wash out the mixer itself.

The main concrete pours at the turbine locations will be planned in advance and proposed mitigation measures (are detailed in Chapter 11: Hydrology) and are summarised as follows:

- Avoiding large concrete pours, for Turbine Foundations for example, on days when heavy or prolonged rainfall is forecast i.e., 25mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or rainfall depth greater than monthly average in seven days (prolonged heavy rainfall over a week). Concrete pouring will be avoided during a period in which a Met Éireann Status Red weather event has been implemented;
- Ensuring that all concrete pour areas are dewatered prior to pouring concrete and while the concrete is curing; and
- Making covers available so that areas can be covered if heavy rain arrives during the curing process which will prevent runoff of concrete which has a high pH.

4.4.4 Construction Movements

Various vehicle types are required during the construction stage of the Proposed Development. Of these, the majority will be standard road vehicles of similar type to those using local roads on a daily basis; construction vehicles, HGVs and cars.

The delivery of the main wind turbine components will require vehicles and transport configurations that are significantly longer and/or wider and/or heavier than standard road vehicles. Legal axle load limitations shall be complied with on all public roads.

4.4.5 Health and Safety

High standards of health and safety will be established and maintained throughout the project.

At all times activities will be undertaken in a manner compliant with applicable health and safety legislation and with relevant good practice as defined under applicable statutory approved codes of practice and guidance, including:

- Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005);
- Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. No. 299 of 2007), as amended;
- Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. 291 of 2013), as amended; and
- Safety, Health and Welfare at Work (Work at Height) Regulations 2006 (S.I. No. 318 of 2006).

The preparation of the Health & Safety Plan, erection of the relevant and appropriate signage on site, inductions and toolbox talks will take place prior to and throughout the construction phase of the proposed development.

Health and Safety is considered further in Chapter 6 Population and Human Health.

4.4.6 Environmental Management

The risk of potential environmental impact during the construction phase will be managed by the site manager, with specialist advice as required from; an Ecological Clerk of Works (ECoW), and or specialists such a hydrologist, a geologist/geotechnical engineer, and archaeologist. The site manager will ensure that construction and

activities are carried out in accordance with the CEMP and mitigation measures outlined in this EIA Report.

4.4.7 Construction Waste Management

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

The Act requires that any waste related activity must have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the site of the development to ensure that all contractors hired to remove waste from the site have valid Waste Collection Permits.

It will then be necessary to ensure that the waste is delivered to a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits and authorisations.

All wastewater will be tankered off-site by a licensed waste collector to the nearest wastewater treatment plant, Ballyvourney/Ballymakeera. There will be no on-site treatment of wastewater.

A Waste Management Plan (WMP) is included within the CEMP (Appendix 4-1), which outlines the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of construction of the proposed development. Disposal of waste will be seen as a last resort.

Prior to the commencement of the development, a Construction Waste Manager will be appointed by the Contractor. The Construction Waste Manager will be in charge of the implementation of the objectives of the plan, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to.

The person nominated must have sufficient authority so that they can ensure everyone working on the development adheres to the management plan.

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

4.4.8 Post Construction Restoration

Reinstatement will be undertaken as soon as practicable after each stage of the project is completed. Plant, materials and machinery will be removed from the Site when no longer required.

Areas of the Proposed Development Site will be reinstated in accordance with this EIAR, and any further planning condition requirements.

The blade lay down areas adjacent to the main crane hardstands at turbine will be reinstated using the original excavated peat material. This material will be stored only in the designated peat repository areas. All peat reinstatement locations will be subject to

approval by the Site Manager and Project ECoW. The recovered areas will be allowed to naturally revegetate.

The temporary construction compounds shall be cleared of plant/compound facilities and the hardstand removed following cessation of use. These areas, totalling 3.93Ha, shall be replanted and incorporated back into the commercial forest.

The on-site drainage network will be left in place and monitored on a quarterly basis to ensure effective operation as per its purpose. Continuous water quality monitoring will be undertaken throughout the construction phase consistent with the measure outlined in Technical Appendix 11-3 Water Quality Monitoring Plan and 4-1 CEMP.

Continuous monitoring probes measuring pH, Dissolved Oxygen (DO), Temperature (°C), Electrical Conductivity (EC) (µS/cm), Turbidity (NTU), Ammonium (NH4) (mg/l), Nitrate (N) (mg/l N), and Dissolved (ortho-)phosphate (PO4-P) (mg/l) shall be installed on the River Clydagh at the upstream and downstream extent of the Proposed Development site.

During this phase of monitoring, discrete 'snapshot' in-situ measurements and grab samples for laboratory analysis shall also be undertaken at all planned monitoring locations. This monitoring will continue for a 12-month period following construction completion and commissioning of the wind farm to ensure that if any pollution migrates to the watercourses that measures are implemented to rectify the impact and remove any contamination source associated with the wind farm.

At decommissioning phase, notwithstanding changes in requirements by the planning authority, environmental regulators or stakeholders, decommissioning phase monitoring would comprise 6 months pre-decommissioning baseline monitoring, continuous and grab sample monitoring for the duration of decommissioning, and in-situ / grab sample monitoring for a 6-month period on completion of decommissioning.

Details of this are included in Chapter 11: Hydrology, and Technical Appendix 11-3 Water Quality Monitoring Plan.

Along the Turbine Delivery Route, street furniture removed to facilitate turbine delivery will be reinstated following delivery completion, in accordance with "Guidance for Managing Openings in Public Roads", Department of Transport, Tourism and Sport, Second Edition (Rev.1), April 2017.

The construction methodology and reinstatement of the grid connection is described in Appendix 4-4.

4.5 Operation

4.5.1 Operational Lifespan

The Proposed Development will have an operational lifespan of 35 years from the date of commissioning of the entire wind farm.

4.5.2 Infrastructure Maintenance

During the operation of the wind farm, the turbine manufacturer, the wind farm operator, or a service company will carry out regular maintenance of the turbines, substation and site infrastructure.

This will comprise monthly inspections and maintenance as required to ensure smooth, efficient and safe operation of the wind farm. Inspections will be undertaken over the course of a day with one vehicle attending Site. In addition, operation and monitoring activities will be carried out remotely with the aid of computers connect via a broadband link.

4.5.3 Operation Waste Management

Wastes arising as a result of servicing and maintenance (e.g. lubricating oils, cooling oils, packaging from spare parts or equipment, unused paint etc.) will be removed from the Site and reused, recycled or disposed of in accordance with the relevant regulations at time of construction, see Technical Appendix 4-1b Waste Management Plan.

4.6 Decommissioning

Once the Proposed Development ceases operation after the period of generation, all major equipment and structures will be removed from the Site or may be replaced with a new set of turbines subject to planning permission being obtained.

The plan provides details of the deconstruction and decommissioning methodologies, the environmental controls that will be implemented, the Emergency Response Procedure, methods for reviewing compliance and an indicative programme of decommissioning works.

The onsite substation and 110kV grid connection will remain in place as they will be under the ownership of the ESB and will form a permanent part of the national electricity grid. A permanent permission is therefore required for the substation and 110kV grid connection.

The seventeen wind turbines will be disassembled and broken down in accordance with the manufacturer's guidelines. All above ground turbine components will be separated and removed off-site for recycling.

Turbine foundations and hardstands will remain in place and allowed to naturally revegetate.

All other elements of the proposed development will remain in-situ. The Site access roads and associated drainage systems will serve ongoing forestry and agriculture activity in the area. All other hard surfaced areas will be allowed to revegetate naturally.

Based on the experience of the project team monitoring operational wind farm sites throughout the country, the approach of allowing hard surfaced areas to revegetate naturally has proven to be very successful.

Cranes of similar size to those used for construction will disassemble each turbine using the same crane hardstands. The towers, blades and all above ground components will be removed from site and reused, recycled, or disposed of in a suitably licenced facility. (The financial costs of decommissioning, at current material values, will be more than met by the recycling value of the turbine components.)

Turbines will be cut on site so as to fit on articulated trucks, therefore allowing the use of the civil construction delivery route to the south for removal.

Potential impacts will be similar to that of the construction phase, albeit to a lesser extent and are described in each chapter of this EIAR.

A decommissioning plan is included as an annex to the CEMP in Appendix 4-1. Prior to the decommissioning works, a plan will be submitted to the planning authority for written agreement. The plan will take account of contemporary Good industry practice at the time of decommissioning.

It is estimated that the decommissioning process will take 12 months.

The potential for effects during the decommissioning phase of the Proposed Development have been assessed in this EIAR.

4.6.1 Decommissioning Waste Management

The decommissioned turbine components will have sufficient salvage value to ensure their proper recycling.

Detail is provided in the Waste Management Plan, appendix to the CEMP (Appendix 4-1).

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