2 Development Description

2.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) provides a description of the repowering of the Operational Barnesmore Windfarm (the Development) which forms the basis of the assessments presented within Chapters 5 to 15. It provides details of the initial decommissioning, construction and operational phases of the Development.

This Chapter includes an overview of the Development followed by a detailed description of the main components and their method of construction. Measures that have been built into the design of the Development to reduce effects, also known as 'Embedded' Mitigation measures, are set out in the various technical chapters and in this chapter. In addition to these Embedded Mitigation measures, Chapters 5 to 15 also present mitigation and enhancement measures where specifically relevant to their assessment topic.

This Chapter of the EIAR is supported by supporting Figures in Volume III and the following Technical Appendix documents provided in Volume IV:

- Outline Construction Environmental Management Plan (CEMP) in **Technical Appendix 2.1**;
- TLI Technical Note 1 on Grid Connection is contained in **Technical Appendix 2.2**;
- Surface Water Management Plan (SWMP) in **Technical Appendix 2.3**; and
- Draft Habitat Management Plan (Draft HMP) in **Technical Appendix 6.7.**

Common acronyms used throughout this EIAR can be found in **Technical Appendix 1.4**.

2.2 Site Location and Environs

2.2.1 Introduction / Existing Land Use / Permitted Land Use

Barnesmore Windfarm is located approximately 10 km northwest of Donegal Town. The site commenced operations in 1997 and currently there are 25 no., 600 kW Vestas V42 Wind Turbine Generators (WTG) with a 61 m tip height operating on the site. General access to the Site will be via the N15 and the L2595, L2095 and onto the L2015 to the site entrance. Refer to **Figure 1.1**.

The existing turbines are sited on elevated moorland above Barnesmore Gap between the N15 and the Irish national border, the Site Boundary is wholly within the Republic of Ireland. The site elevation is between 300 m and 398 m AOD.

Planning permission ('the Existing Permission') was granted by Donegal County Council on the 10th August 1996 under planning reference 95/914 for the erection of up to 26 no., 40 m hub height wind turbine masts, transformer compound with associated single storey switch room building and service roads at Keadew Upper, Cullionboy and Clogher, Co. Donegal. The Existing Permission is for a windfarm in 'perpetuity', which means there is no expiry of The Existing Permission and it can therefore continue to operate with the existing turbines indefinitely.

Planning Permission is being sought by the Applicant to repower the Operational Barnesmore Windfarm at Keadew Upper, Cullionboy and Clogher, Co. Donegal.

The closest building is located approximately 1.3 km from the Site Boundary, although this property is abandoned and used as a shed for livestock. The nearest inhabited residential dwellings are located over 2 km from the Site Boundary to the north of the site apart from one house which is located 1.8 km from the nearest turbine**.** There are 21 houses within 2.5 km of the Development (**Figure 1.2 & Figure 1.3**).

The existing site infrastructure is bounded by the Barnesmore Bog Natural Heritage Area (NHA). The National Parks and Wildlife Service (NPWS) mapping has sought to exclude the existing windfarm infrastructure from the designation. There are parts of the Development which are inside the NHA boundary, for example T13 and its Turbine Hardstand and Site Access Track and parts of the other turbine hardstands which go beyond approximately 3 m of the existing infrastructure.

The Barnesmore Windfarm landholding also contains a number of turbary plots and some sheep grazing occurs on site, outside of any agreement with the landowner (SPR).

2.3 Project Description

Permission is being sought by the Applicant to repower the Operational Barnesmore Windfarm at Keadew Upper, Culionboy, County Donegal. Repowering is the replacement of the less efficient, existing wind turbines with more modern and efficient wind turbines. In the case of the repowering of the Operational Barnesmore Windfarm, this will mean the removal of the existing 25 no., 600 kilowatt (kW) turbines and replacement with up to 13 no., 4-6 megawatt (MW) turbines. The benefit of this process is an increased overall generating capacity and output from 15 MW to over 65 MW, as well as a reduction to almost half the total number of turbines within the Site. One of the main aims of the design strategy is to redevelop the Site within the existing infrastructure footprint. The Development will involve the following phases:

- Initial Decommissioning of the Operational Barnesmore Windfarm;
- Construction of the Development (likely to occur in tandem with the above phase);
- Operation of the Development; and
- Decommissioning of the Development.

The decommissioning of the Operational Barnesmore Windfarm and the construction of the Development are likely to occur partly in tandem and will therefore have lesser inverse effects than if the two processes were to arise at different times. The decommissioning and construction occurring partly in tandem represents a worst-case scenario for assessment purposes.

In line with the existing consent for the Operational Barnesmore Windfarm, the application for the Development is being made on the basis of an operational period that is not time limited and this has also been the basis of the EIA assessment(s).

Any effects arising as a result of any future decommissioning of the Development are considered likely to be similar but be no greater than the effects arising when these two phases are combined. As a result, the final decommissioning phase has not been considered further in the assessment Chapters.

The Development is defined in Section 1.4 of **Chapter 1: Introduction**.

The Development will be able to exploit the improvements in turbine technology that have occurred in recent years. Taller turbines with larger blades are able to produce significantly increased output by maximising the available wind resource. As discussed later in this section, the output of the 13 proposed turbines (and therefore carbon dioxide ("CO_2") emission avoidance) associated with the Development will be four to five times greater than that associated with the Operational Barnesmore Windfarm.

Should energy production operations cease at the Site, all turbine infrastructure will be decommissioned, dismantled and removed from the Site, and grounds reinstated in agreement with the authorities. The Development is designed to be low impact and is fully reversible in nature.

2.3.1 Land Ownership

All lands within the Site Boundary of the windfarm are in the ownership of the Applicant. Agreements are in place for the sections of the haul route where development in third party lands is proposed.

2.4 Wind Resource

Due to the location in the northwest of Ireland, its proximity to the Atlantic seaboard and elevation, the Site experiences high average annual wind speeds. The Operational Barnesmore Windfarm has consistently demonstrated a high level of wind energy productivity, substantiated by speed and direction data obtained from a temporary meteorological mast installed at the Site. This data has also been used to inform the design of the Development's turbine layout and inform the energy yield estimates.

Wind speed at the Site is proven to be sufficient for a commercially viable wind energy development.

2.5 Site Infrastructure and Construction

2.5.1 Proposed Layout Design

The permanent windfarm infrastructure (Shown on **Figure 1.2**) will include the following:

- Decommissioning and removal of 25 no. existing wind turbines and reinstatement of the redundant site infrastructure including site roads of 600m in length;
- Construction and erection of up to 13 no. wind turbines each with maximum overall ground to blade tip heights of up to 180 metres and associated crane hardstandings and wind turbine foundations;
- Upgrade of the existing site access roads and provision of 188m of new site access road;
- Upgrade of the existing Golagh 110 kV electrical substation and compound to include for an expansion of the footprint to accommodate an EirGrid control building, a new IPP control building, car parking, grid transformer, 110kV cable chair, outdoor electrical plant and equipment, security boundary and perimeters fencing, wastewater holding tanks, groundwater well and the removal of the existing overhead line connection and demolition of the existing IPP control building;
- Upgrade works associated with the existing 110kV grid connection including the undergrounding of a 1.15 km section of the existing 110 kV overhead power line, the construction of a new cable interface tower on the existing Golagh Tee 110kV overhead line, underground cable connection in the existing site access track from the new cable interface tower to the upgraded Golagh Substation and removal of the existing angle mast and end mast towers;
- 1 no. permanent meteorological mast up to 30 m in height, including a foundation, underground power and communication cabling and security fencing;
- Temporary Contractors Construction Compound;
- Site drainage network;
- Internal wind farm underground power and communications cabling;
- A 15 Megawatt Energy Storage Facility and associated electrical plant, equipment and security fencing; and
- All associated site development and ancillary works.

The temporary works to facilitate the construction phase, which are assessed in this EIAR as part of the EIA Development, will include the following:

- works on the access road to allow delivery of turbine components, some of which may be left as permanent works if Donegal County Council are in agreement;
- a Temporary Construction Compound; and
- temporary site drainage features.

The layout design was based on the following constraints and buffers where possible:

- new infrastructure restricted to being within or adjacent to existing infrastructure;
- distance to watercourses of at least 50 m;
- distance to land drains of at least 20 m;
- distance from turbines to inhabited houses of 1,000 m; and
- avoidance of ground slopes of greater than approximately 10 - 14%.

The maximum installed capacity of the Development will be up to 76 MW with an additional Energy Storage Unit of 15 MW. It is noted, however, that the potential environmental impacts arise predominately from the number, size and location of the wind turbines and associated infrastructure, rather than their installed capacity. The wind turbine maximum output is a marginal factor for the environmental impacts but does have a greater corollary in the consideration of the benefits of The Development. EirGrid have been consulted and have confirmed that for the grid connection route, reusing the existing infrastructure is viable and that an increase in export capacity is available for a windfarm of the size proposed. However, some works will be required off-site which will involve removal of an overhead line lattice tower and erection of a new tower to divert lines from the Development into the 110 kV Clogher substation. Refer to Section 2.5.8.

2.5.2 Wind Turbine Generator

The proposed turbines will be of typical modern design and will be a three-bladed, rotor up wind of the tower, variable speed, pitched blade regulated machine. Turbine appearance will be a matt non-reflective finish in a white, off-white or grey colour. The foundation-to-tip height will be up to a maximum of 180 m.

The turbine will have a circular based tower, sitting on a reinforced concrete foundation. The tower will support the nacelle, rotor hub, and rotor blades. Commercial wind turbine towers are typically made of steel or a hybrid of steel and concrete. The nacelle is mainly metal (steel, copper, aluminium, etc.) with a metal/plastic/glass-reinforced plastic (GRP) body, while the blades can be made of a matrix of glass-fibre reinforced polyester or wood-epoxy or similar composite materials.

Each turbine will have an installed generator with a maximum capacity of up to approximately 5.8 MW. The turbines may be direct drive machines or may contain a gearbox. 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 final choice of turbine model is unknown at this stage. However, a hypothetical candidate turbine has been identified for the purposes of EIA and planning approval. The candidate turbine represents the worst-case scenario parameters of the shortlisted turbines that are anticipated to be on the market when the turbine procurement contract is tendered. An indicative schematic drawing of the candidate turbine is shown on **Figure 2.10**.

This selection has been informed through consultation with the main turbine suppliers. For this reason, the current planning application is being made in terms which provide for dimensions of ‘up to’ the sizes detailed in the planning application drawings. This will allow a small degree of flexibility in the final dimensions in the grant of planning permission.

For the purposes of the assessments, a candidate turbine has been selected based on the precautionary principle of assessing the worst-case scenario and is presented in **Tale 2.1**.

Table 2.1: Proposed Turbine Parameters

Turbine Parameter	Assessment Envelope
Turbine Blade Tip Height	Up to 180 m
Rotor Diameter	Up to 158 m
Hub Height	Up to 113.5 m

The turbine blade tip height will not exceed 180 m with the blades in a vertical position. Should a smaller rotor be specified, then the tower will likely increase in height correspondingly to maintain the overall turbine height. The assessment of the candidate turbine is based on worst-case scenario of a 158 m rotor diameter.

Wind turbines are generally supplied with a product design life of 25 years. However, experience from the Applicant’s operational portfolio demonstrates that turbines can be warranted to operate safely beyond this period, with appropriate asset monitoring and maintenance programmes.

The turbine blades typically begin to rotate at a wind speed of approximately 2.5 m/s. Full power output is typically reached at a wind speed of between approximately 10 and 12 m/s, and will stop generating at extreme wind speeds, typically between 28 and 34 m/s. The rotor will spin at between 5 and 15 revolutions per minute (rpm).

The turbines are controlled via a Supervisory Control and Data Acquisition (SCADA) computer system so that they are facing into the wind at all times for optimum efficiency. The rotors of all turbines will rotate in the same direction at all times with localised wind conditions determining the specific orientation of each turbine individually.

In high wind speeds, the turbines will turn out of the prevailing wind as controlled through the SCADA control software to maintain their operation prior to cutting out if wind speeds exceed the safe operating limits of the turbine.

Each individual turbine will generate electricity at a nominal voltage depending on the turbine design. Each turbine will also have its own transformer to step-up to an on-site distribution voltage. The transformer and associated switchgear is typically housed in a cabinet located at ground level beside the turbine. The generated power will be transmitted to the Substation by underground electrical Windfarm Internal Cabling which is typically run alongside the Site Access Tracks.

The Development turbine locations are found at the coordinates outlined in **Table 2.2**.

Table 2.2: Development Turbine Coordinates

Turbine No.	ITM Easting [m]	ITM Northing [m]	IG Easting [m]	IG Northing [m]	Existing Ground Elevation [m AOD]
T1	604996	883567	205046	383572	370
T2	604938	883031	204988	383036	366
T3	604646	883152	204695	383157	383
T4	604544	882718	204593	382723	340
T5	604108	883736	204157	383741	361
T6	603251	882996	203300	383001	372
T7	603692	883103	203741	383108	372
T8	604192	882981	204242	382986	364
T9	603594	882331	203643	382336	371
T10	603821	881916	203870	381921	307
T11	604310	882275	204360	382279	333
T12	603355	881850	203404	381855	304
T13	603096	881426	203145	381431	295
Met Mast	604103	883204	204152	383209	383

2.5.3 Turbine Foundation and Turbine Hardstands

All turbine suppliers have a requirement for a Turbine Hardstand area to be constructed beside each turbine. The general layout of the Turbine Hardstand is designed to accommodate the delivery, laydown, and assembly of turbine components (in particular rotor assembly) prior to turbine lifting and assembly and is shown in **Figure 2.3**. The Turbine Hardstands are needed to support the cranes during turbine construction, the operational and maintenance phase, and for decommissioning. The Turbine Hardstands will be constructed first and used to facilitate Turbine Foundation construction, such as steel reinforcement delivery and pouring of concrete. Turbine Hardstands for the Development will reuse existing hardstands/infrastructure as far as possible to minimise new land take.

Construction of the turbine and meteorological mast hardstands will require the excavation of overburden material to the noted area and depth, the laying of a geotextile material on the formation surface and placing engineered stone and a top dressing. The main Turbine Hardstands will be approximately 50 m by 25 m and will be approximately 0.8 m in depth depending on the local bedrock profile and the varying soil depth (giving a surface area of 1,250 m^2 (16,250 m^2 for 13 turbines) and a material volume requirement of approximately 13,000 m^3.

The Turbine Foundations will be up to approximately 22 m in diameter and have a depth of approximately 3 m. The Turbine Foundation design will depend on the turbine type and will be decided by the structural engineers at detailed design stage. These dimensions are indicative but generous and will depend on the existing ground conditions and the depth to soil with a suitable bearing capacity. The central part of the foundation will be approximately 3.5 m in diameter, will be raised from the main Turbine Foundation below ground level and will encompass a cast-in insert or bolts to connect to the bottom of the turbine tower and reinforced bar structural elements.

The anticipated volume of concrete and steel required for each Turbine Foundation will be up to approximately 590 m^3 and 86 tonnes respectively. The area around and above the Turbine Foundation will be backfilled with compacted granular material and the only portion exposed in the long term will be the central foundation section.

Depending on the results of detailed site investigations (post consent), the possibility of installing rock anchors will be explored as a means of reducing the footprint and material volumes, of the Turbine Foundations. Traditional gravity foundations are considered for EIA purposes as this represents a worst case scenario, but it should be noted that the predicted environmental effects could be reduced where rock anchor foundations could be used for some of the Turbine Foundations.

Based on the results of peat probing and geotechnical assessments to date, peat depths are not deep enough to require piling of Turbine Hardstands. Therefore, the construction method for all the Turbine Hardstands is envisaged to be via excavated approach, although it should be noted that most of the Turbine Hardstands are an augmentation of one of the existing hardstand/foundation locations.

The construction methodology for the wind Turbine Foundations will depend on the strength and depth of the substrata specific to each location. Turbine Foundations will need to be taken down to competent bearing strata by excavating through the peat / soil, subsoil and rock if necessary.

A typical method of construction for Turbine Foundation is also described below:

- Install temporary drainage around perimeter of excavation;
- Excavate peat / soil and rock;
- Back fill the foundation with excavated rock;
- Form a level working area to build foundation;
- Install formwork and reinforcement;
- Pour concrete;
- Once the concrete has set and the earthing system is in place, backfill the foundation with suitable excavated material; and
- Use soil to build up the area around the Turbine Foundation.

Excavated peat will be used to reinstate areas of the site to peatland habitat where infrastructure is no longer required and in areas designated for restoration and enhancement. Further details of the approach to restoration and enhancement can be found **in Chapter 6: Biodiversity** and in the Draft HMP in **Technical Appendix 6.7**.

There will be no concrete batching on Site. Rather, it will be transported to the Site as it is required. A dedicated, bunded area will be created to cater for concrete wash-out and this will be within the Temporary Construction Compound. 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.

2.5.4 Site Access Tracks

The existing Site Access Tracks at the Operational Barnesmore Windfarm will be reused for the Development where possible. These will be upgraded and widened as necessary to provide a minimum width of 4.5 m. Approximately 10,320 m of the existing Site Access Track length will be reused for the Development. Proposed Site Access Tracks are shown on **Figure 1.2**. Upgraded Site Access Tracks will be approximately 10,320 m^2 in surface area and will require approximately 5,160 m^3 of stone material.

Where there are sections of existing Site Access Track that become redundant following the repower works, there will be an opportunity remove and reinstate a proportion of this area.

There will also be 188 m of new Site Access Track required for access to Turbine T13. This will be constructed to provide a minimum width of 4.5 m and will cover an area of 846 m^2 and require c.423 m^3 of rock. This track will be excavated to firm bearing strata and constructed using rock, either reused from reinstated Site Access Track and / or Turbine Hardstand or using imported rock from local quarries.

There will be no on-site borrow pits associated with the Development. Rock from the decommissioned sections of the existing Site Access Track can be reused for construction of Turbine Hardstands and Site Access Track upgrades. Other construction materials will be imported to the Site and will include stone and quarry run material for various uses (including Site Access Tracks, Turbine Hardstands, electrical substation compound, etc.). Limestone may be used as capping for roads to assist in reducing sediment runoff. There are a number of local quarries in the area which will be used to supply similar stone to that of the Site. The use of local quarries, where possible, will also reduce any impact on traffic and the environment. The use of any local quarry will be subject to competitive tender by the appointed contractor during the construction phase. The appointed contractor will only be permitted to use authorised quarries in the area.

The Site Access Tracks are necessary to allow access for cranes and delivery trucks during construction of the Development and also during servicing/repairs to the wind turbines. The existing Site Access Tracks associated with the Operational Barnesmore Windfarm will be used as far as possible to minimise additional land take. These tracks will be upgraded as necessary so that the minimum width will be 4.5 m, although Site Access Tracks will need to be somewhat wider at bends and at passing bay locations. Thus, a width of 4.5 m – 5.5 m is generally provided. Gradients should, generally, be limited to 1 in 7 (approximately 12 %) and a stone layer should be provided, so as to provide a good grip during wet weather. Gradients of proposed Site Access Tracks will not exceed this value.

The Site Access Track layout follows the existing Site Access Tracks, avoiding environmental constraints, and following the natural contours of the land. Every effort has been made to minimise the length of track necessary, including removal of redundant tracks where possible.

The Site Access Tracks will be upgraded as necessary to carry a minimum 12 tonne axle construction loading. This design is likely to consist of 150 mm of 50 mm Down Quarried Rock / Gravel Pavement on an average of 400 mm Down Crushed Run Rock. Exact quantities will be determined from the findings of the detailed site investigations phase.

The typical Site Access Track construction detail is shown in **Figure 2.9a & b**.

Site Access Tracks will have to be maintained during the construction phase. When weathered, the stone should not contain any constituents which may be harmful to the environment, surface and groundwater in particular. Stone imported to the Site will be of a similar geochemistry to the existing bedrock. It is envisaged that any rock to be imported to the Site for construction will be sourced from local quarries in the area, subject to testing and availability, and compliance with all applicable laws and permits.

Various Turbine Hardstand areas in addition to turning areas are required in the vicinity of each turbine location. Turbine Hardstand areas must allow two cranes to work in the vicinity of a turbine.

There are a number of crossings of land drains and natural streams/flushes along the Site Access Tracks. Existing crossings will be upgraded for the increased Site Access Track widths for the Development. There is one new crossing of a (unmapped) drain required on the new section of Site Access Track to Turbine T13. This crossing will be designed and constructed in consultation with Inland Fisheries Ireland (IFI) prior to commencement of construction. However, an indicative design has been developed and is shown in **Figure 2.7d**.

2.5.5 Met Mast

As part of the grid code[1] requirements, all windfarms with an installed capacity of greater than 10 MW are required to supply continuous, real-time data for the windfarm location. The data required is the wind speed and wind direction at turbine hub height, air temperature and air pressure. The data is required to be provided by a dedicated meteorological mast up to 30 m in height (location as detailed in **Figure 1.2**) in combination with a LiDAR (Light Detection and Ranging) or anemometer located on one of the turbines.

The Met Mast will be located on the site of the existing met mast and be a free-standing lattice type structure as shown in **Figure 2.4**. The Met Mast foundation be will be up to approximately 4.5 m by 4.5 m, with a depth of approximately 1 m and will be designed and constructed similar to the turbine foundations. The area around and above the foundation will be backfilled with compacted granular material. The Met Mast will be linked to the windfarm Substation via buried Windfarm Internal Cabling for power and communication of approximately 2,150 m in length and will be required for the full operational duration of the Development.

2.5.6 Windfarm Electrical Substation, Control Building and Associated Compound

It is envisaged that the existing 110kV Substation will be upgraded, the location of which is shown in **Figure 1.2**. The general design of the Substation is as shown in **Figure 2.5**. The Substation serves two main functions:

1) provide housing for electrical switchgear, control equipment, monitoring equipment, and storage space necessary for the proper functioning of the windfarm, and
2) provide a substation for metering and for switchgear to connect to the national grid.

The existing Golagh Substation was designed to meet previous EirGrid Specifications. The new EirGrid 110kV Tail Fed AIS Specification has a number of new requirements not previously required in the older specification. These new requirements will increase the overall substation footprint with considerations to minimise exceeding development boundaries due to the sensitivity of the area. The lands around Barnesmore Windfarm are designated as part of Barnesmore Bog Natural Heritage Area (NHA).

A review of the existing substation design and a comparison to the new EirGrid Specification has been undertaken to identify how the existing substation could be upgraded and expanded to meet the new EirGrid requirements rather than constructing a new substation. The main difference between the existing substation layout and the new EirGrid

[1] EirGrid (22 July 2005). EirGrid Grid Code Version 6

specification is the requirement for a larger EirGrid control building. The Applicant is proposing that the existing substation compound is extended to the west to facilitate the construction of a new EirGrid control building and that it also extended slightly to the east to facilitate the installation of the larger transformer required for the windfarm.

The Applicant is proposing to maintain the current layout of the 110kV switchgear where possible and, although this varies to some extent from the new EirGrid specification, EirGrid have confirmed (December 2019) that they are satisfied with these proposals. It should be noted that some of the 110kV switchgear may need to be upgraded to a higher rating as part of the project works. The proposed 110kV grid connection reconfiguration works and substation expansion works are subject to detailed design. Refer to **Figure 2.13**.

Golagh Substation Expansion Works include the following:

- Extension of the existing substation compound to the west and to the east
- Installation of a new substation access point on the west side of the substation
- Installation of a new substation boundary and perimeter fence
- Construction of a new EirGrid control building as per new specification
- Demolish the existing control building and construct a new IPP control building
- Installation of a larger transformer (incl. transformer bund and plinth)
- Retirement of the exiting OHL connection
- Installation of a 110kV Cable Chair
- Connection of a new 110kV UGC to the new cable chair

Other works that may be required depending on EirGrid requirements, include the following:

- Surge arresters at line side are currently located on line disconnect.
- Maintaining use of gantry for over the fence connection.
- Location of transformer disconnect and surge arresters to remain in IPP side of substation.

These changes are outlined in detail in the TLI Technical Note 1 on Grid Connection is contained in **Technical Appendix 2.2.**

The upgraded 110 kV Substation compound will be approximately 65 m x 33 m (increased from 43 m x 30 m for existing substation) and will be approximately 0.75 m in depth and will be constructed from engineered stone material using similar construction techniques as for the Turbine Hardstands (giving an increased surface area of approximately 73 m^2 and an increased material volume requirement of approximately 54 m^3). The overall compound will be enclosed by an approximate 2.65 m high fence and will contain a new IPP control building, an EirGrid Control Building Substation building and ancillary equipment, including the transformers, switch gear, fault protection, metering, car parking and other ancillary elements necessary for the operation of the Development.

The new substation will contain an IPP Control Building which will measure 17.8 m x 6.3 m x 5.5 m. The building will contain a control room, an MV switch room, an office, a toilet and a storage room.

The control components housed at the Substation will include metering equipment, switchgear, the central computer system and electrical control panels.

Warning / health & safety signage will be displayed as is normal practice for such installations. Motion sensitive lighting only will be used.

The IPP control building will be a single story pitched roof structure with traditional rendered finishes. Details of the control building are shown on **Figure 2.12a, b & c**. The telecommunication antenna will be fixed externally to the Substation control building for communication and control purposes (e.g. for the SCADA system) for the Applicant, turbine suppliers and ESB networks. The final finish of the control building will be an off-white or grey colour, and the final details will be agreed in writing with the Planning Authority prior to the commencement of construction. There will be a small area outside the compound and adjacent to the Site Access Track that will be a hard-surfaced area for operational and maintenance for approximately 4 parking spaces.

There will also be a new EirGrid control building measuring approximately 14 m x 13 m x 6.9 m to cater for the increased capacity of the Development. This building will contain a generator room, a battery room, a toilet and relay room. Details of the EirGrid Control Building are shown on **Figure 2.11a & 2.11b**.

The buildings at the substation will provide welfare facilities for any staff visiting the Site during the operation of the Development. A rainwater harvesting system will be installed on the roofs of the IPP and the EirGrid Control Buildings to collect water for the welfare facilities. The water collected will be stored in holding tanks for use as needed.

Potable water will be supplied via a well to be bored adjacent to the substation in accordance with Institute of Geologists Ireland, Guide for Drilling Wells for Private Water Supplies.[2] The well will be flush to the ground and will be covered by a manhole.

Wastewater from the sanitary facilities will be held in a sealed storage tank and transported off site to a licenced facility for disposal. The storage tank will be fitted with an alarm system to warn (in advance) of the tank reaching the point where it will require emptying. The company tasked with transporting the wastewater will hold an appropriate waste collection permit.

2.5.7 Windfarm Transformers and Internal Cabling

The power generated by each wind turbine will be transmitted via underground Windfarm Internal Cabling to the electrical Substation, at either 20 kV or 33 kV, as will the communication signals whose cables will be installed in the same trench. The Windfarm Internal Cabling network will be installed in trenches approximately 0.6 m wide by 1 m in depth and there will be approximately 8,550 m of Windfarm Internal Cable trenching (giving a surface area of approximately 5,130 m^2 and a material volume requirement of approximately 5,130 m^3). A cross sectional drawing is shown in **Figure 2.6**.

The Windfarm Internal Cabling routes will be laid in the verge of the Site Access Tracks and bedded in surplus excavated soil material. Danger tape, incorporating a metallic strip, will be laid during backfilling. Where the Windfarm Internal Cabling is to cross Site Access Tracks, suitable electrical ducting will be provided. Permanent posts up to approximately 0.5 m in height will mark the trenches at regular intervals and at all changes in direction. An as built layout plan showing the location of underground Windfarm Internal Cabling will be on permanent display within the control building.

Transformers will be located adjacent to each turbine at the Site. It will be located next to the tower in a small steel or GRP cabinet along with the external switchgear on a concrete foundation pad.

2.5.8 Windfarm Grid Connection

EirGrid have been consulted on the Development and confirmed that a connection to the national grid via the existing 110 kV lines which currently run from the Site to Clogher Substation for the Operational Barnesmore Windfarm is the most viable option.

The Operational Barnesmore Windfarm is currently connected to the Cathaleen's Fall-Golagh Tee 110 kV Overhead Line (OHL). The current 110 kV grid connection does not have sufficient capacity to facilitate the increased Maximum Export Capacity (MEC) of up to approximately 76 MW. It is therefore proposed to reconfigure the OHL to connect directly into the 110 kV Clogher Substation, removing the tee-connection with the Cathaleen's Fall – Letterkenny line. Grid reconfiguration works will involve the following:

- Construction of a new Cable Interface Tower between Structure 130T and Structure 310;
    - New cable interface tower to be built on the east side of the Cathaleen's Fall-Letterkenny 110kV OHL, under the existing Golagh Tee 110kV OHL
- Underground Cable connection from new interface tower to Clogher 110kV GIS Substation (Spare Bay);
- Removal of hard tee-connection between Cathaleen's Fall-Letterkenny 110kV OHL and Cathaleen's Fall-Golagh Tee 110kV OHL;
- Retirement of existing structure 130T; and
- Termination of existing conductor to new proposed cable interface tower.

The location of these structures is outlined on **Figure 3.5**.

Approximately 1.15 km of the existing 110 kV overhead lines which currently run through the Site will be undergrounded to allow the construction of T10 and T12. EirGrid require that turbines are a minimum of 3 rotor diameters from existing 110 kV lines. Therefore, the replacement section of Windfarm Internal Cabling will be run within the existing Site Access

[2] Institute of Geologists Ireland (2007), Guide for Drilling Wells for Private Water Supplies.

Track for a distance for c. 1.2 km and then return to continue on the existing overhead route. The environmental effect of the grid connection is assessed within this EIAR.

2.5.9 Access to the Site

It is currently proposed that the turbine nacelles, tower hubs and rotor blades will be landed at Killybegs Harbour in County Donegal. From there, they will be transported to the Development site via the R263 and N56 to Donegal Town and then the N15 to the L2595, L2095 and onto the L2015 to the site entrance. This is a proven route for the delivery of windfarm components as it was used for the construction of the 38 turbine Meenadreen Windfarm and existing Barnesmore turbines. The final haul route chosen will be the responsibility of the turbine supplier and subject to their detailed route assessments (refer to **Chapter 14: Traffic and Transport**). The proposed Haul Route assessed in the EIAR is shown on **Figure 2.1**.

From the L2095, turbine components will travel along the local access road (L2015) to the southwest of the existing windfarm. This is the road used to access the Operational Barnesmore Windfarm. The road will be upgraded and widened in two locations where third-party land agreements are required to allow the turbine components to enter the Site. SPR have reached an agreement to secure the necessary rights to undertake the works. Any materials sourced from the local quarries will travel along the L2595, L2095 and use the same local access road. This access will be used to service all 13 turbines.

Works to facilitate the delivery of turbine infrastructure are proposed at eight locations as follows (refer to **Figure 2.1**):

- Point A – Verge strengthening on the southern side of the N56 at Bruckless Bridge and on the western side before the bridge to allow for the wheel loading of abnormal load vehicles.
- Point B - Relocation of electricity pole at Darney on the N56, verge strengthening for wheel loading and blade oversail on the western side of the road north of the bend and removal of existing vegetation on the verge to the east of the road on the northern side of the road.
- Point C - On the N15, a part of the road verge will need to be strengthened for wheel loading and some existing vegetation will need to be removed to allow oversail of the turbine vehicle. On the L2595, the verge will need to be strengthened on the western side of the road, the Stop signs will need to be temporarily relocated, existing vegetation will need to be removed on the western side and there will be strengthening of the verge on the eastern side to allow the necessary wheel loading.
- Point D – Verge to be strengthened to allow for the necessary wheel loadings on the northern side of the L2595 and on the southern side of the L2095.
- Point E - Existing verge will need to be strengthened on the L2095 between Clogher Bridge and the L6565 to allow for the necessary wheel loadings for turbine transport vehicles.
- Point F - The road will need to be widened at the junction to allow abnormal loads vehicles to turn onto the L2015 from the L2095. An ESB pole will also need to be removed.
- Point G - Widening of the L2015 local road to the Site.
- Point H - Widening on the L2015 to the Site to allow abnormal load vehicles to negotiate the bend. There will also be a requirement to pipe an existing open drain and strengthening of the verge to allow for the required wheel loading.

These works are not part of the Development (aside from the works at Point F & G). Works will be authorised under a separate application, as required. However, the environmental effects of this element are considered within the wider assessment (EIA Development).

Other normal heavy goods vehicles ("HGV") material deliveries will use the national and regional road network to site. Light goods vehicle ("LGV") and staff car transport will retain flexibility due to higher flexibility requirement for local workforce personnel. A Transport Management Plan will be drafted in consultation with the Council and Highways authorities to agree the management of project transport elements.

2.5.10 Site Signage

Signs will be placed on the L2095 and the L2015 showing directions to the Site, as is currently the case with the Operational Barnesmore Windfarm. Additional signage will be placed on these roads, warning of construction vehicles entering and egressing the Site for road safety measures. As is currently the case, the Site entrance on the L2015 will have a sign confirming that it is the entrance to the Site and the speed limit of 19 m/h (or 30 km/h). There will also be additional signs during the initial decommissioning and construction phase confirming that construction works are taking place and proper precautions must be taken by anyone entering the Site. There will be no entry to unauthorised persons or the general public during decommissioning and construction.

2.5.11 Energy Storage Unit

The Development will include an Energy Storage Unit with a capacity for up to 15 MW of energy storage which will supersede the consented 6 MW facility at the Operational Barnesmore Windfarm. The facility will contain 10 no. 12 m containers mounted on concrete plinths with a maximum height of 5 m. The batteries will be fully enclosed in the containers. The compound will be approximately 750 m^2 and located next to the proposed 110 kV Substation. The estimated amount of imported rock is 480 m^3. The location of the proposed Energy Unit is shown on **Figure 1.2** and the layout is shown on **Figure 2.14a & 2.14b.**

The current energy storage technology favoured today is Li-ion batteries. These batteries are used widely due to their fast response time, which makes them preferable for grid-scale deployment. The Li-ion batteries vary in cell chemistries (e.g., Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt Oxide, Lithium Cobalt Oxide, Lithium-Titanate) and cell arrangement (e.g., cylindrical, pouch, prismatic). Chemistry and arrangement will dictate the batteries' performance characteristics. The final selection of energy storage technology used will be based on the best appropriate technology available at the time of construction, and it is requested that final details of this ancillary element be secured via the use of an appropriately worded planning condition.

The compound will be surrounded by a 2.6 m high paladin-type fence. Access to the fenced off compound shall be through similar styled paladin double gates.

2.5.12 Table of Key Development Infrastructure Metrics

Table 2.3 contains the Key Development Infrastructure Metrics. This table was provided for ease of access to these metrics for reference by the personnel writing the other EIAR chapters.

Table 2.3: Key Development Infrastructure Metrics

Description	Length [m]	Width [m]	Depth [m]	No.	Area [m^2]	Volume of Excavation [m^3]
Upgraded Site Access Track	10,320	1	0.5	1	10,320	5,160
New Site Access Track	188	4.5	0.5	1	846	423
Windfarm Internal Cabling (power & communications)	8,550	0.6	1	1	5,130	5,130
Turbine Hardstands - cranes	50	25	0.8	13	16,250	13,000
Turbine Foundation (22 m diameter)			3.0	13	4,940	14,820
Met Mast foundation	4.5	4.5	1	1	20.25	20.25
Electrical Substation (additional area following upgrade)	22	3.3	0.75	1	72	54
Battery Storage Compound	40	40	0.3	1	1,600	480
Cut & Fill Areas & Junctions	n/a	n/a	0.5	1	49,151	24,576
Permanent areas / volumes	n/a	n/a	n/a	n/a	83,200	58,533
Temporary areas / volumes	n/a	n/a	n/a	n/a	5,130	5,130
TOTAL	**n/a**	**n/a**	**n/a**	**n/a**	**88,330**[3]	**63,664**

Areas of the existing Site Access Track and Turbine Hardstands will be reinstated with the areas of each outlined in **Table 2.4** below.

Table 2.4: Reinstated Areas

[3] Some of the areas are on previously disturbed ground and this will reduce the overall effect.

Description	Length [m]	width [m]	Depth [m]	No.	Area [m^2]	volume [m^3]
Reinstated Site Access Tracks	600	3.5	0.5	1	2,100	1,050
Reinstated Hardstand areas	n/a	n/a	0.5	n/a	10,109	5,055
TOTAL	**n/a**	**n/a**	**n/a**	**n/a**	**12,209**	**6,105**

Taking the above Figures into consideration, the permanent additional land take from the Development will be 83,200 m^2 (8.32 hectares) with 12,209 m^2 of the Operational Barnesmore Windfarm being reinstated. The Development will use approximately 60,400 m^2 (6.04 ha) of the Operational Barnesmore Windfarm infrastructure. Therefore, the total land take required for the Development will be 14.36 ha.

2.6 Decommissioning and Construction

The first phase of the Development will comprise the initial decommissioning phase, which will involve the removal of the existing 25 turbines on the Operational Barnesmore Windfarm and the reinstatement of the lengths of Site Access Track and Turbine Hardstands which are not proposed to be used for the Development. The construction phase of the Development will occur partly in tandem with the decommissioning phase and will begin with site preparation works and will be completed when the turbines are built and ready for commissioning, and when all wastes have been removed from the Site. For the Development, it is envisaged that the construction phase will last approximately 12 – 18 months.

Table 2.5: Indicative Decommissioning / Construction programme

Activity	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Site Establishment												
Decommissioning existing turbines												
Access road upgrade, removal & construction												
Substation & Energy Storage Hardstanding construction												
Excavation & construction of Turbine Foundations & Hardstands												
Windfarm Internal Cabling installation												
Turbine erection												
Commissioning												
Energy Storage Unit construction												
Site restoration												

Reinstatement works will involve restoration of the areas of the Site to peatland habitat following the removal of the unrequired sections of Site Access Track and Turbine Hardstand areas. Further details on the approach to restoration can be found in Chapter 6 and in the Draft Habitat Management Plan (HMP) in **Technical Appendix 6.7**.

2.6.1 Micrositing

The Development site infrastructure is designed around considerations of technical, economic, and environmental constraints. While the Site layout was optimised as far as practicable and EIA standard environmental investigations have taken place, adverse geotechnical ground conditions may require the minor micrositing of Development infrastructure. As per Section 5.3 Ground Conditions/Geology of the current 2006 Wind Energy Planning Guidelines ("the 2006 WEPG"):

> *"Provision must be made for carrying out site-specific geo-technical investigations in order to identify the optimum location for each turbine. These investigations may suggest minor adjustments to turbine location. In order to accommodate this practice there should be a degree of flexibility built into the planning permission and EIS. The extent of flexibility will be site specific but should not generally extend beyond 20 metres. Any further changes in location beyond the agreed limits would require planning permission*."

Any such movement will only be implemented if necessary and the above noted requirements of the 2006 WEPG will be followed. Such variations in ground conditions will only become apparent following full and complete excavation of the Turbine Foundation area during the construction phase. A movement of the turbine will require the associated Turbine Hardstand and Site Access Track to 'follow' the Turbine Foundation move.

2.6.2 Construction and Environmental Management Plan

A Construction and Environmental Management Plan ("CEMP") will be prepared and implemented for the Development. The CEMP will be agreed with the Planning Authority in writing prior to the commencement of construction. To manage potential impacts, the CEMP will be prepared to collate and manage the detailed implementation and phasing of the Development; to agreed detailed mitigation measures; monitoring; and post-construction reinstatement arrangements.

An Outline CEMP is appended to the EIAR in **Technical Appendix 2.1**. This document will be developed into a site-specific Barnesmore CEMP post consent/pre-construction once a contractor has been appointed and will cover both the decommissioning of the Operational Barnesmore Windfarm and the construction of the Development. It will include all of the mitigation recommended within the EIAR. For the purpose of this application, a summary of the mitigation measures is included in **Technical Appendix 15.1**.

A CEMP provides a commitment to mitigation and monitoring, and reduces the risk of pollution whilst improving the sustainable management of resources. The environmental commitments of the Development will be managed through the CEMP and will need to be secured in contract documentation and arrangements for construction and later phases, such that there is a robust mechanism in place for their implementation. The CEMP will mainly address the initial decommissioning and construction phases, however it can also be continued through to the commissioning, operation and final decommissioning phases. An Environmental Manager / Ecological Clerk of Works (ECoW) with appropriate experience will be appointed for the duration of the construction phase to ensure that the CEMP is fully developed and effectively implemented.

2.6.3 Construction Hours

It is estimated that the Development would have approximately 50 staff members during the construction phase. In general, working hours for decommissioning / construction will be from 07:00 to 19:00 throughout the week, with reduced working hours at weekends. It should be noted that during the turbine erection phase, operations may need to take place outside those hours to facilitate Turbine Foundation construction and so that lifting operations are completed safely. Hours of working will be agreed with Donegal County Council prior to the commencement of construction. Any extensions to working hours would be agreed in advance with Donegal County Council. A detailed Traffic Management Plan ("TMP") will be put in place for the construction phase, which shall be agreed during the planning compliance stage with the Planning Authority so that strict controls are in place with all suppliers coming to the Site.

2.6.4 Construction Compound and Temporary Works Area

The Temporary Construction Compound will be set up upon commencement of the construction phase. The proposed location for the Temporary Construction Compound is at the site of the proposed Energy Storage Unit shown in **Figure 1.2** and the layout is shown in **Figure 2.8**. The proposed construction compound will be approximately 750 m^2 m using approximately 562 m^3 of rock. Once the wind turbines have been erected and the 110 kV Substation upgraded, then the Temporary Construction Compound will be decommissioned and the Energy Storage Unit will be constructed on the same area to minimise land take on the Site. The compound will be used as a secure storage area for construction materials and to contain temporary site accommodation units for sealed type staff welfare facilities. The compound will contain cabins for office space, meeting rooms, canteen area, a drying room, parking facilities, and similar personnel type facilities including first aid.

An area within the compound will be used for the storage of fuel and oils, and this will be suitably bunded. The bund itself will be lined with an impermeable membrane in order to prevent any contamination of the surrounding soils, vegetation and water table. Alternatively, double protection containers / equipment will be used along with drip trays etc., and such details will be included in the final CEMP.

During the construction phase, water will be supplied by water bowser. The maximum wastewater production is estimated to be the same as the maximum water consumption (of approximately 2,000 litres per day). The Development will include an enclosed wastewater management system at the Temporary Construction Compound capable of handling the demand during the construction phase, when as many as up to 50 people will be working on site at peak times. A holding tank is proposed for wastewater management. Wastewater will be taken off-site and disposed of at an appropriate licenced facility.

2.6.5 Construction Turbine Assembly

Once on Site, the wind turbine components will follow a detailed route and plan to minimise manoeuvring. Components can be placed on Turbine Hardstands prior to assembly. It is envisaged that a 'just in time' delivery strategy will be in place for turbine blades to reduce the need for temporary set down areas. Typically, one large crane will be required for erecting the turbines, assisted by smaller cranes. Similar cranes will also be required for maintenance during the operational phase. As with all other vehicles, refuelling of cranes will be carried out in accordance with Site procedures to minimise the risk of spillage or pollution.

The towers will be delivered in sections, and work on assembly will not start until a suitable weather window is available. Three methods can be used to attach the blades:

1. The blades can be attached to the nacelle and hub on the ground. The hub and blades are then lifted as one.
2. The hub can be attached to the nacelle and the two blades attached to the hub while the nacelle is on the ground – the "bunny lift". The nacelle is then lifted into position and the third blade lifted into place separately. This requires manoeuvring of several components on the ground and usually the repositioning of cranes.
3. Lifting the nacelle and hub as one unit, as described above and then attaching the blades one at a time, rotating the hub between lifts. The blade lifting operations do not require repositioning of the crane.

The most appropriate method will be decided by the lifting contractor and the turbine manufacturer, prior to turbine erection.

2.6.6 Construction Traffic

It is estimated that during civil construction, approximately 2,323 loads will be delivered to Site. This breaks down to approximately 194 loads per month (for a 12 month construction period) or an average of 8 to 9 loads per day (excluding Sundays). The peak number of deliveries per day will occur during the concrete pour for Turbine Foundation construction. An estimated 62 concrete and steel truck deliveries will be required per Turbine Foundation. Some other materials will also be delivered on such days, so a realistic estimation of peak deliveries is approximately 63 to 65 deliveries per day (for at least 13 separate days in the construction programme when the Turbine Foundations will be poured). This is assessed in **Chapter 14: Traffic and Transport**.

2.6.7 Construction and Management of Site Drainage

It is intended to provide drainage measures to the Development to attenuate runoff, guard against soil erosion, soil compaction, and safeguard local water quality. Details of the proposed drainage system are shown on **Figure 2.7 (a-c)**. Please note that the drainage plan will be subject to a detailed design process at pre-construction phase but will conform to the parameters set out in the EIAR. Full details are provided in **Chapter 9: Hydrology and Hydrogeology** and the **Surface Water Management Plan** in **Technical Appendix 2.3**.

There are a number of natural streams and loughs on the Site. A buffer zone of 50 m will be in place for natural streams and loughs where possible. It should be noted that the Development is reusing as much of the existing infrastructure as possible and in some cases, this existing infrastructure is closer than 50 m from natural streams and loughs on site. Best practice Sustainable Urban Drainage System (SuDS) principles will be employed as follows:

- Source controls for surface water:
    - Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sandbags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems.
    - Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures.
- In-line controls for surface water:

    - Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sandbags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriates systems.
- Treatment systems for surface water:
    - Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbusters and/or other similar/equivalent or appropriate systems.

If heavy rainfall is predicted, then works will be suspended or scaled back.

Further details on drainage management and mitigation can be found in **Chapter 9: Hydrology and Hydrogeology** and the **Surface Water Management Plan in Technical Appendix 2.3**.

2.6.8 Construction Reinstatement and Monitoring

Following completion of the construction phase, all plant and machinery will be removed from Site. Temporary works needed for the construction phase such as extra areas at Turbine Hardstands will be reinstated using the original spoil material removed and stockpiled close to the location from where it was excavated. All rubbish and waste/excess materials will be removed from Site to an appropriate licenced facility from where it will be reused/recycled, where possible, or disposed of accordingly.

Peat and spoil materials excavated during construction of the new infrastructure will be used to reinstate areas of infrastructure from the Operational Barnesmore Windfarm which will not be required for the Development, e.g. Site Access Tracks and Turbine Hardstand areas. Peat turves will be removed in layers with the vegetated side up. The top vegetated turves will be placed on top of reinstated / restored areas so that the turves can 'knit' together effectively form areas of restored peatland habitat in accordance with the Draft HMP in **Technical Appendix 6.7**.

The on-site installed drainage network will be left in place where considered beneficial to do so and this will be periodically monitored to see that it is operating to its stated design purpose. Surface water monitoring of the receiving drainage and on nearby natural watercourses associated with the site will be undertaken in real time during the construction phase and at a reasonable frequency during the operational phase of the Development to determine if any pollution has migrated off-site, and if so, implement measures to rectify the impact.

2.6.9 Construction Supervision and Monitoring

The construction activities will be monitored by a Site Geotechnical Engineer, a qualified archaeologist and an "ECoW. The Geotechnical Engineer will oversee all activities and monitor for issues such as ground stability, water ingress into excavations etc. The ECoW will have stop work authority if, for example, a sensitive habitat feature is encroached upon or there is the possibility of silt/pollution runoff to natural watercourses. The archaeologist will have responsibility for providing that potential archaeological features are protected should any be discovered during excavations. If any potential archaeological features are discovered, then they will inform the National Monuments Service (NMS).

The ECoW will be employed prior to the commencement of the construction phase and they will monitor the working corridor and review of pollution control measures and working practices during construction and have input into Site remediation.

A geotechnical engineer/engineering geologist will be contracted for the detailed design phase and their services retained throughout the construction and reinstatement phases to monitor and supervise construction activities on an ongoing basis.

An inspection and maintenance plan will be developed for the planned Site drainage prior to commencement of construction. Regular inspections of the installed drainage system will be undertaken, especially after heavy rainfall events, to check blockages and see that there is no build-up of standing water in any part of the system where is it not designed to be.

Excess build-up of silt at check dams, attenuation/settlement ponds or any other drainage feature will be removed.

During the construction phase, field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs should be undertaken for each primary watercourse close to the site, and specifically following heavy rainfall events (i.e. weekly, monthly and event based).

A CEMP will be developed in detail once the Contractor has been appointed. This will set out the proposed Site organisation, sequencing of works, methodologies, mitigation measures (including these outlined above) and monitoring measures.

Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work should immediately be stopped and a geotechnical assessment undertaken.

The local road network near the Site used to transport construction materials will be monitored during construction, so that any damage caused by construction traffic associated with the Development can be identified and repaired as soon as possible, depending on the level of damage / inconvenience, to avoid issues for other road users. This monitoring will be undertaken on the section of the L2595 from the N15 to the junction with the L2015 and on the L2015 to the Development entrance. It is envisaged that Readymix concrete and rock will be sourced from local quarries and monitoring may also be undertaken on the route as required.

2.6.10 Construction Sequencing

It is envisaged that the sequence of construction at the Development will follow that outlined in the Indicative Decommissioning / Construction Programme in **Table 2.5**.

The first step will be to construct the Contractor's Temporary Construction Compound and Welfare Facilities. Access to the area will be via the Operational Barnesmore Windfarm Site Access Tracks. The next step will be to prepare the areas of the Site where infrastructure is to be located by marking out the construction works corridor and the relevant environmental buffer zones as needed.

Following the Site preparation, the Site Access Tracks will be upgraded according to the specifications of the chosen turbine manufacturer and the estimated 600 m of unrequired Site Access Track will be decommissioned and reinstated. The next step will involve construction of the crane hard-standing areas for the 13 turbines according to the specifications of the chosen turbine manufacturer. The 13 no. Turbine Foundations can then be excavated and constructed using rebar and imported concrete, no concrete batching will take place on Site. Following the construction of the Turbine Foundations, Windfarm Internal Cable ducting from the turbine locations to the on-site 110 kV Substation will be laid in trenches along the constructed Site Access Tracks. The last step will be to erect the 13 no. wind turbines on the previously constructed foundations using two cranes. Commissioning and testing of the turbines can then proceed.

After the Site Access Tracks have been upgraded to allow the construction of the Development, the upgrade of the existing on-site 110 kV Substation can commence. The section of the existing 110 kV overhead lines required to be undergrounded will be carried out and the Substation will be commissioned and ready to export power to the national grid via Clogher substation.

2.6.11 Construction Employment

It is estimated that at peak construction, up to approximately up to 50 workers will be employed on-site during the peak period of Turbine Foundation construction.

2.7 Commissioning

Windfarm commissioning can take in the region of 3 months to complete from the erection of the final turbine to the commercial exportation of power to the national grid. It involves commissioning engineers working through an entire schedule of SCADA (Supervisory Control and Data Acquisition) and electrical and mechanical testing and control measures to check that the windfarm will perform and export power to the national grid, as designed.

2.8 Operation and Maintenance

During the operation of the Development, the turbine manufacturer, the Transmission System Operator (TSO) (EirGrid), the operator or a service company will carry out regular maintenance of the turbines. In addition, operation and monitoring activities may be carried out remotely with the aid of computers connected via a telephone broadband link. Routine inspection and preventative maintenance visits will be necessary to provide for the smooth and efficient running of the Development.

2.9 Decommissioning

The Applicant is applying for a consent that is not time limited, however in the event that the Development is required to be decommissioned, the process would be similar to the decommissioning of the Operational Barnesmore Windfarm. Given the fewer number of turbines, the potential effects arising from such decommissioning will be less than the effects arising as a result of the combined initial decommissioning and construction phases described above. These phases combined therefore represent the worst-case parameters for assessment purposes.

Cranes of similar size to those used for construction will disassemble each turbine using the same Turbine Hardstands. The towers, blades and all components will then be removed from Site and reused, recycled, or disposed of in a suitably licenced facility. The turbine transformers will also be removed from Site. There is potential to reuse turbine components, while others can be recycled.

Underground cables will be cut back and left underground. The Turbine Foundations and Windfarm Internal Cabling will not be removed if the environmental assessment of the decommissioning operation demonstrates that this would do more harm than leaving them in situ. The assessment will be carried out prior to decommissioning to take into account environmental changes over the Project life.

Prior to the decommissioning work, a comprehensive plan will be drawn up that takes account of the findings of this EIAR and the contemporary best practice at that time, to manage and control the component removal and ground reinstatement.