MWP

Chapter 02 Description of the Proposed Development

Ballinlee Wind Farm

Ballinlee Green Energy Ltd.

September 2025

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22635	6006	A	23/09/25	MT/A O'C	A O'C/C McL	KF	**FINAL**

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2. Description of the Proposed Development

2.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents information on the elements that constitute the entire proposed development, as detailed in EIAR **Volume II, Chapter 01** Introduction. The Project Description details the characteristics and operations involved in the project. The purpose is to provide an appropriate level of detail to provide the basis for Environmental Impact Assessment (EIA). The chapter describes the site location, all characteristics and components of the project and details the activities and operations required to construct, commission, and operate the wind farm development and connection to the National Grid. Decommissioning of the project is also discussed.

The details of the proposed development are further supported by the following documents:

- Civil Engineering (EIAR **Volume II**, **Chapter 04**).
- Construction Environmental Management Plan (CEMP) (EIAR **Volume III, Appendix 2A**).
- Resource Waste Management Plan (RWMP) (EIAR **Volume III, Appendix 2B**).
- Turbine Delivery Route Assessment (EIAR **Volume III, Appendix 2C**).
- Grid Connection Route Assessment (EIAR **Volume III, Appendix 2D**).
- Surface Water Management Plan (EIAR **Volume III, Appendix 2E**).
- Consideration of Alternatives (EIAR **Volume II, Chapter 03**).
- Planning Drawings accompanying the planning application.

For the purposes of the planning application and the analysis presented in this EIAR, turbines T1 to T5 and T7 to T17 are based on a wind turbine design comprising of a tower with a height of 92 m and a rotor diameter of 136 m, giving an overall tip height (blade in the vertical position) of 160 m. Turbine T6 also incorporates a rotor diameter of 136 m but is limited to a lower overall tip height of 150 m (refer to **Table 2- 2** for turbine dimensions). Refer to **Planning Drawing No. 22635-MWP-00-00-DR-C-5402** for turbine elevation details.

2.2 Project Summary

Ballinlee Green Energy Ltd (the Applicant) propose to develop a wind farm (named Ballinlee Wind Farm) comprising seventeen (17) No. wind turbines located on privately-owned predominantly agricultural lands in east County Limerick.

Table 2-1 sets out the characteristics of the project elements for which development consent is being sought and all other associated project components.

Table 2-1: Characteristics of the Proposed Development

Proposed Development for which consent is sought	**Core Wind Farm Components** • Seventeen (17) No. wind turbines (turbine tip height of 160m, and 150m (T6 only)) with associated foundations and crane hardstand areas. • One (1) No. Permanent Meteorological Mast (92m height) and associated foundation, hardstand area and ancillary main crane hardstand area. • One (1) No. Electrical Substation (110kV) including Eirgrid compound, IPP, maintenance compounds, ancillary building, security fencing and all associated works. • Nine (9) No. site entrances. • New and upgraded internal site service tracks (approximately 10.8km of new internal access tracks to be constructed). • New clear span bridge over the Morningstar River. • Underground electric collector cable systems between turbines within the wind farm site. • Underground electric cabling systems between the wind farm site and connection point at existing Killonan 220/110kV substation. **Associated Components of the Proposed Development** • New temporary access track via R516 to facilitate turbine delivery route located in the townland of Tullovin. • Three (3) No. temporary construction site compounds (one approximately 95m x 50m and two approximately 55m x 25m). • Two (2) No. borrow pits to be used as a source of stone material during construction and for storage of excess excavated materials. • Nine (9) No. permanent and two (2) temporary deposition areas. • Associated surface water management systems. • Tree felling required for wind farm infrastructure.
Other Associated Project Components	• Whooper Swan Management Area works • Habitat Enhancement Area works • Landscaping, fencing and all associated works.

A Turbine Delivery Route (TDR) between the Port of Foynes to the proposed development will require temporary works along the public road to allow for the delivery of wind turbine components (Refer to Section 2.3.6 and 2.5.3 for further detail on the TDR). Once operational, the proposed development will be capable of providing an expected Maximum Export Capacity (MEC) in excess 76 Megawatts (MW) of renewable electricity to the National Grid.

2.3 Site Description

The proposed development is located in a rural area of east Limerick approximately 18km south of Limerick City and 3km southwest of Bruff. **Figure 2-1** outlines the location of the proposed development and indicates the planning application boundary included in the planning application. The area within this boundary is approximately 255.12 ha.

2.3.1 Site Location

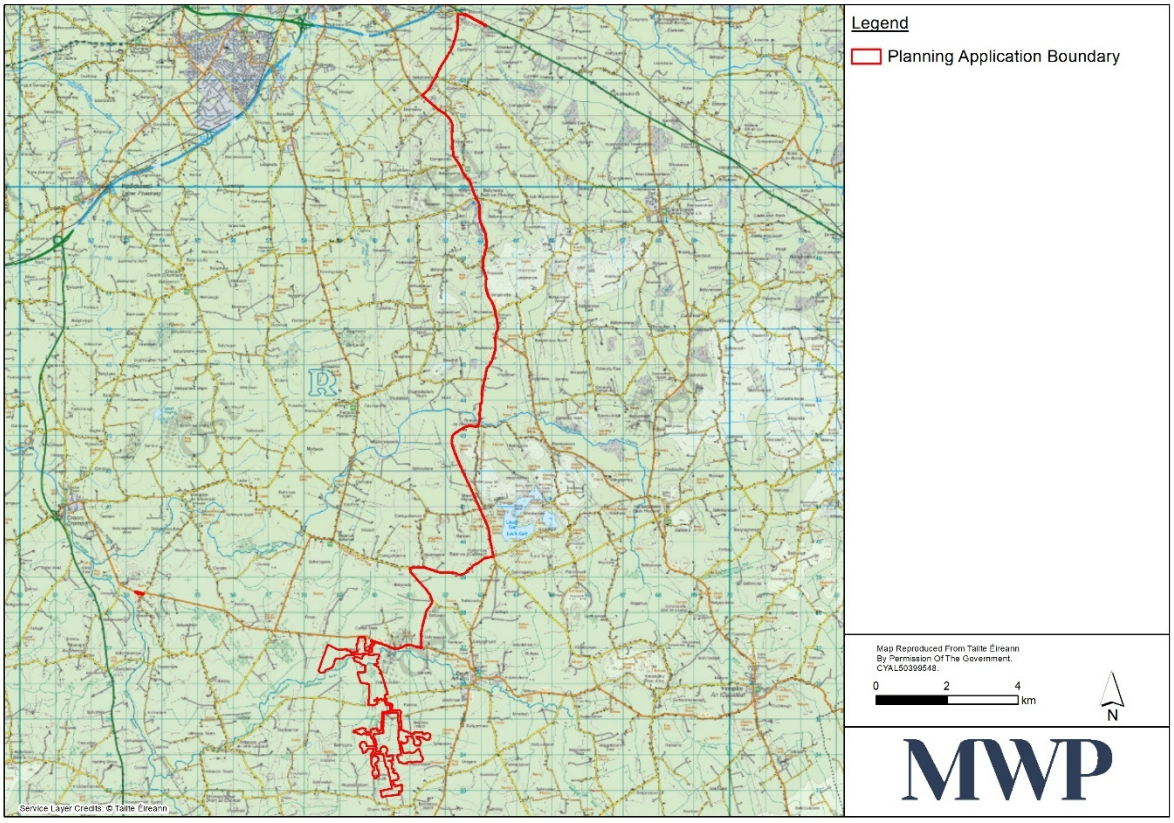

Figure 2-1: Site location

2.3.2 Existing Land-Uses

The wind farm site under consideration is located on privately-owned predominantly agricultural lands within the townlands of Ballincurra, Ballinlee South, Ballingayrour, Ballinrea, Knockuregare, Ballinlee North, Carrigeen and Camas South, approximately 18km southeast of Limerick City and 3km southwest of Bruff, Co. Limerick. The site is situated in a rural area characterised by agricultural holdings and one-off residential dwellings. Some patches of forestry plantation occur within the planning application boundary.

The grid route is approximately 27.6km and is located along road networks within the townlands of Milltown, Ballysimon Commons, Coolyhenan, Knockananty, Ballybrennan, Drombanny, Carrigmartin, Cahernarry (Cripps), Scart, Ballyogartha, Ballyneety, Knockbrien, Glen, Ballymacreese, Ballynagarde, Stonepark, Carriganattin,

Rochestown, Friarstown, Rockstown, Skool, Friarstown South, Grange, Ballynagallagh, Rockbarton, Cahirguillamore, Ballynanty, Ballybane, Ballyreesode, and Camas North.

One section of the turbine delivery route at, Tullovin Bridge (approximately 3.3km southeast of Croom, Co. Limerick), will require the construction of a temporary access track on privately-owned predominantly agricultural lands, to avoid vehicle manoeuvre difficulties at the bridge and the bends either side.

2.3.3 Development Lands Ownership

The proposed development lands described in the previous sections are private lands. Consent letters from all relevant landowners are included within the planning application documents.

Road opening licences will also be sought from Limerick City and County Council for the grid route and TDR development works within and along the public road network (see details in Section 2.5.4).

2.3.4 The Wind Farm Site

The proposed elements of the development are summarised in Section 2.2 and are illustrated in Figures 2-2 and 2-3. The proposed development will involve the construction and operation of a wind farm and all associated infrastructure with an export capacity in excess of 76MW. The planning application boundary is shown in Figure 2-1. It is envisaged the proposed development will comprise the key components detailed in Table 2-1.

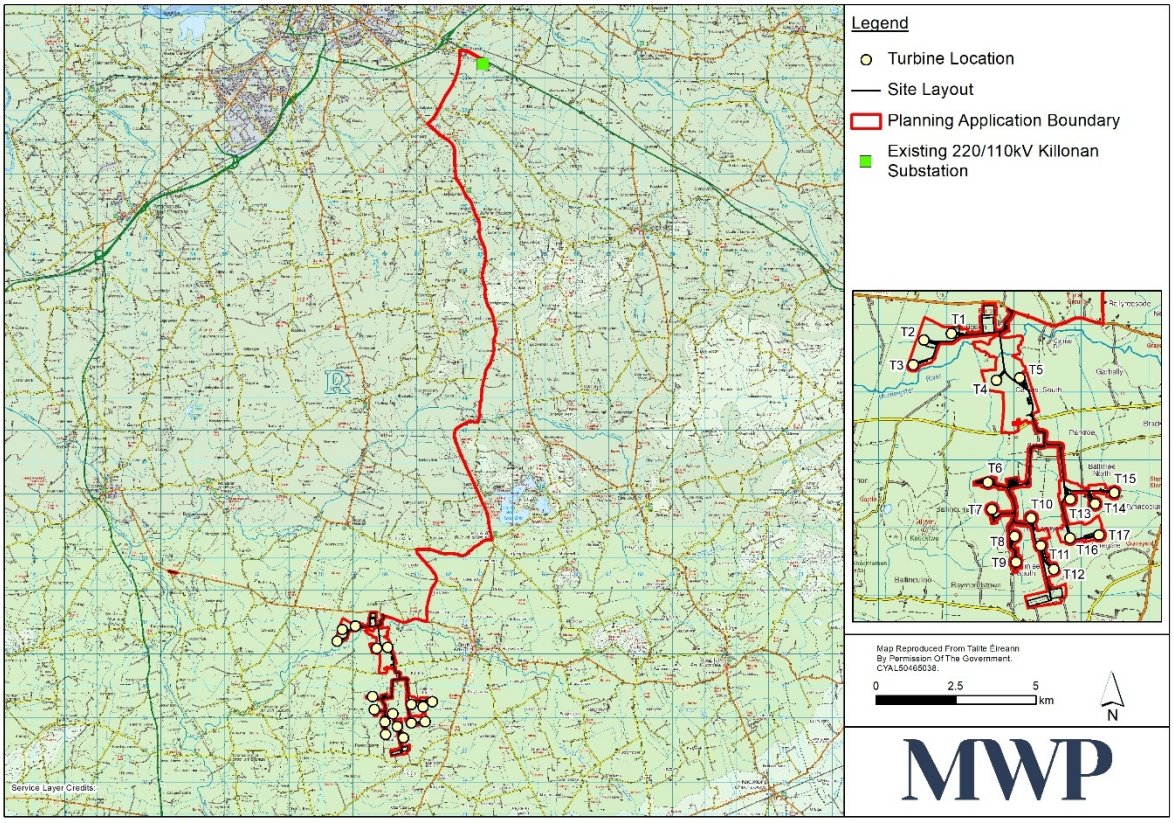

Figure 2-2: OSI Site Layout

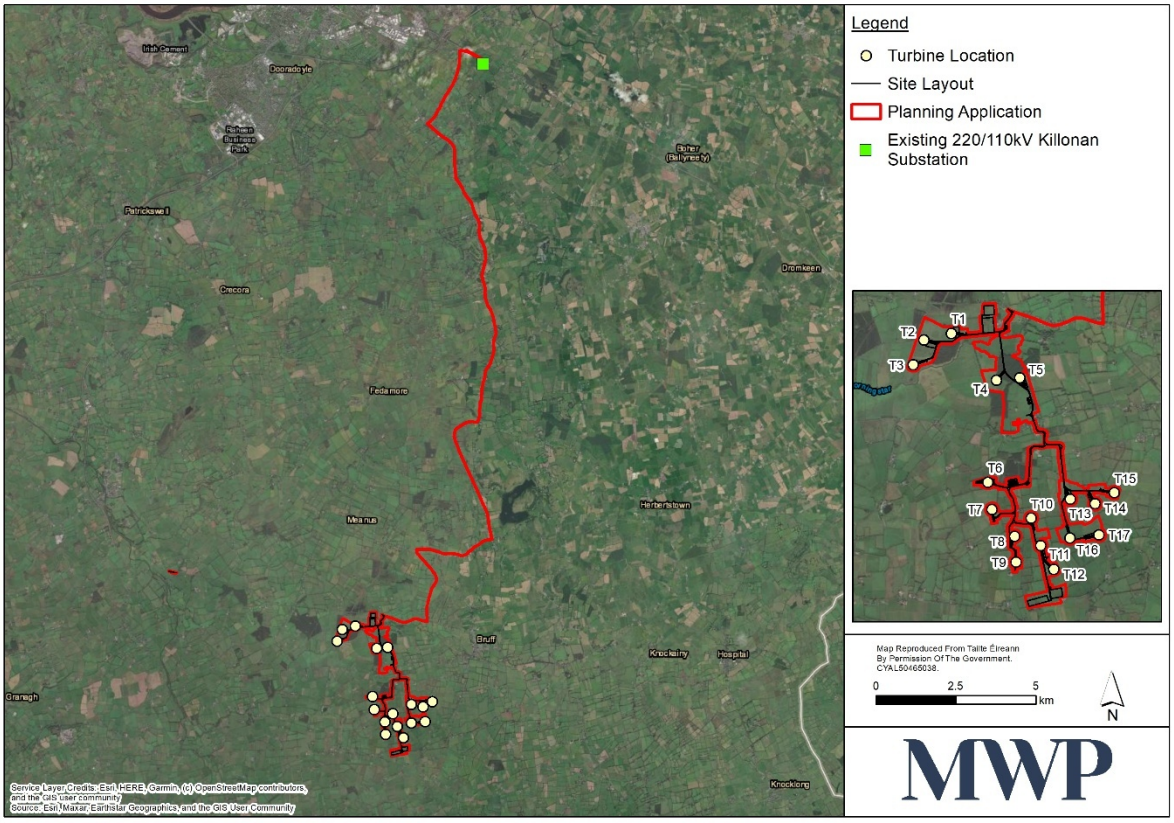

Figure 2-3: Aerial Image of Site Layout

2.3.5 Substation and Grid Connection Route

The proposed grid connection route is approximately 27.6km in length from the existing Killonan 220/110kV Substation which is located on the Tipperary Road (N24) East of Limerick City to the proposed Wind Farm substation (see **Figure 2-4**). The route generally follows a southern direction on a mixture of regional and local roads. From the existing 220/110kV Killonan substation the route follows the N24 in a westerly direction and then proceeds along the L1171 for a short distance to the intersection with the L1170 (Ballysimon Commons rd) going south until it intersects with the R512. It then follows south along the R512 through Ballyneety to Hollycross, then west onto the L1412 road, then south along the L8011 road to the R516 where it turns west towards the proposed site entrance. The grid route is also contained in the planning application and within the planning application boundary as shown in **Planning Drawing No. 22635-MWP-00-00-DR-C-5003** (outlined in **Figure 2-4**).

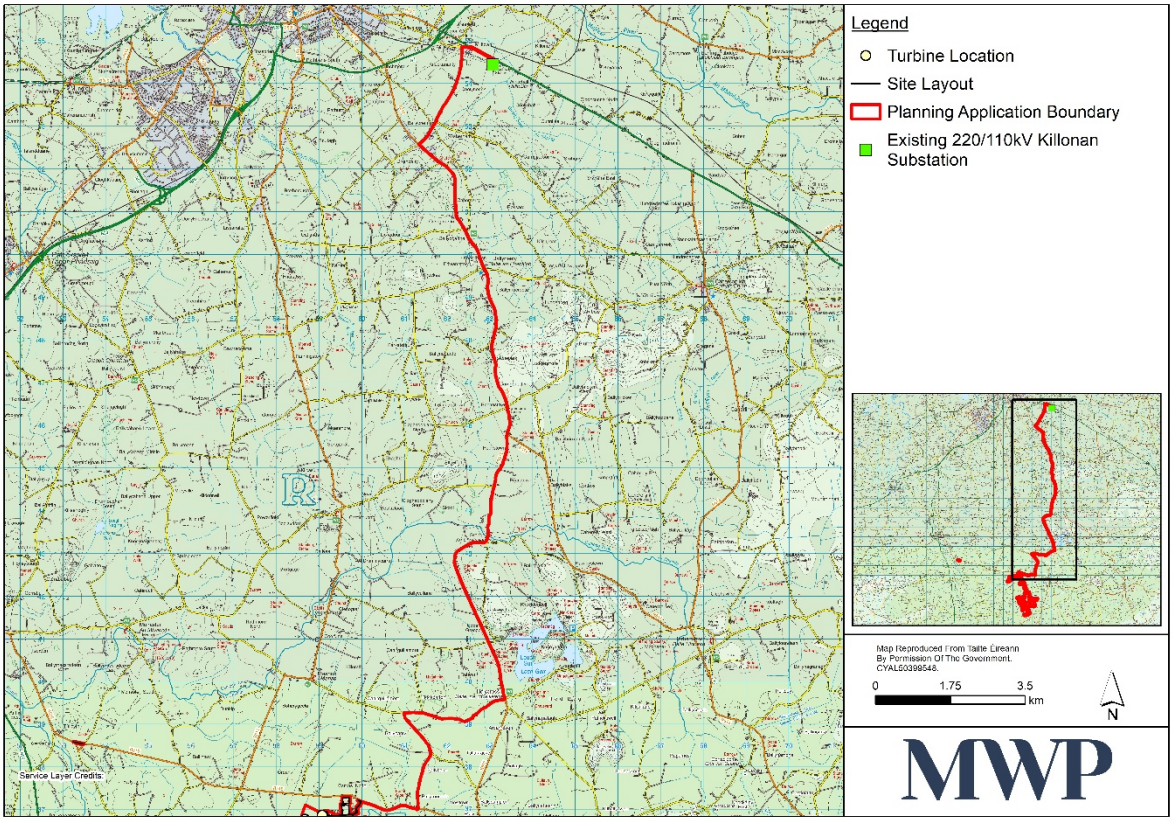

Figure 2-4: Proposed Grid Route Connection to existing 220/110kV Killonan Substation

2.3.6 Turbine Delivery Route

The proposed route to deliver wind turbine components from the port at Foynes County Limerick to the proposed Ballinlee wind farm site entrance is shown on **Drawing No. 22635-MWP-00-00-DR-C-5071** and also in **Figure 2-5**.

The Turbine Delivery Assessment Report is available in EIAR **Volume III, Appendix 2C**. The Proposed Wind Turbine Component Delivery Route:

- Depart Foynes Port and travel along the N69 as far as the N18 (east) bypass.
- Turn south onto the M20 and at the N20 junction turn left at Ballybronogue.
- In Croom town turn off on the R-516 to site.

The delivery of turbine components to the proposed development will require temporary works on sections of the public road network along the delivery route including hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and verge strengthening.

One section of the delivery route at, Tullovin Bridge, will require the construction of a temporary access track, approximately 250m in length, to avoid vehicle manoeuvre difficulties at the bridge and the bends either side of the bridge. Planning drawing **22635-MWP-00-00-DR-C-5072** shows the location of the proposed temporary access track. It is included in the Planning Boundary for the proposed wind farm development.

The turbine components are expected to be delivered by sea to the Port of Foynes in County Limerick and transported to site along the national, regional and local road network. Approximately 160 - 180 deliveries are expected, mostly at night.

The potential environmental effects of these temporary works, including hedge and tree cutting and verge strengthening on local roads, have been fully considered and are assessed in the relevant chapters of this EIAR to ensure a comprehensive evaluation of the TDR.

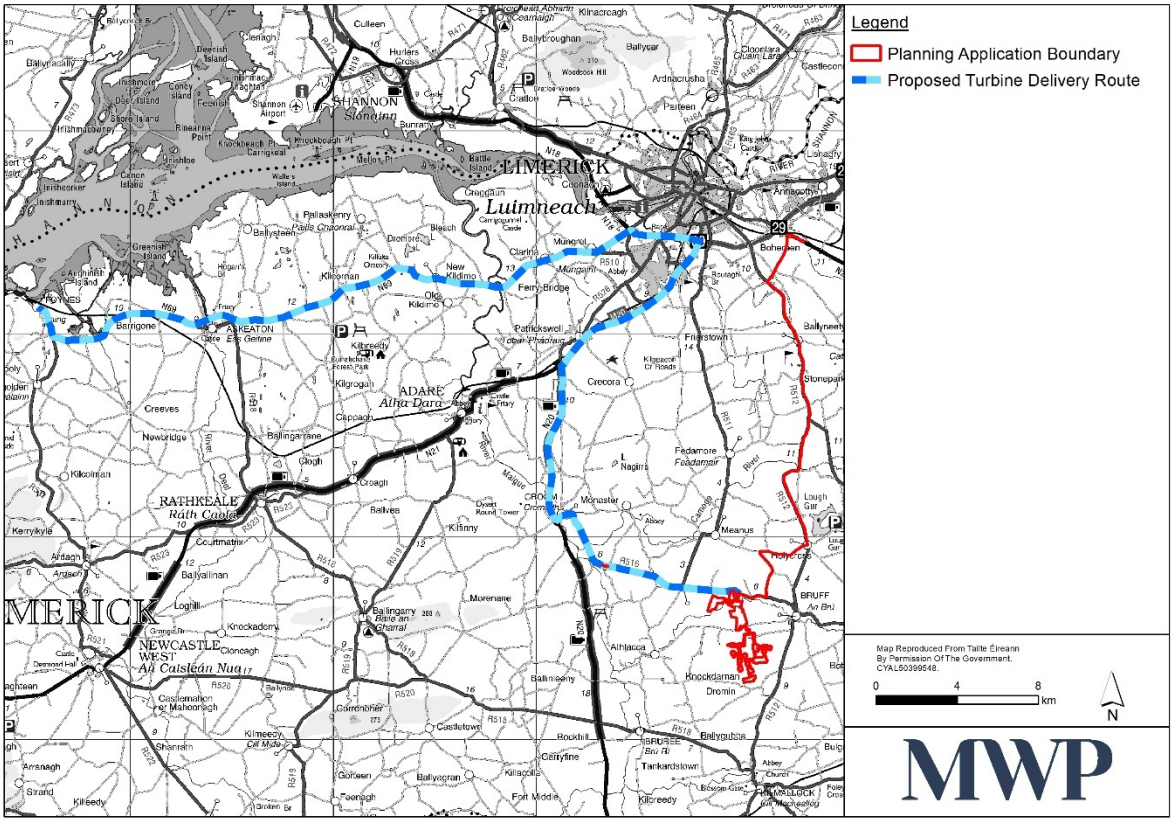

Figure 2-5: Proposed Turbine Delivery Route.

2.3.7 Duration of Permission

A ten-year consent is being requested for the proposed development. That is, planning consent for the construction of the development will remain valid for ten years following the grant of permission. It is noted that the Wind Energy Development Guidelines (2006) state that "Planning Authorities may grant permission for a duration longer than 5 years if it is considered appropriate, for example, to ensure that the permission does not expire before a grid connection is granted. It is, however, the responsibility of the applicants in the first instance to request such longer durations in appropriate circumstances". This text also appears in Section 7.22 of the Draft Revised Wind Energy Development Guidelines (2019).

A 10-year planning permission is considered appropriate for a development of this size to ensure all consents are secured prior to commencement of construction.

The applicant requests the grant of permission on the basis of an operational period not less than 35-years from the date of full operational commissioning of the wind farm. Permission for the proposed onsite substation is sought in perpetuity by necessity, given that the substation will form part of the national electricity network. Therefore, the substation will be retained as a permanent structure and will not be removed.

2.3.8 Key Project Design Approach and Considerations

There are multiple elements which must be considered in the design of an appropriate wind farm development. Some of the key elements of the project design approach for the proposed project included:

- Constructability;
- Environmental Constraints and Iterative Design Process; and
- Wind Resource Zoning and Designations.

2.3.9 Constructability

Site conditions such as topography, hydrology, geology, and access can affect the 'buildability' of the project. A constructability constraint approach was used integrating the most significant of construction related constraints including ground slope, and hydrology, providing a constructability ranking based on a qualitative assessment. This has been developed by Malachy Walsh and Partners' Wind Farm Engineering Team, and it reflects actual site experience and an understanding of the constraints involved in constructing and delivering wind turbine components and infrastructure. Further detail of the constraints and alternatives considered is provided in EIAR Volume II, Chapter 03 Consideration of Alternatives, and the construction details are provided in EIAR Volume II, Chapter 04 Civil Engineering.

2.3.10 Environmental Constraints and Iterative Design

An iterative analysis approach was adopted during the wind farm design process based on the detailed baseline studies, which included detailed constraint mapping and iterative modelling, as required, for environmental aspects. This approach also took into consideration issues raised in the public consultation process. 'Mitigation by avoidance' and iterative design was a critical component of the wind farm design process. The objective of the iterative design process was to achieve the optimum, or the most suitable and environmentally sensitive wind farm infrastructure layout, that most complemented the particular environmental and physical characteristics of the project site. Refer to EIAR Volume II, Chapter 03 Consideration of Alternatives for discussion of the iterative design process.

2.3.11 Wind Resource Zoning and Designations

The area where the proposed wind farm is sited has been designated as a preferred area for wind energy development by Limerick City and County Council as part of the Limerick Development Plan 2022– 2028 in line with current national policy and favourable conditions for wind energy generation. See Figure 2-6.

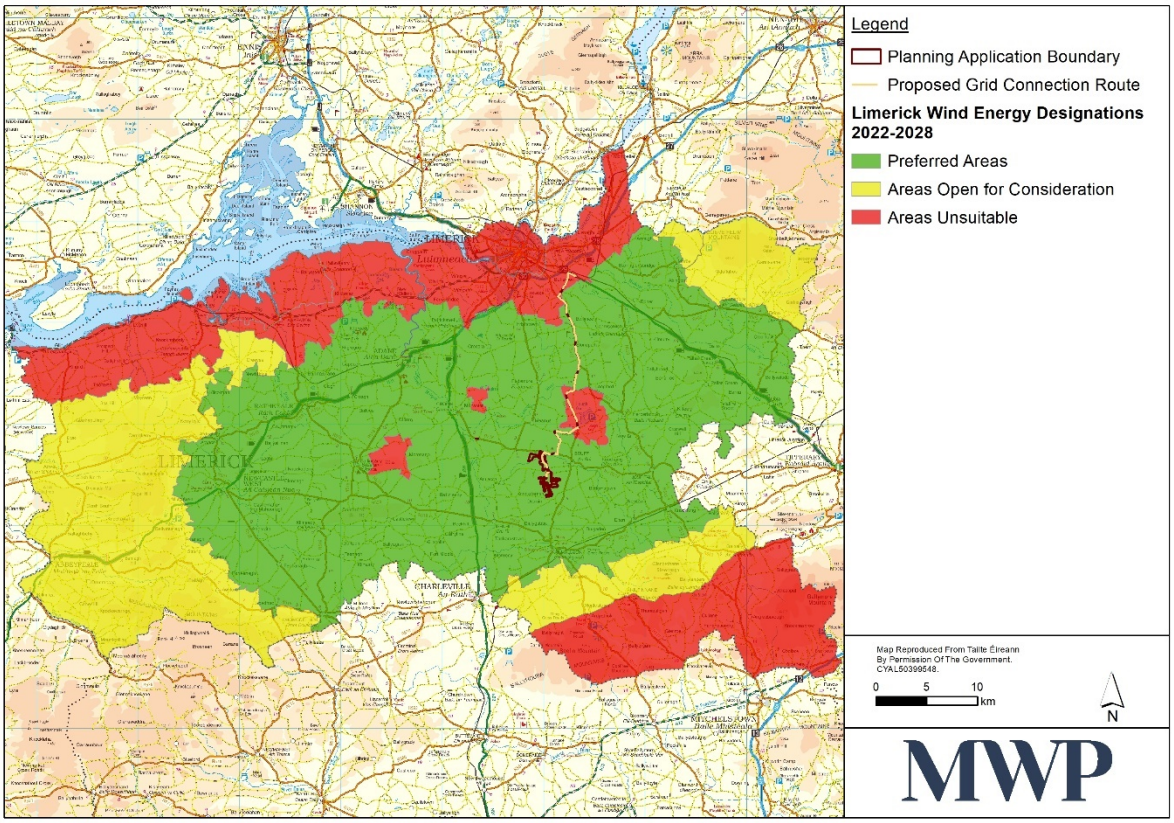

Figure 2-6: Wind Energy Zoning

2.3.12 Community Benefit Fund

In line with Community Benefit Fund Guidelines, governed by the Sustainable Energy Authority of Ireland (SEAI), and based on the current project scope, the development will generate a Community Benefit Fund estimated at €5 million over the first 15 years of operation. This amounts to approximately €350,000 per annum. Ballinlee Green Energy Ltd. will work in partnership with residents in the local area to form a committee to oversee the administration of the Community Benefit Fund. The committee will be established once the project successfully completes the planning permission process and the necessary grid connection process.

Based on the current project scope, the proposed development has the potential to displace 2.5 million tonnes of CO_2 over its lifetime and provide the capacity to power more than 42,000 homes. The proposed development will support employment in the energy supply and construction/maintenance sectors, creating approximately 80 direct and indirect jobs, based on estimates from the SEAI. The team is committed to working with local suppliers where possible.

2.4 Project Description

The proposed development boundary included in the Strategic Infrastructure Development (SID) planning application is outlined in **Figure 2-7**. The area within this boundary is 255.12ha.

Figure 2-8 shows the proposed Wind Farm Site layout for which planning permission is being sought and illustrates the positions of the turbines, access tracks, crane hardstand areas, internal underground cabling, route of the grid connection, substation, meteorological mast, 2 borrow pits, material deposition areas and temporary construction compounds. The proposed development footprint for the access tracks, hardstands and other facilities within the application area is approximately 49.91ha.

The layout reflects the outcome of the iterative engineering and environmental analysis approach adopted during the wind farm design process which considered a number of factors including minimising any risk in terms of poor ground conditions, negative influences on the existing drainage, avoidance of sensitive ecological habitats, and any known archaeological features. The design rationale and evolution is described in EIAR **Volume II**, **Chapter 03** Consideration of Alternatives.

The figures presented in the following sections are for illustrative purposes only. Refer to **Planning Drawings No. 22635-MWP-00-00-DR-C-5003** to **22635-MWP-00-00-DR-C-5005** for details.

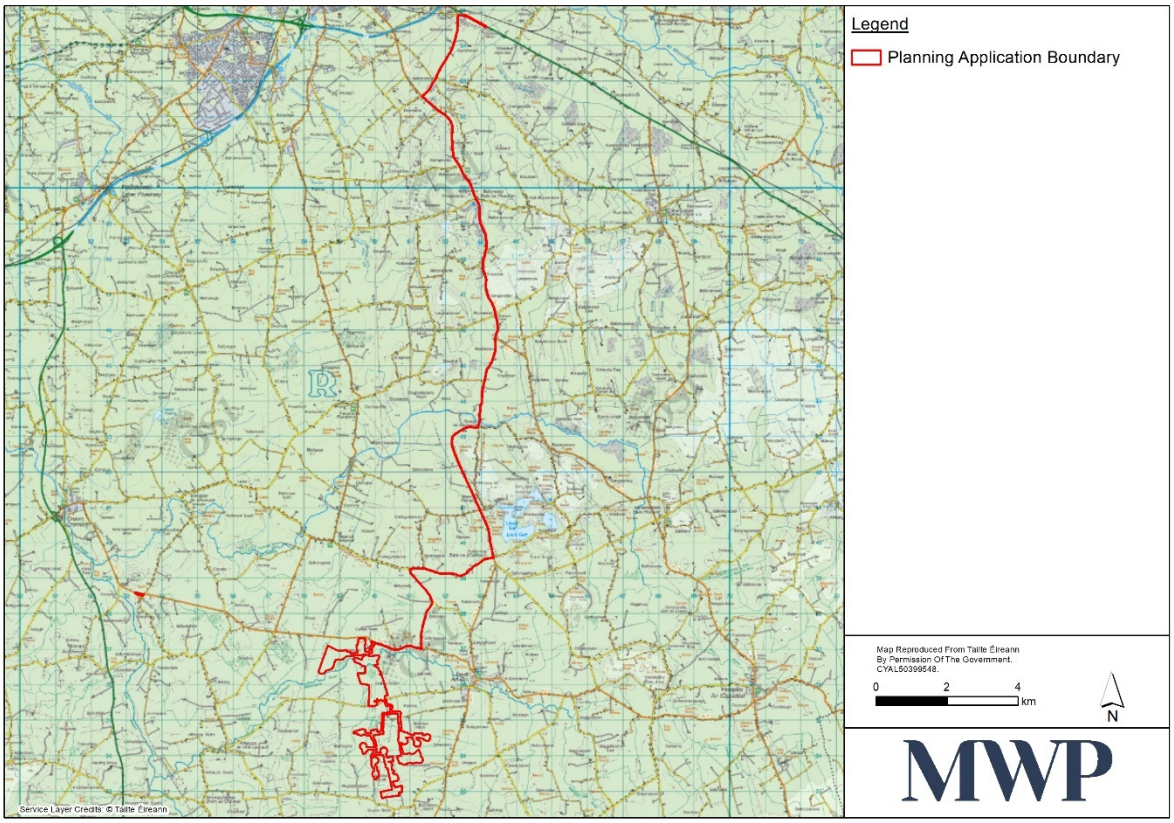

Figure 2-7: Planning Application Boundary

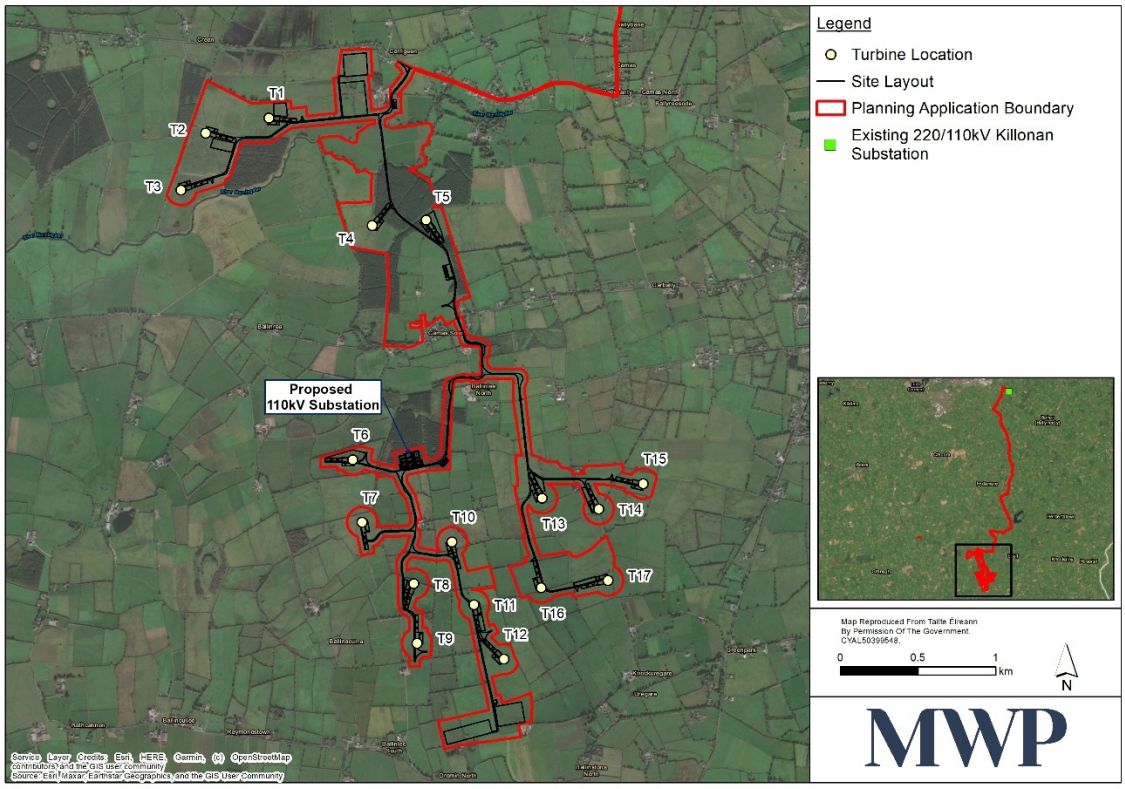

Figure 2-8: Wind Farm Site Layout

2.4.1 Wind Turbines

The turbine dimensions for the Ballinlee Wind Farm will have a tip height of 160m with rotor of 136m diameter. There will be one turbine (T6) with a tip height of 150m using the same rotor size of 136m.

The turbines will be certified under the International Electrotechnical Commission IEC 61400-1 safety standards and will be designed to withstand the environmental conditions encountered on site. The proposed turbines will be of a modern design, incorporating tubular towers and three blades attached to a nacelle. The tower supports a nacelle and rotor hub. It is proposed that the wind turbine hubs and towers will be made of steel, while the blades will be made of a matrix of glass-fibre reinforced polyester or wood-epoxy or a similar composite material. The turbines will be designed in accordance with the requirements for finish and colour that are detailed in the 2006 Department of Environment, Heritage and Local Government Wind Farm Development Guidelines (DoEHLG 2006 Guidelines) as follows:

- Turbines shall be finished to a white, off-white, or grey colour to correspond with the colour scheme of existing turbines.
- All surfaces will have a matt non-reflective finish.

It is proposed to install obstacle lighting on the turbines in a sequence agreed with the Irish Aviation Authority (IAA) for aviation visibility purposes. Agreement with the IAA will be sought during the post-consent period and prior to construction. The dimensions and co-ordinates of the proposed turbines are set out in Table 2-2.

Table 2-2: Proposed Turbine Heights and ITM Co-ordinates

Turbine No	Tip Height	X Coordinate	Y Coordinate
T1	160m	559035	636918
T2	160m	558629	636821
T3	160m	558471	636454
T4	160m	559699	636226
T5	160m	560048	636262
T6	150m	559575	634719
T7	160m	559635	634317
T8	160m	559967	633921
T9	160m	559988	633538
T10	160m	560213	634189
T11	160m	560355	633784
T12	160m	560540	633452
T13	160m	560792	634470
T14	160m	561156	634401
T15	160m	561442	634564
T16	160m	560787	633896
T17	160m	561214	633948

2.4.1.1 Power Output

As part of indicating the likely beneficial environmental effects on the climate, it is considered that the proposed wind farm will have an assumed rated electrical power output in excess of 76 megawatts (MW).

2.4.1.2 Turbine Transformers

Each individual turbine will generate electricity at a nominal voltage. Each turbine will also have its own transformer to step-up to an on-site distribution voltage. The transformer and associated switchgear will be located within the turbine tower.

2.4.1.3 Communication Links

There will be communication links between the wind turbines, meteorological mast, and the substation. The links will use ducted fibre optic cables laid in the same trench as the network of underground electrical cables throughout the site. Further details on this are provided in **Section 2.4.2** and in EIAR **Volume II**, **Chapter 04** Civil Engineering **Section 4.5**.

2.4.1.4 Wind Turbine Foundations

Each wind turbine will have a reinforced concrete base pad foundation with a central plinth above the base, which will support the tower. The foundations are anticipated to be circular in shape, be approximately 27m in diameter and will be installed to a depth of approximately 3.5m below ground level. A total of 62,435 m^3 of material is expected to be excavated to construct the 17 No. turbines. The turbine foundations shall be constructed using reinforced concrete construction techniques. Detailed of foundation designs are provided in **Section 4.4.3** of EIAR **Volume II**, **Chapter 04** Civil Engineering. Turbine foundations will be designed to Eurocode Standards. Foundation

loads will be provided by the wind turbine supplier, and factors of safety will be applied to these in accordance with European design regulations. See planning application **Drawing No. 22635-MWP-00-00-DR-C-5403** for foundation details and **Figure 2-9**.

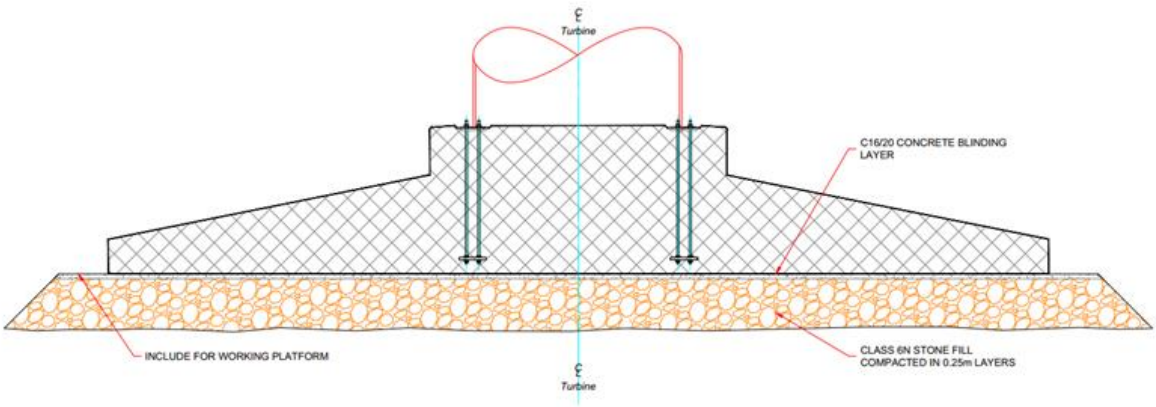

Figure 2-9: Typical turbine foundation detail

2.4.1.5 Hardstands and Laydown Areas

Turbine hardstands are required to accommodate the delivery of the turbine components prior to their erection, to support the cranes during erection and to provide a safe working area during construction, operation and decommissioning. Each wind turbine will have an associated turbine hardstand area adjacent to the foundation. The footprint of each turbine hardstand is detailed in **Figure 2-10**. The hardstand areas will be excavated and bear onto rock (or other suitable bearing stratum) with a foundation of 0.5-1.5m depending on the local bedrock profile. In the decommissioning phase, the hardstands will be left *in situ* and covered over by soil and revegetated. See planning application **Drawing No. 22635-MWP-00-00-DR-C-5404** for the hardstand details.

The area of hardstand, which includes the access track adjacent to the hardstand, is anticipated to be 2,305m^2 based on the dimensions of the proposed wind turbine.

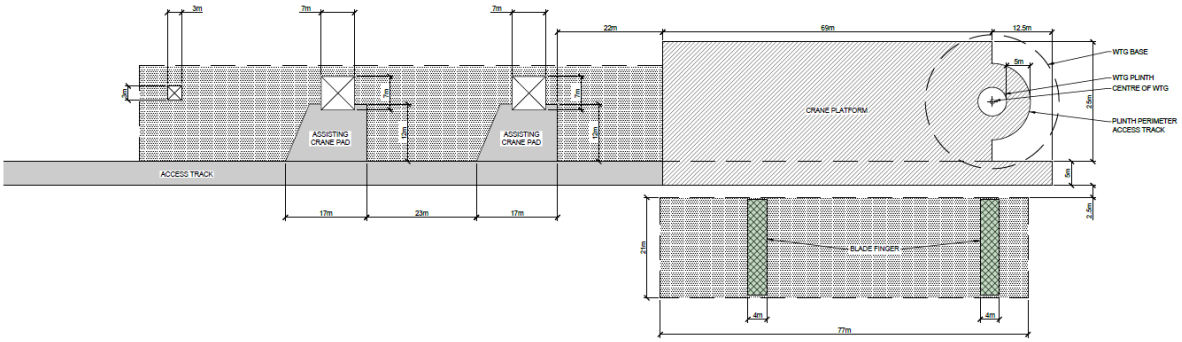

Figure 2-10: Typical turbine hardstand footprint

2.4.2 Meteorological Mast

A permanent meteorological mast will be erected within the planning application boundary to monitor the local wind regime while the wind farm is in operation. The permanent meteorological mast will be located north of borrow pit No. 2, see **Figure 2-11**. The meteorological mast will be approximately 92m in height and have a base foundation and hardstanding area. An example of a meteorological mast is shown in **Figure 2-12**. The meteorological mast will have an antenna for internal radio communications for the SCADA (Supervisory Control and Data Acquisition) equipment on site. The meteorological mast will be surrounded by a galvanised steel palisade fence, 2.4m in height. See planning application **Drawing No. 22635-MWP-00-00-DR-C-5405** for details.

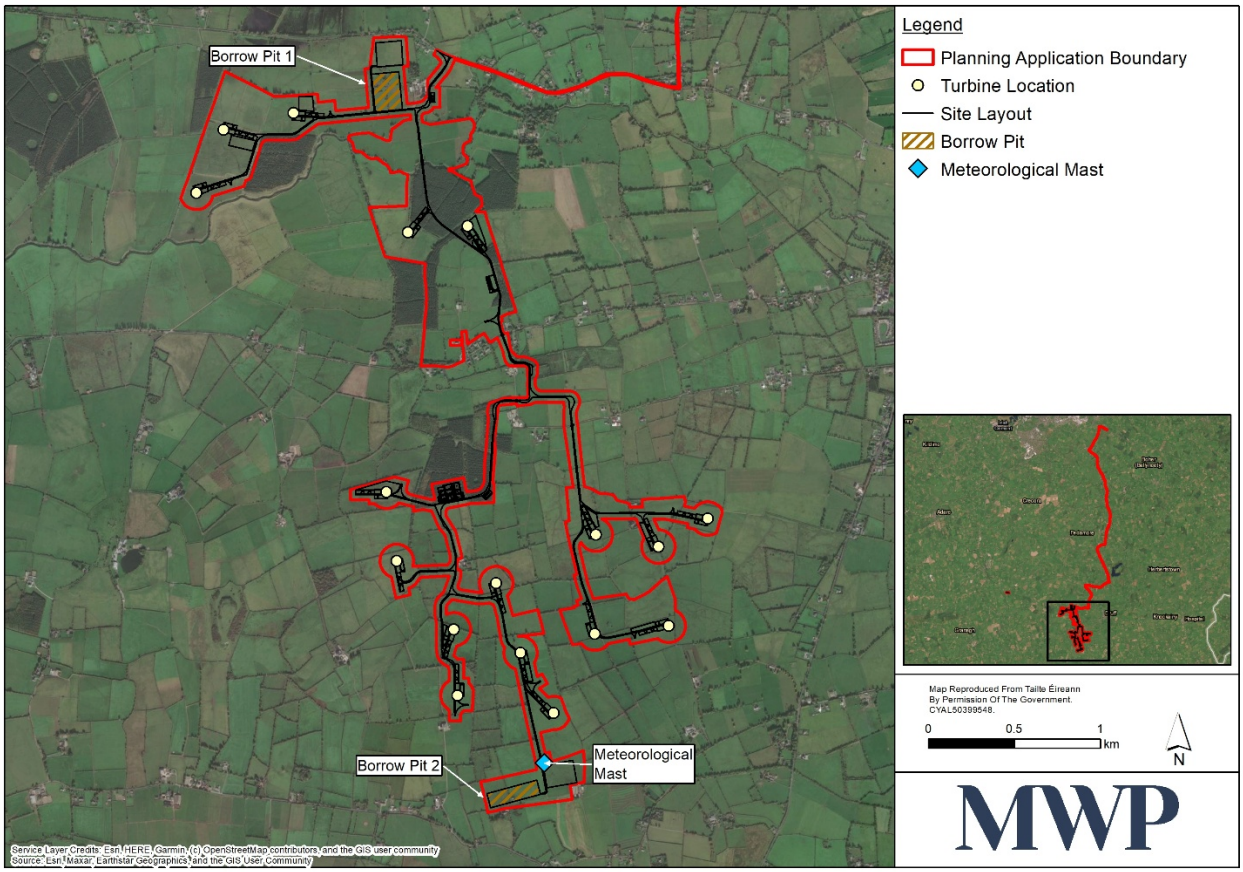

Figure 2-11: Location of Meteorological Mast

Figure 2-12: Example of a Typical Meteorological Mast on a Wind Farm

2.4.3 Underground Cabling

A network of underground cabling servicing each turbine with electrical power and signal transmission will be installed along internal access tracks within the proposed development. Further information is available in EIAR Volume II, Chapter 04 Civil Engineering.

2.4.4 Internal Site Access Tracks

Internal site access tracks are required to interconnect elements of the proposed development and allow access to all wind turbines and wind farm infrastructure. New tracks will be constructed to access each of the turbines, substation compound and meteorological mast. The routing of internal access tracks is shown in Figure 2-13. These access tracks will be constructed using excavated and floating track techniques depending on the ground conditions. See planning application Drawing No. 22635-MWP-00-00-DR-C-5406 for details. The methods of construction are outlined in EIAR Volume II, Chapter 04 Civil Engineering.

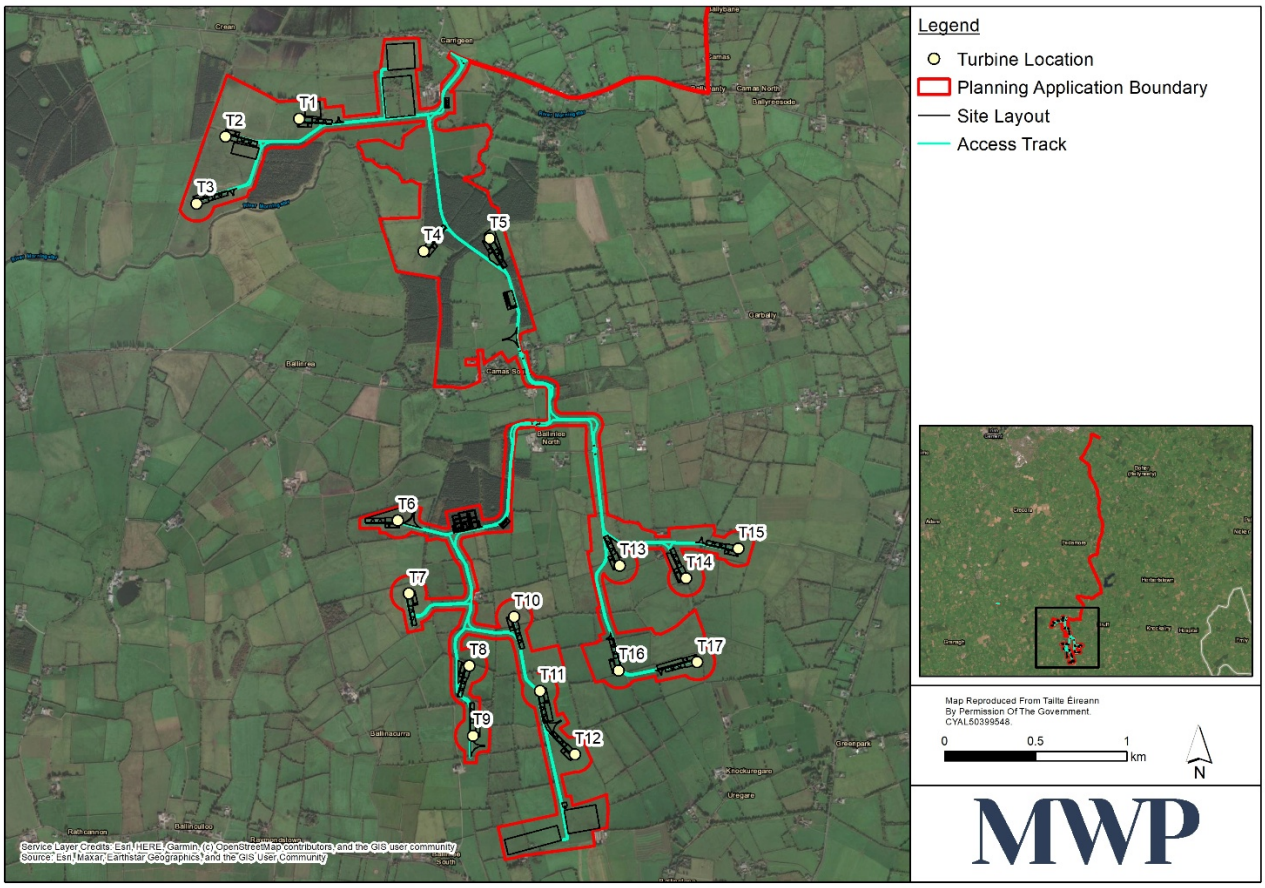

Figure 2-13: Internal Access Track Layout

2.4.5 Site Access and Traffic

The wind farm site is located mainly in agricultural flatlands due southwest of the town of Bruff. Access to the wind farm site will be via the Local Road network. The R512 is located to the east of the wind farm site running from Bruff to Kilmallock. The closest National primary road is the N20 located to the west of the proposed development.

The main site entrance is via the R516 Regional Road between Croom and Bruff on the north side of the wind farm site. This will be a new entrance close to an existing farm/dwelling entrance along the R516.

In total there will be Nine (9) No. site entrances utilised for the construction phase (see **Figure 2-14** and **Figure 2-15**). These entrances are required to facilitate construction traffic delivering material and to facilitate turbine deliveries, and operations and maintenance vehicles.

Entrances One (1 No.) to Seven (7 No.) provide access to the main wind farm site.

Entrance Eight (8 No.) and Nine (9 No.) are part of the turbine delivery route, avoiding the Tullovin bridge, and both are off the R-516. These will be reinstated to their pre-construction condition following delivery of the turbine components.

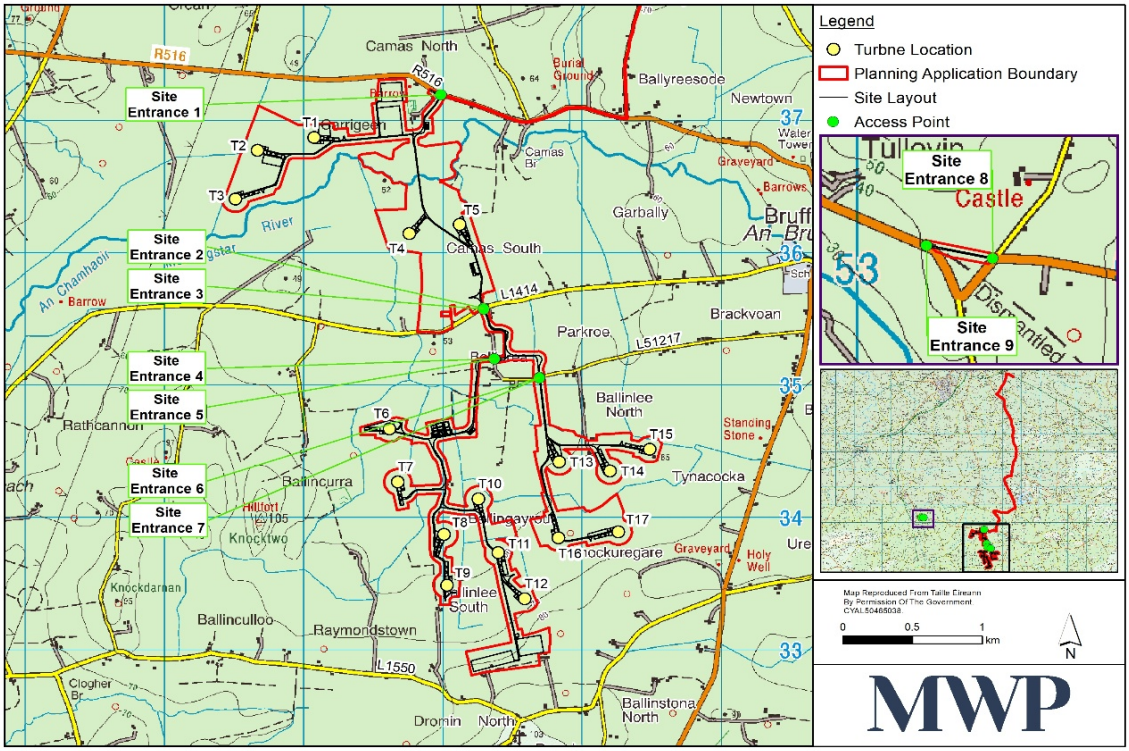

Figure 2-14: OSI Site Entrances Layout

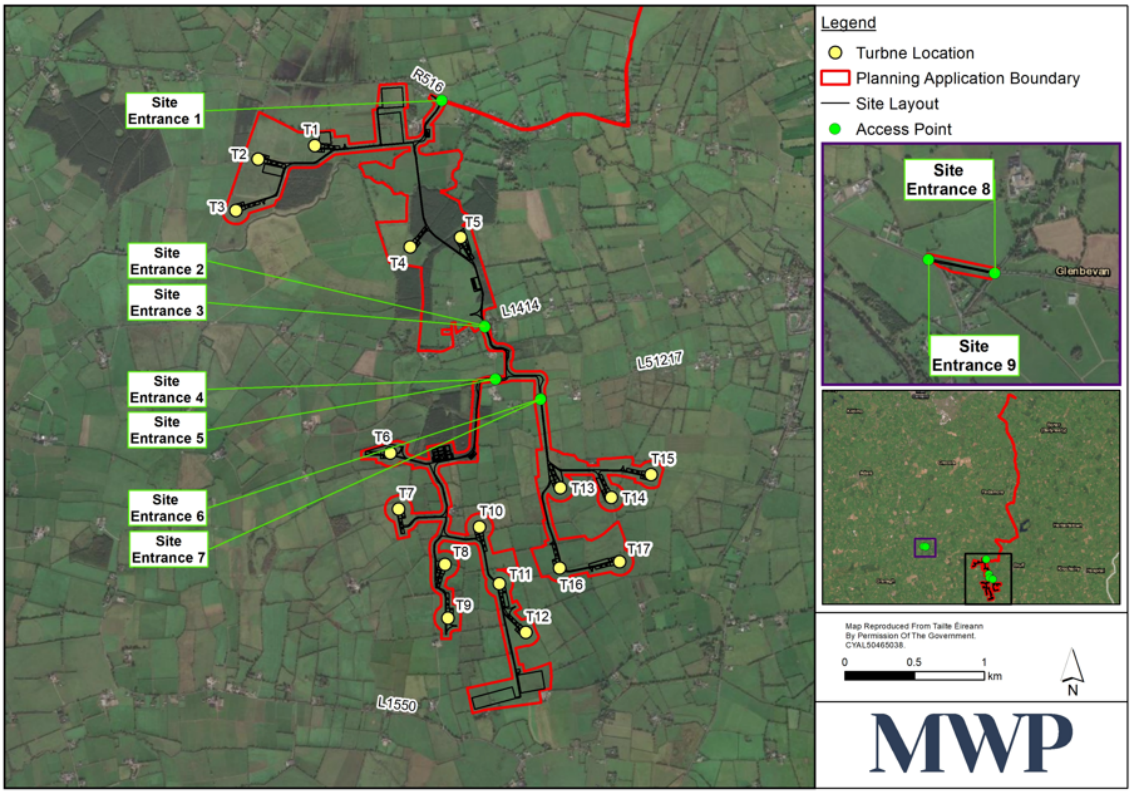

Figure 2-15: Site Entrance Layout

2.4.6 Temporary Construction Compounds and Welfare Facilities

Three (3) No. temporary construction compounds will be set up upon commencement of the construction phase. The locations of the temporary construction compounds are shown in **Figure 2-16**. See planning application **Drawing No. 22635- MWP-00-00-DR-C-5413** and **Drawing No. 22635-MWP-00-00-DR-C-5414** for details.

The compound will be used as a secure storage area for construction materials and will also contain temporary site cabins to provide welfare facilities for site personnel. Facilities will include office space, meeting rooms, canteen area and mobile sanitary facilities. The proposed development will include an enclosed wastewater management system at the temporary compound capable of handling the demand during the construction phase. A holding tank is proposed at the compound for wastewater management. The holding tank will be emptied by a licensed permitted contractor only and disposed of at a licensed waste facility. Upon completion of the project the compounds will be decommissioned by backfilling the area with the material arising during excavation and landscaping with topsoil.

Three temporary construction compounds:

1. Close to the entrance of the site and the junction for the access track to T1.
2. To the South of T5.
3. To the East of the substation site.

Table 2-3: Details of the Construction Compounds

Compound Site	L (m)	W (m)	Area	Units
TC1	55	25	1375	m^2
TC2	95	50	4750	m^2
TC3	55	25	1375	m^2
Total Area	205	100	7500	m^2

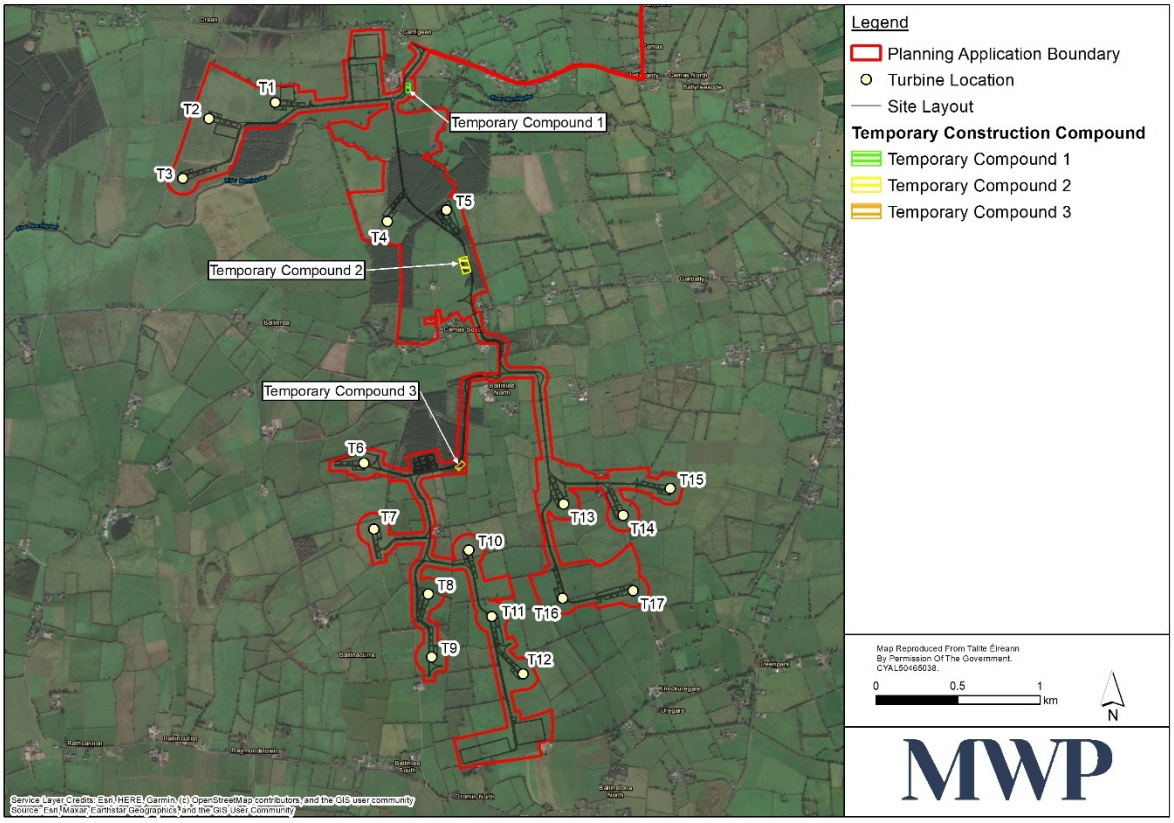

Figure 2-16: Location of Construction Compounds

2.4.7 Borrow Pits

There are two (2) No. proposed on-site borrow pit locations which have been identified to provide fill material for internal tracks, passing bays, hardstands, foundations, and temporary compounds. It is estimated that these will provide 99,852 m^3 (61%) of aggregate material required for the development. The location of these proposed borrow pits is shown in **Figure 2-17** and **Figure 2-18**.

The extraction of rock from the borrow pits is proposed to be undertaken by a combination of rock breaking and ripping.

During the construction period, and post-excavation, the borrow pit areas and the other deposition areas will act as material storage areas for the management of material generated on the site during construction. See planning application **Drawing No. 22635-MWP-00-00-DR-C-5073** and **22635-MWP-00-00-DR-C-5074** for details. Post-construction, the borrow pits will be filled with excess material generated on the site during construction and thereafter topped with topsoil recovered from construction areas and stored for later use in landscaping. The borrow pit sites will then be revegetated and restored to its current use as pasture.

Trial pits were excavated to assess the suitability of the underlying strata at each of the two (2) No. borrow pit locations.

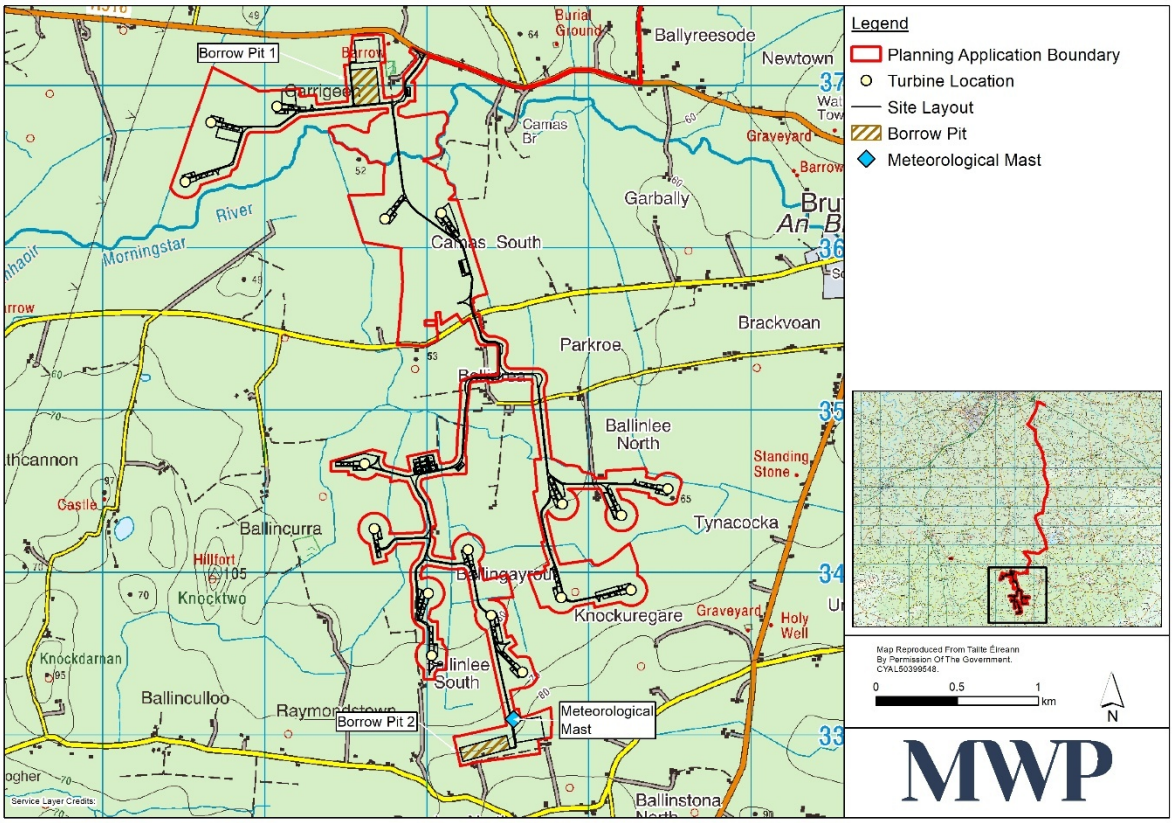

Figure 2-17: OSI Borrow Pit Locations

Figure 2-18: Aerial Image of Borrow Pit Locations

2.4.8 Deposition Areas

There are nine (9) no. permanent deposition areas and two (2) temporary deposition areas shown in **Figure 2-19**. The deposition areas will act as material storage areas for the management of excess material generated on the site during construction. Details of the deposition areas are described in EIAR **Volume II**, **Chapter 04** Civil Engineering and in EIAR **Volume III**, **Appendix 2A**, Construction Environmental Management Plan (CEMP).

Table 2-4: Area of Deposition Area

Permanent / Temporary	Name	Value	Units
Permanent Deposition Areas	PDA1	6,888	m^2
	PDA2	8,689	m^2
	PDA3	5,691	m^2
	PDA4	8,903	m^2
	PDA5	3,112	m^2
	PDA6	2,659	m^2
	PDA7	3,295	m^2
	PDA8	2,798	m^2
	PDA9	1,593	m^2

Permanent / Temporary	Name	Value	Units
	Total Area	**43,627**	**m²**
Temporary Deposition Areas	TDA 1	21,000	m^2
	TDA 2	22,750	m^2
	Total Area	**43,750**	**m²**

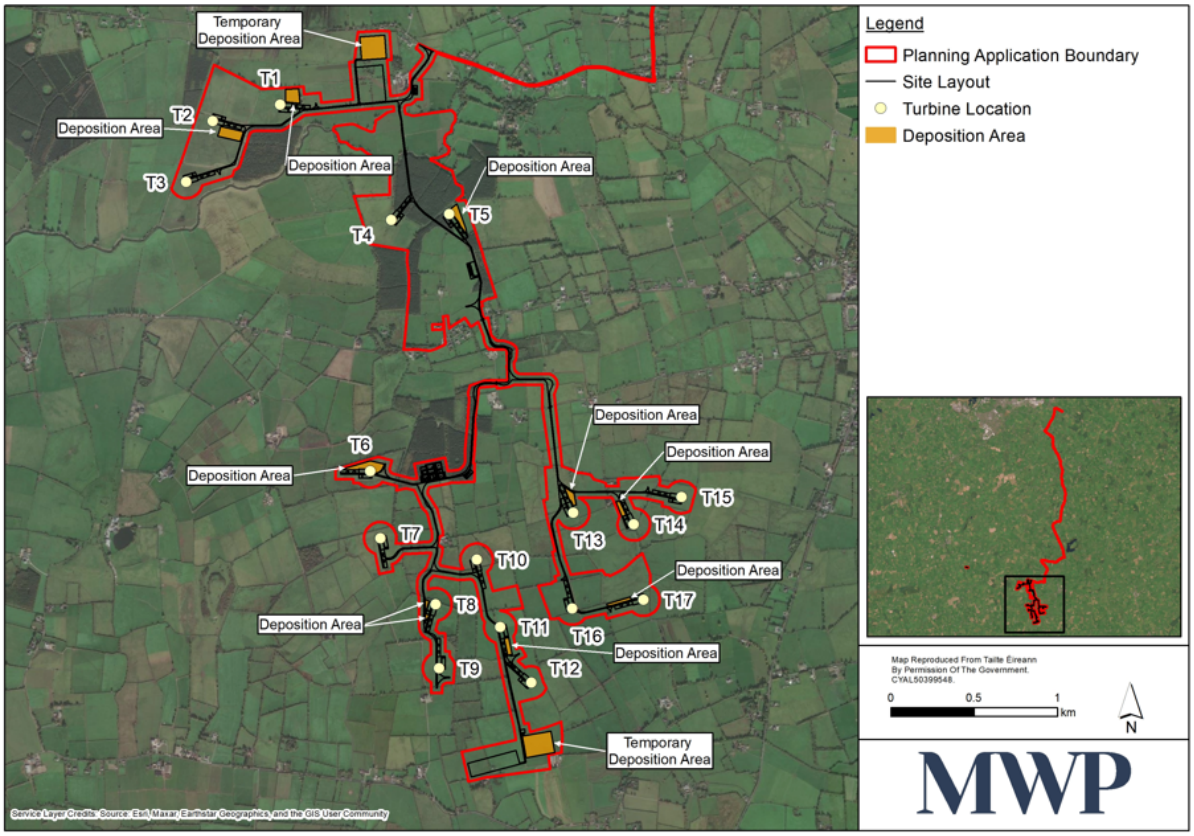

Figure 2-19: Location of Deposition Areas

2.4.9 Water Crossings

Watercourses within the proposed development area will be traversed using designs intended to minimise disturbance to the aquatic environment. In line with best practice, watercourse crossings will incorporate clear-span precast structures wherever possible. There will be no in-stream works in EPA mapped watercourses. One major watercourse crossing is proposed, as shown in **Drawing No. 22635-MWP-00-00-DR-C-5009**. This will consist of a clear-span precast concrete bridge design. For crossings of drainage ditches, the contractor may opt for an alternative method if the site conditions restrict the use of clear span pre-cast concrete culverts. Refer to **Drawing No. 22635-MWP-00-00-DR-C-5417** for further details. All such crossings will be in accordance with the CEMP management plan and/or conditions attached to a grant of planning permission and agreed with the OPW and IFI prior to construction.

Where existing surface water drains (classified as non-EPA watercourses) require removal or infilling to facilitate the development, disruption to the natural surface water network will be mitigated through the construction of swales. These swales will collect surface water runoff that would have otherwise entered the removed drains and convey it to, or close to, the original discharge point. In this way, the swales will replicate the function of the existing surface water drains, ensuring continuity of surface water management. The locations of drains to be removed are detailed in Drawing No.'s 22635-MWP-00-00-DR-C-5052 to 22635-MWP-00-00-DR-C-5066.

In addition, the installation of precast concrete headwalls will require works adjacent to drainage ditches. Surface water from the IPP and EirGrid compounds will outfall via a manhole and precast concrete headwall into the existing land drainage network. The outfall location is identified in Drawing No. 22635-MWP-00-00-DR-C-5419, with headwall details provided in Drawing No. 22635-MWP-00-00-DR-C-5441.

Further information on works in the vicinity of a watercourse are set out in EIAR Volume II, Chapter 4 Civil Engineering and Chapter 9 Water.

2.4.10 Surface Water Management

A site surface water management system will be constructed on the site to attenuate run-off, guard against soil erosion and safeguard downstream water quality. The drainage system will be implemented along all work areas including all internal site access tracks, storage areas, crane hardstand areas and temporary site construction compound. A Surface Water Management Plan (SWMP) is available in EIAR Volume III, Appendix 2E. Details of the proposed site drainage system are described in EIAR Volume II, Chapter 04 Civil Engineering.

The following gives an outline of drainage management arrangements along internal services tracks:

- The surface water run-off drainage system will be implemented along all internal access routes, to separate and collect 'dirty water' run-off from the access track and to intercept clean over land surface water flows from crossing internal tracks.
- To achieve separation, clean water drains will be positioned on the upslope and dirty water drains positioned on the downslope of access tracks, with track surfaces sloped towards dirty drains.
- Clean water will be piped under both the access tracks and downslope collection drains to avoid contamination. Piping the clean water under the service track allows the clean water to follow the course it would have taken before construction thus mimicking the existing surface water over land flow pattern of the site and thus not altering the natural existing hydrological regime on site.

See planning application Drawing No. 22635-MWP-00-00-DR-C-5051 to 22635-MWP-00-00-DR-C-5066 for details.

2.4.11 Forestry Felling

Felling of some portions of existing forestry is required within and around wind farm infrastructure to accommodate the construction of the turbine foundations and associated hardstands, access tracks, turbine assembly, substation and deposition areas. Forest and trees in a radius of between 73.9m to 97.1m around each turbine will be felled as part of the project. Two core sections of conifer forestry that will be felled for this purpose are indicated in Figure 2-20 and Figure 2-21. Additional tree line and hedge removal will be needed in some areas for the new access tracks and construction areas. While any tree felling, planting, or hedgerow removal will be subject to the relevant licence or consent at a later stage, the potential environmental effects of such activities have been fully assessed in the relevant chapters of this EIAR to ensure comprehensive consideration at this stage of the assessment.

Forestry felling of 14.4ha and 1,578m of hedgerow removal which will be undertaken in accordance with a tree felling licence, using good working practices as outlined by the Department of Agriculture, Food, and the Marine (DAFM) Standards for Felling and Reforestation (2019) and will follow the specifications set out in Forest Service's 'Forestry and Water Quality Guidelines' (2000) and 'Forest Harvesting and Environmental Guidelines' (2000). These standards deal with sensitive areas, buffer zone guidelines for aquatic zones, ground preparation and drainage, chemicals, fuel, and machine oils. All conditions associated with the felling licence will be complied with. A felling licence application will only be submitted once planning permission is received for the proposed development.

The following two areas of conifer plantation felling will be required:

1. For Turbines 4 and 5 and their associated hardstands and access tracks and deposition areas are indicated in **Figure 2-20**.
2. For the proposed substation, temporary construction compound and the access track from the site entrance to the substation and beyond to T6 indicated in **Figure 2-21**.

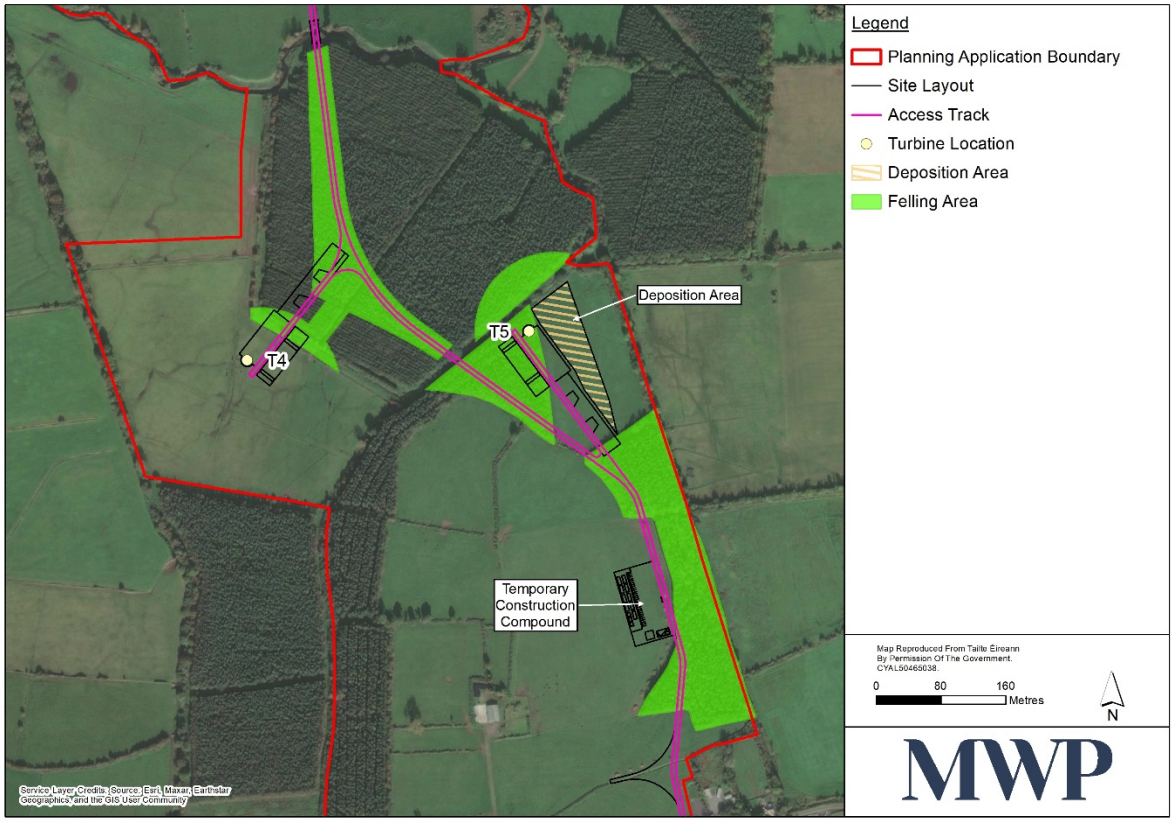

Figure 2-20: Areas where Conifer Plantation Felling will be Needed for T4 and T5 and Associated Infrastructure and Access Tracks

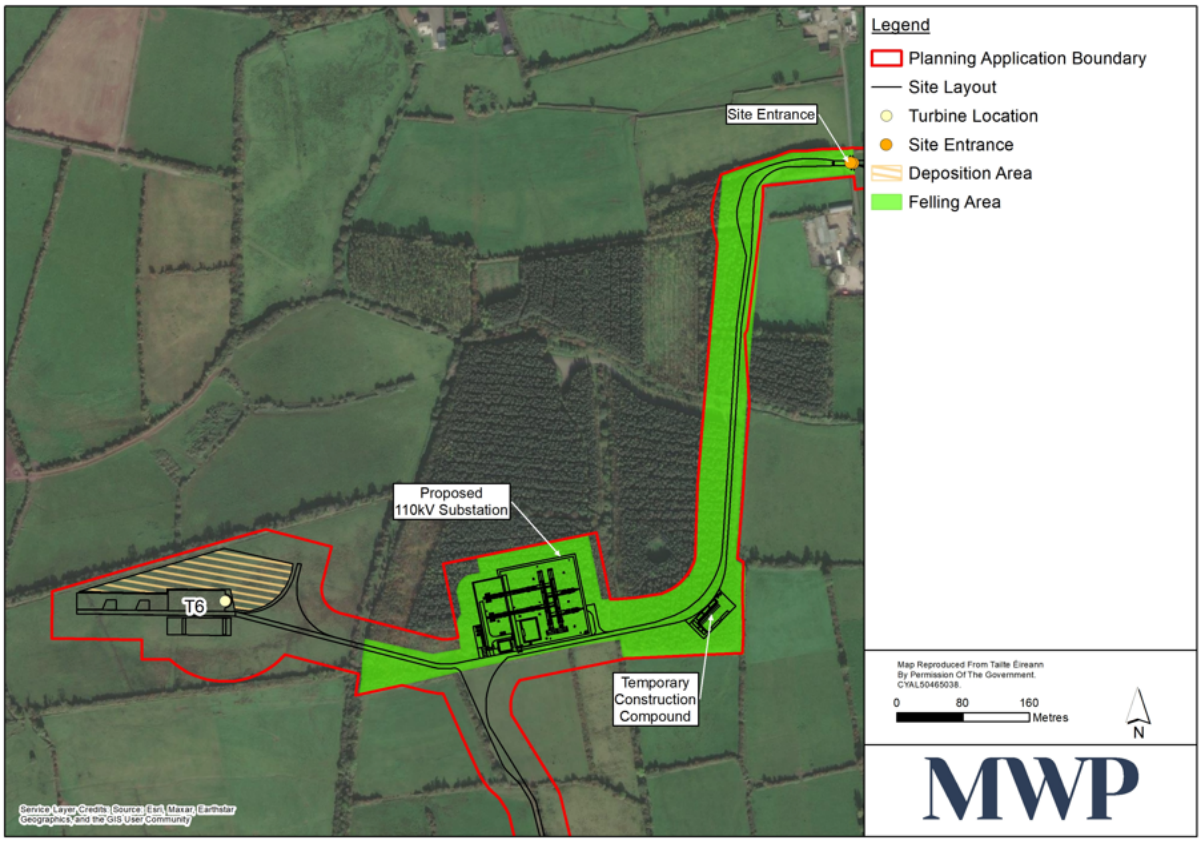

Figure 2-21: Areas where Conifer Plantation Felling will be Needed for the Proposed Substation and Temporary Construction Compound and Associated Access Tracks

2.4.12 Replant Lands

The permanent clear-felling of trees in the State requires a felling licence. The associated afforestation of alternative lands equivalent in area to those lands being permanently clear-felled 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.

For the purposes of this Project, the location of any replanting (alternative afforestation) associated with the project will be outside any potential hydrological pathways of connectivity i.e., outside the catchments within which the proposed project is located and also at a distance so as to not create any potential cumulative effects. The developer commits to not commencing the project until both felling and afforestation licenses are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.

2.4.13 Grid Connection Options and Infrastructure

Following a grid connection route study, one grid connection route and associated connection point to the National Grid has also been assessed in this EIAR as shown in **Figure 2-22** and **Figure 2-23**. See planning application **Drawing No. 22635-MWP-00-00-DR-C-5005**, **22635-MWP-00-00-DR-C-5431** and **22635-MWP-00-00-DR-C-5434** for details.

The proposed Grid Connection Route will consist of approximately 27.6km of a 110kV underground cable buried in the public road (local and regional roads) and under access tracks within the wind farm site. The route generally follows a southern direction on a mixture of regional and local roads. From the Eirgrid 220/110kV Killonan Substation the route follows the N24 in a westerly direction and then proceeds along the L1171 for a short distance to the intersection with the L1170 (Ballysimon Commons rd) going south until it intersects with the R512. It then follows south along the R512 through Ballyneety down to Hollycross, then west onto the L1412 road, then south along the L8011 road to the R516 where it turns west towards the proposed site entrance. The grid route is also contained in the planning application and within the planning application boundary as shown in **Planning Drawing No. 22635-MWP-00-00-DR-C-5003** (outlined in **Figure 2-22** and **Figure 2-23**).

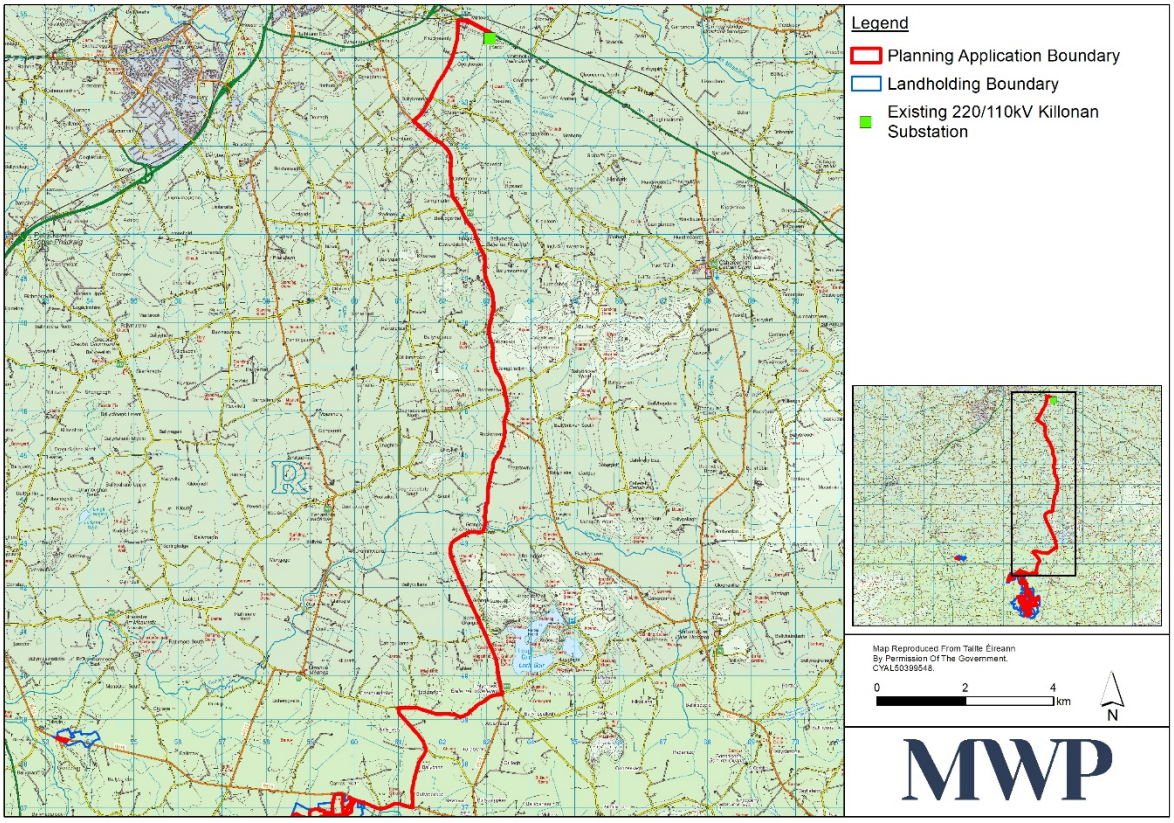

Figure 2-22: Proposed Grid Connection Route

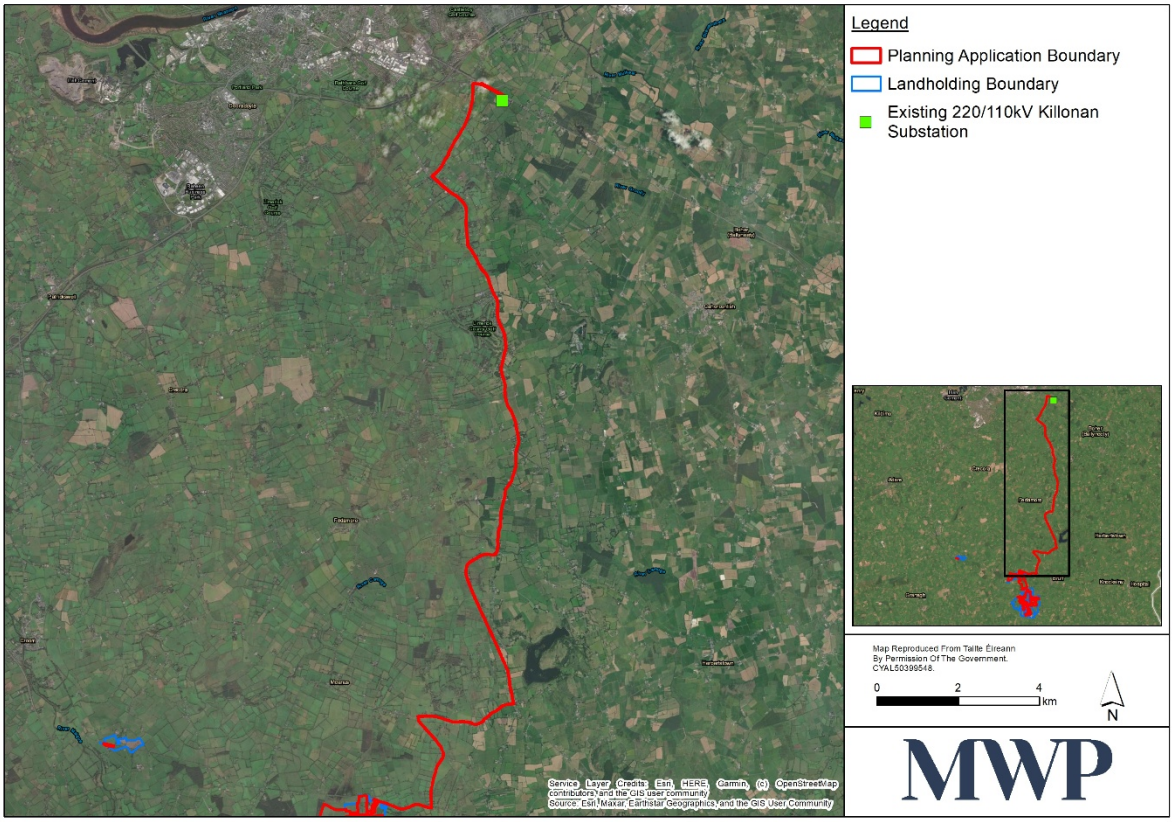

Figure 2-23: Aerial Image of Proposed Grid Connection Route

2.4.13.1 Crossings

The initial section of the grid route outside the existing 220/110kV Killonan substation is immediately on the N24 National Primary Road. Transport Infrastructure Ireland (TII) will be consulted in relation to works in this section as the road is under their management. . Three crossings of TII infrastructure will be required in this section namely 2 No.1200mm Drainage Pipes and 1 No. Farm Underpass. Horizontal Directional Drilling (HDD) is proposed with consultation with the Local Authority and TII to be undertaken to confirm the alignment.

In addition, HDD is also proposed for the crossing of a private Farm underpass on the R512 road. Consultation with the Local Authority and TII will be undertaken to confirm the alignment The route continues on the L1170 and R512 roads and crosses multiple watercourses, where there are a mixture of Concrete Pipes and Masonry Box Culverts present. Images of typical structures encountered are presented in **Figure 2-24** and **2-25**. Due to shallow cover levels, the presence of the structures built on the natural stream bed and dry-stone construction methods used, HDD solutions under many of these structures may be required. Further information of each of these crossings is given in EIAR **Volume III**, **Appendix 2D**.

A major watercourse crossing is present on the R512 named Sixmile Bridge which is a Protected Structure built in the 1800s and consists of a multi span Masonry Bridge Crossing the Camoge River. Due to minimal cover levels and being a Protected Structure, a HDD solution is proposed for this location.

Figure 2-24: Image of 1200mm Concrete Pipe

Figure 2-25: Image of Box Culvert as Cattle Underpass

2.4.13.2 Utility Services

During the route desktop study, information was reviewed from several Service Providers. Due to the geographical nature of the route, it is expected that multiple service crossings will be present along the route. A summary of the major services encountered is outlined below.

These crossings will be investigated further at detailed design stage and appropriate site investigation will take place to ensure accurate information is gathered for each service crossing design and the detailed design shall be agreed with all stakeholders including the utility providers prior to construction.

Electrical Networks

Within the grounds of the existing Killonan 220/110kV substation, multiple High Voltage (HV) and Medium Voltage (MV) cables are indicated in the obtained service records, and the detailed design of the route shall be finalised in close cooperation with both the Station Owner Eirgrid and Operator ESB Networks.

Detailed survey and design will be undertaken in these areas to confirm the exact grid route. For the remainder of this route option all encounters with existing underground cables are relatively uncomplicated being lower voltage MV or LV cables and generally crossing perpendicular to the proposed grid route. It should be noted that multiple overhead lines are encountered along the route ranging from Low Voltage (LV) to HV. In addition, public lighting is present at various locations and the detailed design will have regard to the locations of these.

Gas Networks

Gas Networks distribution pipelines are indicated along this grid route and there is Gas Transmission pipeline crossing along the Public Roads.

The same Gas Transmission pipeline will cross within the proposed windfarm site, and the detailed design of the internal site cabling and the grid connection route cabling will provide for the crossing of the Gas Transmission pipeline.

Public Water Supply and Foul Networks

The majority of the grid route is in the public road andis supplied by either public or group water main schemes and this will need to be taken into consideration at detailed design stage. Minimum separation distances, which are sized according to pipe diameter will be maintained. In addition, areas of Ballyneety and other high concentration of housing are serviced by Foul Networks.

For a 2.5km section of the route on the L1170 an additional Rising Foul Main is contained within the road, it is constructed to serve the Shannonside Galvanising Plant located in Drombanna. The main is 100mm in diameter. Due to the presence of Watermains, Foul Sewer and Rising Foul Main in this section of road amongst other services careful consideration shall be given to the design of this section of the route.

Communication Networks

Various providers were contacted as part of the desk study, from the respondents OpenEIR appear to have the largest network within the planning application boundary. OpenEIR underground network will share the road with the proposed grid route for approximately 18km. The route will share space with Auroa telecom for a distance of approximately 4.0 km between Drombanna and Ballyneety Golf Club. Appropriate separation distances will be maintained to ensure there is no disruption to any services.

2.4.13.3 Joint Bays

The grid connection route will include 36 No. joint bays which have been sited at suitable locations along the route and assessed in this EIAR (see **Figure 2-26**). These are pre-cast concrete chambers where individual lengths of cables are joined to form one continuous cable. All of the proposed joint bays are located within the public road (except where the joint bays are within the access tracks within the main wind farm site). Detailed design may give rise to some micro siting of the proposed joint bay positions within the public road. Any micro siting will remain within the planning application boundary.

Figure 2-26: Typical Construction Process of a Joint Bay

2.4.14 Wind Farm Substation

The proposed 110kV substation (see **Figure 2-27**) will comprise an outdoor electrical yard and two single storey buildings (one for the system operator and one for the wind farm operator). The system operator (Eirgrid) compound and the wind farm operator or independent power producer (IPP) compound make up the substation compound which measures approximately one hectare in area and is composed of compacted layers of suitable site won crushed rock or granular fill. The Eirgrid building will contain a control room, a storeroom, an office / canteen, a toilet and four parking spaces. The IPP building will contain a storeroom, a communications room, a control room, a staff room, an office/canteen, a switchgear room, a toilet and four parking spaces. The EirGrid substation building will be 8.5m in height and the IPP building will be 6.7m in height. Both buildings have pitched roofs and an external blockwork and plastered finish (see further details in **Section 4.7** of EIAR **Volume II**, **Chapter 04** Civil Engineering and in **Drawings No. 22635-MWP-00-00-DR-C-5419** to **22635-MWP-00-00-DR-C-5425**). There will be a very small water requirement for toilet flushing and hand washing for which it is proposed to harvest rainwater from the roofs of the buildings. The discharge from the toilet within each building will go to a holding tank located close to the substation compound where the effluent will be temporarily stored and removed at regular intervals by an approved contractor and disposed of in a licenced facility. The four car parking spaces for each building will be located within the compound area. The substation buildings and associated compound will be contained within a 2.6m high galvanised steel palisade fence around the boundary of the substation compound. It is proposed to topsoil and revegetate the cut and fill slopes required for the substation site.

A layout drawing of the proposed substation compound and buildings is provided in **Figure 2-27**. See planning application **Drawing No. 22635-MWP-00-00-DR-C-5419** for details.

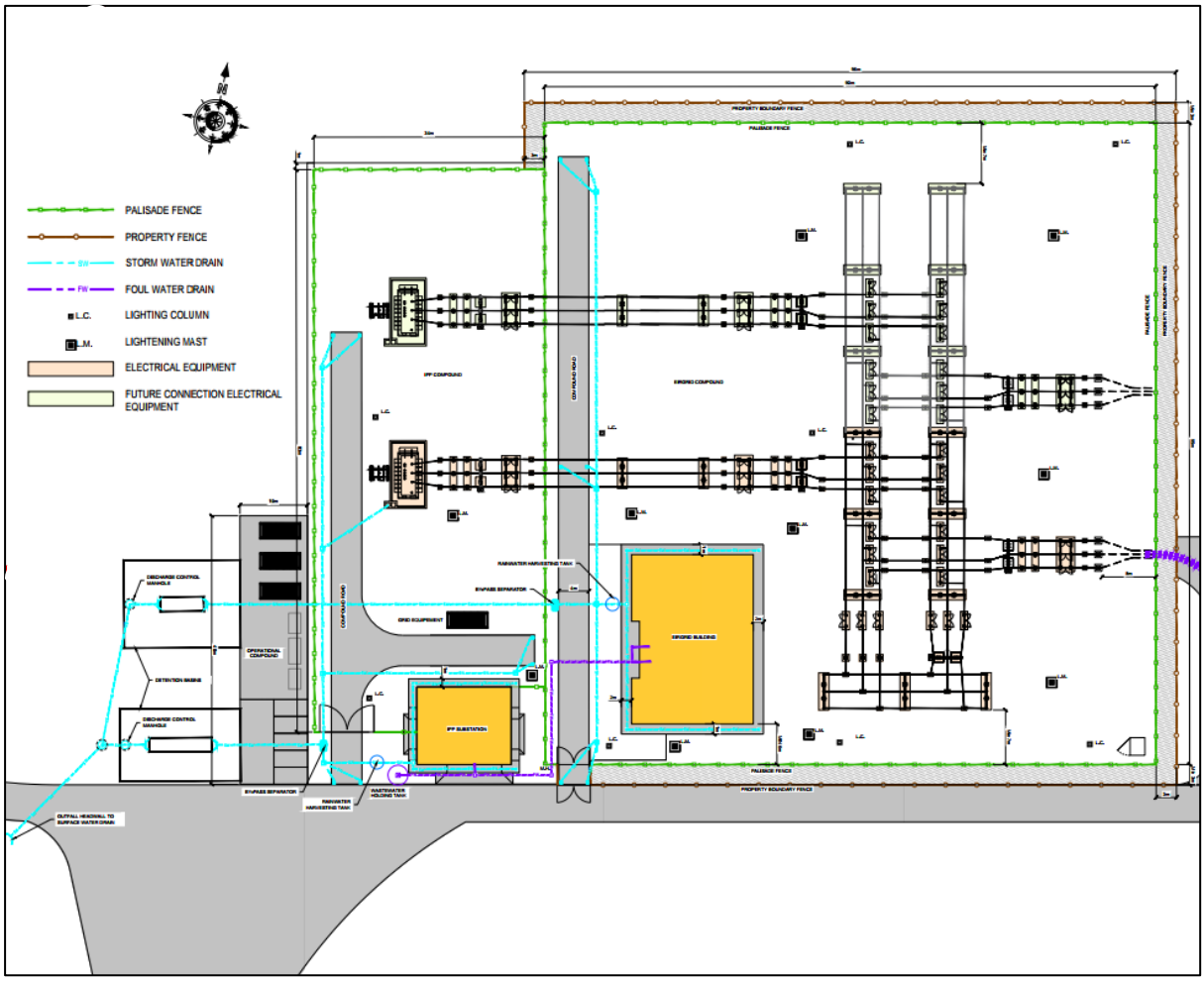

Figure 2-27: Proposed 110kV Substation

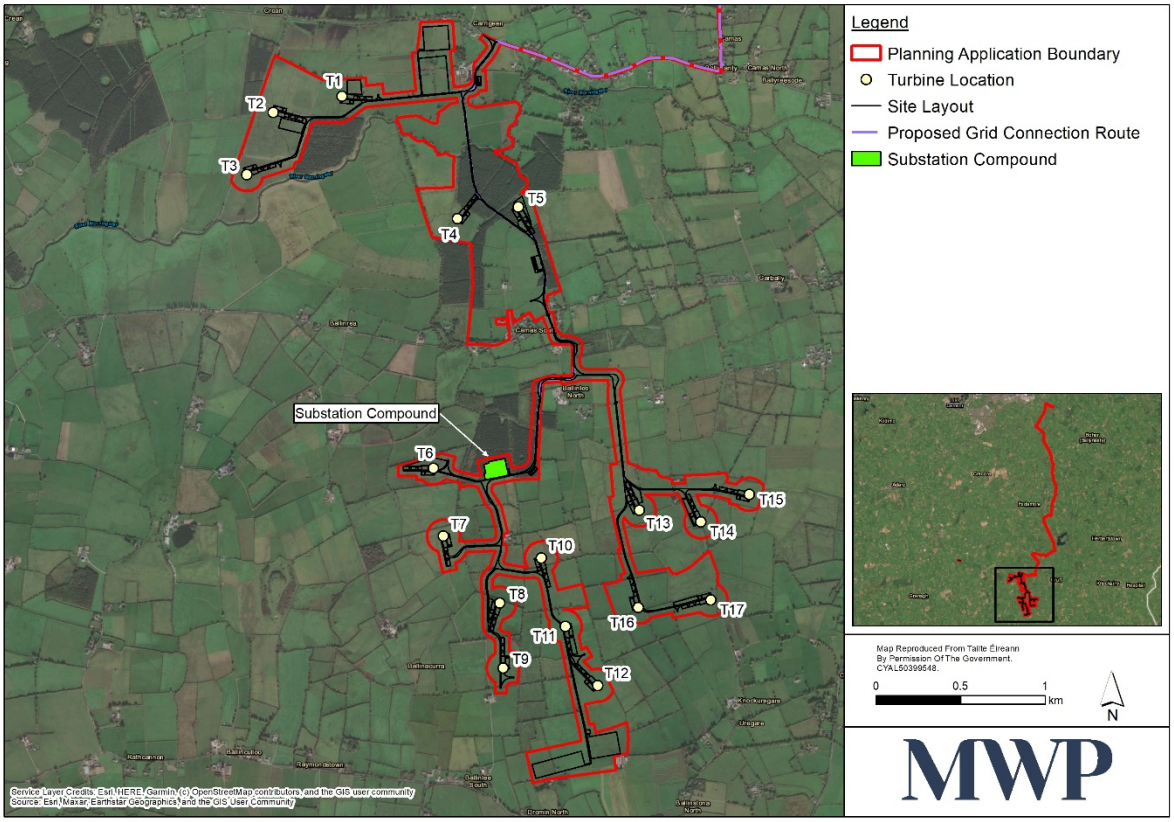

Figure 2-28: Location of Substation Compound

2.4.15 Clear-Span Bridge

A clear-span bridge is required as part of the proposed development over the Morningstar River to provide access to the northern and southern parts of the site. No instream works are proposed, however works are required within the watercourse buffer zone. All environmental and ecological constraints and requirements will be considered at detailed design stage and will be complied with by the appointed contractor. Construction activities include (but are not limited to) vegetation removal, topsoil stripping, crane pad preparation, excavation, dewatering of excavation (if required), blinding bedding, aggregate placement & compaction, shuttering, placing reinforcement, pouring concrete, abutment walls, cill beam, crane erection for pre-cast units, pre-cast bridge beams, bridge deck surface, backfilling, grading and revegetation.

The design of a clear span pre-cast concrete bridge will ensure that:

- The existing channel profile within the watercourse is maintained.
- Gradients within the watercourse are not altered.
- There is unrestricted passage for all size classes of fish by retaining the natural watercourse stream / riverbed.
- There are no blockages within the watercourse. The large size of a clear span culvert allows for the passage of debris in the event of flood flow conditions.
- The watercourse velocity is not changed.
- The clear span of a culvert will ensure that the existing stream / riverbank is maintained during construction which will in turn avoid the occurrence of in-stream works.

Post planning detailed design of the bridge is required in consultation with a precast manufacture, Office of Public Works, Inland Fisheries Ireland and the Environmental Protection Agency. A typical example of a clear-span bridge is shown in Figure 2-29. The preliminary design for the crossing is a clear span pre-cast concrete bridge and is shown in planning drawing 22635-MWP-00-00-DR-C-5401.

Figure 2-29: Typical Example of a Clear Span Bridge

2.5 Construction Works

2.5.1 Proposed Works

Construction works will be carried out in a phased manner to minimise disruption to the local community, minimise environmental impact and ensure the safest working conditions possible. A comprehensive description of activities is outlined in EIAR Volume II, Chapter 04 Civil Engineering. The construction of the proposed development will principally comprise of the following works:

- Felling of any areas of coniferous forestry plantation necessary to facilitate construction works;
- Construction of site entrances and any sections of internal access tracks necessary to facilitate access to the temporary construction compound and proposed on-site borrow pit locations;
- Construction of a temporary construction compound including fencing (for security and ecology, water) archaeological exclusion zones, site offices, parking, material laydown and storage areas, etc;
- Establishment of the on-site borrow pits and temporary storage of stockpiled overburden and surplus excavated materials within the material storage areas;
- Earthworks and drainage infrastructure associated with construction of new and upgraded internal access tracks, crane hardstand, turbine foundations and substation compound;
- Construction of upgraded and new watercourse crossings for construction of internal access tracks and underground cables;
- Excavation of turbine bases and permanent met mast foundations, and associated turbine hardstand areas;

- Installation of sections of underground cabling between turbines;
- Installation of sections of underground cabling to selected connection point option;
- Construction of the substation compound;
- Turbine delivery, installation, and commissioning; and
- Meteorological mast delivery, installation, and commissioning.

2.5.2 Construction Methods

Details on the construction methods are fully set out in EIAR **Volume II**, **Chapter 04** Civil Engineering and in the CEMP (EIAR **Volume III**, **Appendix 2A**). **Table 2-5** provides a summary of the types of proposed construction techniques for the various elements of the project.

Table 2-5: Proposed Construction Methodologies

Element	Construction Technique
Site Access	Sightline improvements of the existing site access junction will be required. Construction activities include vegetation clearing, topsoil and/subsoil stripping, aggregate placement and grading, and landscaping of temporary works areas.
Stormwater Management	Construction activities will include topsoil stripping, excavation, geotextile installation, check dams with imported/site won aggregate, installation of silt fences, compaction, grading, landscaping, fall/edge protection around open water and the installation of drainage: pipes, rip rap, outfalls, channels, ponds, tanks, berms.
Wind Turbine Foundation	Wind turbine locations will be cleared, graded, and foundations will be either excavated or piled by rotary core technique. Blasting may be required at wind turbine locations where bedrock is present near the ground surface. An engineered concrete foundation will be installed in the excavated/piled structure location. Construction activities include tree removal, vegetation clearing, topsoil stripping, excavation and or piling, grading, foundation construction, final grading and landscaping of temporary works areas.
Wind Turbine Hardstand	Backfill will be provided, and grading will be performed in a manner to allow for immediate drainage away from each tower. Construction activities include tree removal, vegetation clearing, topsoil stripping, excavation and or piling, grading, geogrid/geotextile installation, backfill with imported/site won aggregate, compaction, grading, final grading and landscaping of temporary works areas.
Internal Access Tracks - Founded	Construction activities will include topsoil stripping, excavation, geogrid/geotextile installation, backfill with imported/site won aggregate, compaction, grading, drainage channels, drainage berms, landscaping and fall/edge protection if required.
Internal Access Tracks - Floated	Construction activities will include removal of major protrusions, geogrid/geotextile installation, backfill with imported/site-won aggregate, compaction, grading, drainage channels, drainage berms, landscaping and fall/edge protection if required.
Internal Access Tracks - Upgraded	Construction activities will include surface layer stripping, excavation, geogrid/geotextile installation, backfill with imported/site won aggregate, compaction, grading, drainage channels, drainage berms, landscaping and fall/edge protection if required.
External Access Roads	Construction activities will include stripping road surface, excavation, backfill with imported aggregate, compaction, grading, maintaining drainage channels and berms, landscaping, fall/edge protection if required and revegetation of disturbed areas or resurfacing to approved specification.

Element	Construction Technique
Internal Collector Cables	To the extent possible, underground electrical collector cables will be co-located within/adjacent to access tracks in order to minimise the area of construction disturbance. Underground cable installation construction activities include topsoil stripping, trenching, bedding, installing electrical cables, backfill with imported aggregate/concrete/site won aggregate and revegetation of disturbed areas unless the cables are under the tracks.
External Cables	Underground cable installation construction activities include topsoil stripping, trenching, bedding, installing electrical cables, backfill with imported aggregate/concrete aggregate and revegetation of disturbed areas or resurfacing to approved specification.
External Cables HDD	Underground cable installation construction activities include topsoil stripping, excavation, bedding, shoring, pipe welding, horizontal directional drilling, backfill with imported/site won aggregate and revegetation of disturbed areas or resurfacing to approved specification.
Borrow Pit	Construction includes tree removal, topsoil stripping, drainage installation, access track, excavation and/or blasting, backfill and revegetation.
Temporary Compound	Construction includes topsoil stripping, excavation, grading, aggregate placement, compaction, portacoms + portaloos + containers delivery/installation, compound fencing, wheelwash, lighting and landscaping.
Substation	Construction includes vegetation removal, topsoil stripping, drainage, excavation, dewatering, grading, bedding & compaction, shuttering, placing reinforcement, pouring concrete, blockwork walls, timber roof construction, transformer structures, cable ducts, electrical components, parking, compound fencing.
IPP	Construction includes vegetation removal, topsoil stripping, drainage, excavation, dewatering, wastewater tank installation, rainwater harvesting tank, oil separator, grading, bedding & compaction, shuttering, placing reinforcement, pouring concrete, blockwork walls, timber roof construction, transformer structures, cable ducts, electrical components, parking, compound fencing.
Clear Span Bridge	Construction activities include (but not limited to) vegetation removal, topsoil stripping, crane pad preparation excavation, dewatering, blinding bedding, aggregate placement & compaction, shuttering, placing reinforcement, pouring concrete, abutment walls, cill beam, bridge beams, bridge deck surface, backfilling, grading, revegetation.
Met Mast	Construction includes vegetation removal, topsoil stripping, drainage, excavation, dewatering, grading, bedding & compaction, shuttering, placing reinforcement, pouring concrete, met mast structure, crane erection, cable ducts, electrical components, compound fencing.
Watercourse	No in-stream works in EPA mapped watercourses. Existing watercourse crossing construction activities include (but not limited to) widening using pre-cast piping, debris removal, cleaning, silt fence installation.

2.5.3 Turbine Delivery Route

The proposed turbine delivery route has been assessed, and the required temporary accommodation works required identified (see Turbine Delivery Route Assessment (EIAR **Volume III**, **Appendix 2C**) and **Figure 2-5**. The proposed route follows the N69 from Foynes Harbour in Co. Limerick to the N18 (east) bypass around Limerick city, then turnd south onto M20, turns south onto the N20 at Ballybronogue, and east onto the R516 at Croom to the proposed wind farm site.

TDR Route:

- Foynes Port to N69.
- N69 to the N18 towards Dublin.
- N18 to Junction 1 at Roxborough.
- Take the exit for the M20 at Junction 1 and head south towards Adare.
- Take Exit 5 onto N20 signposted Cork/Croom.
- Take Exit signposted Croom/Bruff.
- Take 1st exit at the roundabout onto the R516.
- Continue on R516 to Bruff and merge onto R512.
- Continue on R512 to Knockaneagh.
- Head 0.5km south along the R512.
- Turn right and continue to site entrance.

A detailed assessment of the TDR is provided in this EIAR **Volume III**, **Appendix 2C**. Eighteen pinch points have been identified along the route where various accommodation works will be required. The temporary accommodation works include the following:

- Works required to strengthen areas of soft verge with granular fill at pinch points.
- Works required to roundabouts to allow vehicle to traverse over them.
- Tree/Hedge trimming likely to be required.
- Street lighting and signage will need to be temporarily removed/moved at various points.
- ESB Overhead lines to be temporary moved at various locations.
- Temporary access track at Tullovin.
- Limerick City & County Council and Transport Infrastructure Ireland consultation for proposed temporary works along the public road network.

The majority of the temporary works mentioned can be carried out through road opening licence once agreed with the local authority, while certain elements qualify as exempted development. Any works requiring planning permission have been included within the planning application boundary of the proposed development, are shown on the planning drawings, and are assessed as part of this EIAR. As such, all proposed works can proceed without the need for a separate planning application. Details of the accommodation works required are provided in **Section 2.4.5** and Turbine Delivery Route Assessment (EIAR **Volume III**, **Appendix 2C**) and the potential effects of these works are assessed within the relevant chapters of this EIAR.

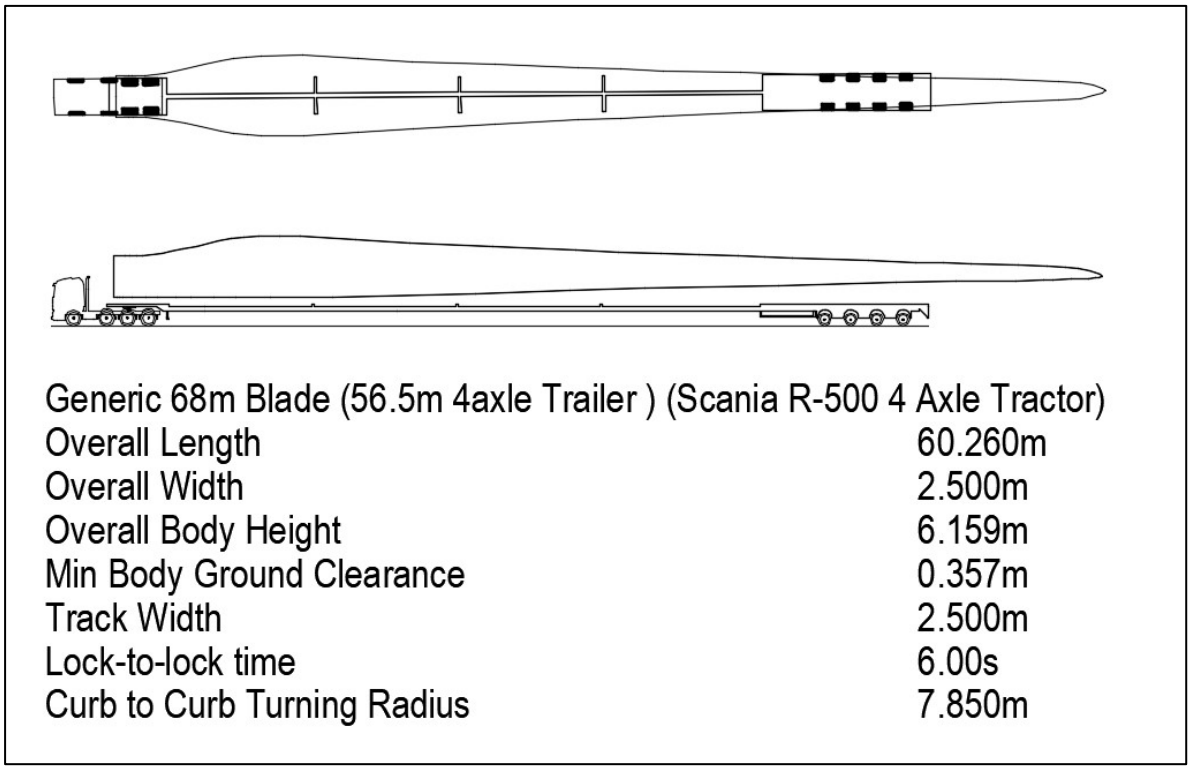

Figure 2-30: Typical Blade Length and Vehicles used to undertake the Swept Path Analysis and Identify Pinch Points and the Required Temporary Accommodation Works

2.5.4 Traffic Management

The proposed wind farm will be constructed in parallel with the proposed grid route/substation and will make use of the same roads and apply the same CEMP and Temporary Traffic Management Plan (TTMP).

Reasonable efforts will be made to minimise the impact of the works on local residences and users of the public road networks. A TTMP outlining the required traffic management procedures to be implemented on the public roads during the construction of the proposed project and delivery of the wind turbine components is appended to the EIAR (EIAR Volume III, Appendix 16A). In the event that planning approval is granted for the proposed development, an updated TTMP will address the requirements of any relevant planning conditions. The appointed contractor will be responsible for the updated TTMP and will amend it further to the site-specific risks, controls and construction programme. Prior to construction the final TTMP will form part of the contractor's request for a road opening licence.

2.5.5 Construction Environmental Management Plan

A Construction and Environmental Management Plan (CEMP) has been prepared. The CEMP will be updated to incorporate the requirements of any planning conditions during the pre-construction and construction phases and shall be implemented on site. The CEMP will be a key construction contract document, which will ensure that all mitigation measures, which are considered necessary to protect the environment, prior to construction, during construction and during operation and decommissioning of the proposed development, are implemented. The CEMP will collate and manage the proposed and agreed mitigation measures, monitoring and follow-up arrangements and management of environmental impacts. The environmental commitments of the project will be managed through the CEMP and will be secured in contract documentation and arrangements for construction

and later development stages. The CEMP will mainly address the construction phase. However, where mitigation and monitoring are to continue into the operational and decommissioning phases, these commitments will be communicated and transcribed into operational process documentation. The CEMP is included in EIAR Volume III, Appendix 2A.

The primary objective of this CEMP is to provide a framework for actions, responsibilities and protocols associated with environmental management with which the Appointed Contractor(s) are required to adhere to in order to construct the proposed development in accordance with regulatory requirements and to reduce and/or avoid any adverse environmental impacts.

This CEMP document will be updated as required to address, for example, any conditions stipulated in the planning permission. The version presented sets out the fundamental work practices, construction management procedures, management responsibilities, mitigation measures and monitoring proposals that are required to be adhered to.

The CEMP includes the following minimum site management controls.

a) Temporary Construction Compounds

- Drainage within the temporary site compound will be directed to an oil interceptor to prevent pollution if any spillages occur.
- No domestic wastewater discharges to the environment. Temporary toilet facilities will include an integrated wastewater holding tank which will be emptied routinely by a licence waste contractor.
- A bunded containment area will be provided within the compound for the storage of fuels, lubricants, oils, etc.
- The compounds will be in place for the duration of the construction phase and will be removed once commissioning is complete.

b) Soil Stripping

- The timing of the construction phase soil stripping and excavation works will take account of predicted weather, particularly rainfall.
- Soil stripping activities will be suspended during periods of prolonged rainfall events.
- The area of exposed ground will be kept to a minimum by maintaining where possible existing vegetation that would otherwise be subject to erosion in the vicinity of the wind farm infrastructure. The clearing of soil will be delayed until just before construction begins rather than stripping the entire site months in advance particularly during access track construction.

c) Excavation Works

- Earth movement activities will be suspended during periods of prolonged rainfall events.
- The earthworks material will be placed and compacted in layers to prevent water ingress and degradation of the material.
- Drainage and associated pollution control measures will be implemented on site before the main body of construction activity commences.

d) Dewatering

- Where dewatering is required for construction activities, any pumped waters will be directed to the surface water management system.

e) Storage and Stockpiles

- Temporary stockpiles of excavated material, stored in the footprint of the excavation areas, will then be directed for use in backfilling, landscaping and restoration or placed in the temporary deposition areas at the borrow pits.
- Stockpiles of stripped topsoil will be in locations with minimum trafficking to prevent damage and dusting.
- Reusable excavated sub-soils and aggregate will be stored in temporary stockpiles at suitably sheltered areas to prevent erosion or weathering and shall be shaped to ensure rainfall does not degrade the stored material.
- Where unsuitable material is encountered this will be removed to the borrow pit for permanent storage.
- Stockpiled materials will be located on hardstanding surfacing and silt retaining measures (silt fence, / silt curtain or other suitable materials) shall be installed along the downgradient edges of stockpiled earth materials to reduce risk of silt run-off.

f) Refuelling of Construction Plant On-Site

- Refuelling will be carried out using 110% capacity double bunded mobile bowsers. The refuelling bowser will be operated by trained personnel. The bowser will have spill containment equipment which the operators will be fully trained in using.
- Plant nappies or absorbent mats will be placed under refuelling points during all refuelling to absorb drips.
- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas, 50m away from drains and open water.
- To reduce the potential for oil leaks, only vehicles and machinery will be allowed onto the site that are mechanically sound. An up-to-date service record will be required from the main contractor.
- Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits, all oil and any contaminated material will be removed and properly disposed of in a licensed facility.
- Immediate action will be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks will be kept at the site compound and also in site vehicles and machinery.
- Correct action in the event of a leak or spill will be facilitated by training all vehicle/machinery operators in the use of the spill kits and the correct containment and cleaning up of oil spills or leaks. This training will be provided by the Environmental Manager at site induction.
- In the event of a major oil spill, a company who provide a rapid response emergency service for major fuel spills will be immediately called for assistance, their contact details will be kept in the site office and in the spill kits kept in site vehicles and machinery.

g) Materials Handling, Fuels and Oil Storage

- Fuel containers will be stored within a secondary containment system e.g. bund for static tanks or a drip tray for mobile stores.
- The potential for hydrocarbons getting into the existing drains and local watercourses will be mitigated by only refuelling construction machinery and vehicles in designated refuelling areas using a prescribed refuelling procedure.
- Collision with oil stores will be prevented by locating oils within a steel container in a designated area of the site compound away from vehicle movements.
- Leakages of fuel/ oil from stores will be prevented by storing these materials in bunded storage areas which have a capacity of 110% of the total volume of the stored oil. Ancillary equipment such as hoses and pipes will be contained within the bunded storage area. Taps, nozzles or valves will be fitted with a lock system.
- Long term storage of waste oils will not be allowed on site. These waste oils will be collected in leak-proof containers and removed from the site for disposal or re-cycling by an approved service provider.
- On-site washing of concrete truck barrels will not be allowed. The washing of the chutes at the rear of the trucks may be permitted. A designated chute wash down area, which will retain the washout water, will be located within the construction compound and there will be no other chute wash down activity on any other part of the wind farm site.

h) Access Track Maintenance

The surface of the internal access tracks can become contaminated with clay or other silty material during construction. Track cleaning will, therefore, need to be undertaken regularly during wet weather to reduce the volume of sediment runoff to the treatment system. This is normally achieved by scraping the track surface with the front bucket of an excavator and disposing of the material at designated locations within the site which may include the proposed borrow pits.

i) Construction Wheel Wash

A number of Construction Wheel Washs will be used to wash truck tyres leaving the construction site. Water residue from the wheel wash will be fed through a settlement pond, interceptor and then discharged to a vegetated area of low ecological value. The wheel wash area will be cleaned regularly to avoid the buildup of residue.

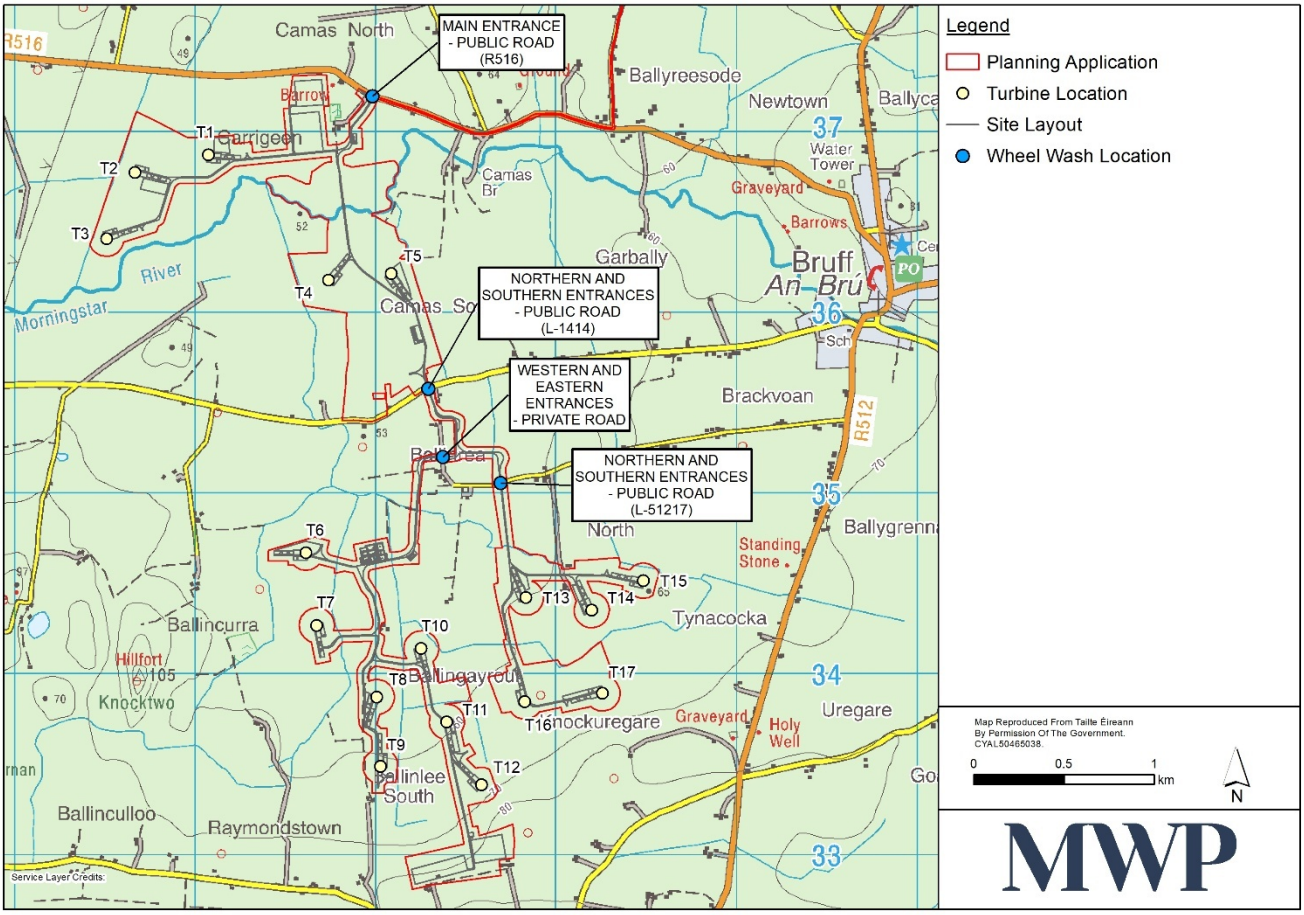

Figure 2-31: Map of Wheel Wash Locations

j) Inspection and Maintenance

The drainage and treatment system will be managed and monitored and particularly after extreme rainfall events during the construction phase. Controls will be regularly inspected and maintained to ensure that any failures are quickly identified and repaired to prevent water pollution. A programme of inspection and maintenance will be designed and dedicated construction personnel assigned to manage this programme. A checklist of the inspection and maintenance control measures will be developed and records kept of inspections and maintenance works.

2.5.6 Duration and Timing

It is envisaged that construction of the proposed development will take place over a 24 month period followed by a 6 month commissioning period. The start date is dependent on planning being granted, receipt of a grid connection offer from EirGrid, funding and all permits being in place.

A typical programme of work is outlined in **Table 2-6**. A number of these phases will however run concurrently outlined as follows.

- As the internal site access tracks are constructed up to each turbine, hardstanding areas for the crane, turbine foundations and building foundations will be prepared.
- Once the tracks are completed, the trenching and laying of underground cables will begin.

- Construction of the site sub-station and control houses will commence so that they will be ready to export power as turbines are commissioned.

Table 2-6: Preliminary Construction Programme

Phase	Activity	Duration
Phase 1	Site Clearance	0.5 months
Phase 2	Enabling Works	0.5 months
Phase 3	Site Establishment	0.5 months
Phase 4	SMA	1.0 month
Phase 5	Access Tracks	1.0 month
Phase 6	Borrow Pit	1.5 months
Phase 7	Turbine Hardstand	4.0 months
Phase 8	Turbine Foundation	4.0 months
Phase 9	Internal Cables	3.0 months
Phase 10	Clear Span Bridge	3.0 months
Phase 11	IPP	1.0 month
Phase 12	Substation	1.0 month
Phase 13	Met Mast	0.5 months
Phase 14	Turbine Delivery	2.0 months
Phase 15	Turbine Erection	3.0 months
Phase 16	Replanting	0.5 months
Phase 17	WF Commissioning	6.0 months

2.5.7 Major Temporary Features

Temporary features on site include the construction compound facilities, plant, and equipment along with safety fencing and building materials. Large excavators and turbine erection cranes are also a temporary feature on site during the construction phase. There will be some temporary stockpiling of soils on site. Any surplus material will be placed within the proposed borrow pits and material deposition areas.

2.5.8 List of Plant

Various plant used for construction projects will be required to facilitate the proposed project. The following non-exhaustive list of mechanical machinery and electrical equipment is proposed to be used for the wind farm and heavy civil engineering work:

- 30-50T Excavators;
- 15-30T Excavator;
- Rubber Tired 15-20T Excavator;
- 3-10T Mini Diggers;
- Mobile Crane for construction;
- Rebar/shuttering/precast units/conc. pipes/box culverts etc 60t to 120t;
- Cranes (1 main, 1 assist) Erection 120t to 1000t;
- Telescopic Handler;
- Tractors and trailers;

- Road grader;
- Double contained fuel bowsers;
- 12T Rollers;
- Diesel powered generators;
- Mobile crushing mill;
- Mobile screening unit: and
- Water bowsers.

2.5.9 Construction Working Hours

2.5.9.1 Wind Farm Site

It is proposed that construction will occur within the hours 07.00am – 7.00pm, Monday to Saturday or as otherwise conditioned as part of the consent.

Due to the requirement for the concrete pours to be continuous, the working day may extend outside normal working hours to limit the traffic impact on other road users, particularly peak period school and work commuter traffic. Such activities are limited to the days of turbine foundation concrete pours, which are normally complete in a single day per turbine. Turbine and crane erections may also occasionally occur outside of these times to take advantage of low wind periods. Working hours will be confirmed at the outset of the project and any changes in hours will be agreed with Limerick City and County Council.

Works along public roads will be from 7.00 a.m. to 7.00 p.m. Monday to Friday and 9.00 a.m. to 2.00 p.m. on Saturdays. A permit for moving abnormal loads will be sought from An Garda Síochána for the nighttime movement and delivery of oversized wind turbine components (i.e. blades, nacelles and towers).

There will be no work on Sunday or bank holidays unless pre-approved with the Local Authority.

2.5.9.2 Grid Connection Cable

The works for the grid connection route are estimated to take approximately 6 months within the overall project works schedule. Construction activities along the proposed grid connection route will operate between the hours 7:00 a.m. and 7:00 p.m., Monday to Saturday or as otherwise conditioned as part of the consent. Any works along public roads will be from 7.00 a.m. to 7.00 p.m. Monday to Friday and 9.00 a.m. to 2.00 p.m. on Saturdays.

2.5.10 Construction Personnel

During the construction phase, the number of on-site construction personnel will vary for each phase of the proposed development. Overall, it is envisaged that the proposed development would generate employment for up to 80 persons during the construction phase to include site contractors, on-site vehicle and plant operators, engineers, materials delivery personnel, environmental personnel, health and safety personnel.

It is expected that the civil works for the grid connection route will require at least 15 personnel to complete the works. The electrical works will require less heavy machinery but more labour personnel, with an expected 25 personnel to complete the works.

2.6 Commissioning

Wind farm commissioning is expected to take six months to complete from the erection of the final turbine to exporting of power. It involves commissioning engineers working through an entire schedule of SCADA (Supervisory Control and Data Acquisition) and electrical testing and control measures to ensure the wind farm will perform and export power to the national electricity grid as designed.

2.7 Operation

2.7.1 Land Use Requirement

The permanent land take requirements are set out in Table 2-7 and will be limited to the wind turbine hardstands and crane pads, access tracks, met mast area, control building and substation hardstanding. All land within the planning boundary but not used for the aforementioned permanent elements of the proposed wind farm can be reinstated and continue in agricultural use throughout the operational phase of the proposed development.

Table 2-7: Land Use Requirements

Item	Description	Unit	Quantity
Wind Turbine Construction	Wind turbine hardstand area for vehicle during construction and operational phase – 1,797m^2	m^2	30,549
Access Tracks	Existing, new and upgraded access tracks both founded and floated required for construction and operational phases - 10.8km x 5.5m	m^2	59,400
Substation	Compound including fences, grid connection access tracks & attenuation for operational phase	m^2	9,350
Independent Power Provider	Compound and maintenance compound including attenuation for operational phase	m^2	3,500
Met Mast	Permanent met mast + vehicle hardstand for operational phase	m^2	806
Deposition Areas	9 No. permanent deposition areas throughout site	m^2	43,627

2.7.2 Operating Hours and Operational Conditions

The proposed project is expected to have a lifespan of 35 years. The proposed project is designed to operate when wind speeds at the hub height are within the operating range of the wind turbines. Most turbine models have a cut in wind speed of 4m/s with optimum generation at approximately 12.5m/s. The turbines are expected to have a cut out wind speed of approximately 25m/s.

Each wind turbine will be computerised to control critical functions, monitor wind conditions and report data back to a SCADA system. An anemometer mounted on the top of the wind turbine nacelle provides wind speed information used to automatically set blade pitch and control the wind turbine. A wind vane mounted on top of the nacelle provides information needed to yaw the wind turbine into the wind. The SCADA system monitors numerous parameters and diagnoses potential issues. If a problem causes a wind turbine to shut down, the wind turbine will either be restarted by the SCADA system operator, or service personnel will perform the necessary repairs and then manually restart the wind turbine.

In addition, the wind turbine can also be controlled manually at the nacelle, from a panel inside the base of the tower, or from a remote computer via the SCADA system. Using the tower top control panel, the wind turbine can be stopped, started, and turned to a safety position.

Turbines can be programmed to shut down during periods when shadow flicker is predicted to occur. Shadow flicker control modules will be installed on the appropriate turbines which can be programmed to shut down to eliminate the occurrence of shadow flicker at any particular dwelling. Turbines will be fitted with shadow flicker control modules to ensure that the proposed wind farm will comply with existing guideline thresholds and also eliminate flicker at receptors. This is detailed in EIAR Volume II, Chapter 15 Shadow Flicker.

2.7.2.1 Turbine Maintenance

During the operation of the wind farm, the turbine manufacturer, the Developer or a service company will carry out regular maintenance of the turbines on a weekly basis. Other likely schedule of visits to the site during the operational phase is as follows:

- The regional supervisor will visit the site 2 times per month, civils maintenance will occur as needed and will likely take place twice per year, substation maintenance will occur once per year and the Original Equipment Manufacturer (OEM) will inspect the wind turbines twice per year or as needed if specific issues are identified.

During the life of the proposed development, it is envisaged that at least two permanent jobs will be created locally in the form of an operator or maintenance personnel. In addition, operation and monitoring activities may be carried out remotely with the aid of computers connected via a telephone broadband link. However, routine inspection and preventive maintenance visits will be necessary to ensure the smooth and efficient running of the wind farm.

2.7.2.2 Grid Maintenance

During the operational phase the grid connection cable will remain *in situ*. It is unlikely that the underground cable will require maintenance during its operation but in the event a fault does occur, inspection of the fault will be carried out to determine what works to the ducting/cabling may be required.

2.7.2.3 Community Benefit

Under the Renewable Electricity Support Scheme (RESS) all renewable electricity generation projects must establish a Community Benefit Fund to be used for the wider economic, environmental, social and cultural well-

being of the local community. The contribution is set at €2 per Megawatt hour of generation of the RESS Project. This means there are real and quantifiable funds being made available annually for the benefit of the local community. The Fund will be aligned to incentivise investment in local renewable energy, energy efficiency measures and climate action initiatives.

The key stakeholders involved in the Community Benefit Fund are the Community, the Fund Committee, the Developer and the Administrator. For the proposed project, the community benefit funds under RESS is expected to deliver approximately €350,000 per year which will contribute to a near neighbour scheme and sustainable community initiatives in line with the latest RESS guidelines.

2.8 Decommissioning Phase

2.8.1 Wind Farm

At the end of the 35-year lifespan of the proposed development, the Developer will make the decision whether to repower or decommission the turbines. Any further proposals for proposed development, including repowering, at the site during or after this time will be subject to a new planning permission application. If planning permission is not secured at the end of life of the turbines, the site will be decommissioned and reinstated with all 17 No. wind turbines removed. Removal of infrastructure will be undertaken in accordance with the Schedule of Environmental mitigation (EIAR Chapter 19, Volume III) and commitments arising from any conditions attached to a grant of permission, in conjunction with other landowner, regulatory requirements and best practice applicable at the time. The information below outlines the proposed decommissioning tasks based on current requirements and best practice.

Prior to the decommissioning work, the following will be provided to Limerick City and County Council for approval:

- A detailed plan outlining measures to ensure the safety of the public and workforce and the use of best available decommissioning techniques at the time.
- A comprehensive reinstatement proposal, including the implementation of a programme that details the removal of all structures and landscaping.

Wastes generated during the decommissioning phase will be taken off site and disposed of at an authorised waste facility in accordance with the provisions of the RWMP (EIAR Volume III, Appendix 2B). Any materials suitable for recycling will be disposed of in an appropriate manner.

It is anticipated that internal underground cables connecting the proposed turbines to the proposed on-site substation will be cut back and left underground in order to minimise disruption from construction and the potential for environment effects. The cables will not be removed if an environmental assessment of the decommissioning operation demonstrates that this would do more harm than leaving them *in situ*. The assessment will be carried out closer to the time to take into account environmental changes over the project life.

Hardstand and turbine foundation areas will be left *in situ* and covered with soil to match the existing landscape. Access tracks will be left *in situ* for agricultural use.

2.8.2 Grid Connection

The grid cable will be taken in charge by EirGrid on commissioning of the proposed development and remain a permanent part of the national electricity grid and therefore decommissioning is not foreseen. In the event of

decommissioning, it will involve removing the cable from the ducting but leaving the ducting and associated supporting structure in place. Similarly, the proposed on-site substation will be taken in charge of by EirGrid on commissioning and will remain in place and will form part of the national electricity grid.

2.9 Transboundary Effects

Transboundary impacts relate to potential impacts on other Member States, i.e. outside of the Republic of Ireland. The location of the proposed development is entirely in County Limerick within the Republic of Ireland.

Considering the nature of the proposed development and the largely localised nature of any potential impacts, it is considered that the proposed development would not have potential to result in significant transboundary effects.

2.10 The Use of Natural Resources

2.10.1 Aggregate, Concrete and Steel

Details of aggregates, concrete, and steel that will be used during construction are detailed in **Table 2-8**.

Sixty one percent of aggregate materials (circa 99,852m^3) required for the construction of the access tracks, hardstands and the substation compound will come from aggregate (rock, stone, gravel, sand) extracted from the proposed on-site borrow pits. An additional 67,740m^3 (39%) of material will be sourced from local quarries, this will mainly consist of higher-grade materials not available to be won on site, limestone capping material for tracks and hardstands, and concrete for the construction of the 17 No. turbine bases, permanent met mast foundation, underground cabling (on site and for grid connection), storage areas and substation infrastructure.

Table 2-8: Summary of Approximate Aggregate and Steel Quantities

Item	Unit	Quantity
Total volume of aggregate required (including site won and imported)	**m3**	**164012**
Site won aggregate from onsite borrow pit	m3	99852
Total volume of site won aggregate required	**m3**	**99852**
Imported stone for turbine bases	m3	16905
Imported stone for turbine hardstand	m3	7548
Imported stone for access tracks	m3	9801
Imported stone for temporary compound	m3	1320
Imported stone for substation area	m3	10362
Imported stone for independent power provider	m3	5313
Imported stone for met mast area	m3	532
Imported stone for internal cable route	m3	1203
Imported stone for external cable route	m3	14755
Total volume of imported aggregate required	**m3**	**67740**
Concrete for turbine bases	m3	19097
Concrete for substation	m3	63
Concrete for independent power provider	m3	66

Concrete for met mast	m3	12
Concrete for internal cable route	m3	4922
Concrete for external cable route	m3	11426
Total volume concrete required	**m3**	**35586**
Reinforced steel for turbine bases	tonnes	2865
Reinforced steel for substation	tonnes	8
Reinforced steel for independent power provider	tonnes	8
Reinforced steel for met mast	tonnes	1
Total volume of imported steel reinforcement required	**tonnes**	**2882**

Concrete and aggregate materials will be sourced from authorised facilities. There are eight concrete/aggregate facilities within 35km of the proposed development, all capable of supplying the required construction materials (see **Table 2-9**). The aggregate source will be finalised by the appointed contractor prior to construction.

Table 2-9: Concrete/Aggregate facilities within 35km of the site

Name	Address	Product Type	Distance from site (by road (km))	Co-ordinates (Lat/Long)
McGrath Concrete Products Ltd	Ballinard, Co. Limerick	Concrete	12.5	52.52541381259566, -8.475756258526937
Liam Lynch Quarries Ltd	Kilfinny, Co. Limerick	Aggregate	19.0	52.51074067719904, -8.799939516197368
Costello Quarry Products	Coolruss, Bruree, Co. Limerick	Concrete & Aggregate	21.0	52.45064808350377, -8.73500700270491
Leahy's Stone	Ballynacourty, Kilfinane, Co. Limerick	Aggregate	24.0	52.32093714540462, -8.416940787371674
Ballyorgan Quarries	Ballyorgan, Co. Limerick	Aggregate	25.0	52.32893823579882, -8.471916760380546
W.M. McAuliffe Ltd.	Quarry, Kilmeedy, Co. Limerick	Aggregate	32.0	52.41853360605965, -8.90787161620183
Gleeson Concrete	Farnaclara, Donohill, Co. Tipperary	Concrete	44.0	52.523481433928, -8.14487247887865
Joseph Hogan Roadstone	Ballylin, Foynes, Co. Limerick	Concrete & Aggregate	69.0	52.57541182927034, -9.038467696437204

2.10.2 Water

Water needs for construction activities will be limited to potable water, concrete truck chute washing, wheel wash, dust suppression and sanitary facilities. This water requirement will be imported to the site in bulk and stored at temporary compounds.

It is estimated that up to approximately 3,000 litres per day of potable water will be required during peak construction for construction employees. It is proposed that this water requirement will be imported in bulk water tanks.

Potable water for the operational and maintenance phase is estimated to be approximately 20 litres per day. This water will be supplied as bottled water. Waste water facilities at the substation compound will be serviced by a rainwater harvesting system.

2.11 The Production of Waste

2.11.1 Excavated Soils and Subsoils

It has been calculated that there will be approximately 321,758m³ of material excavated during the construction of the proposed development (see **Table 2-10**). Excavated soils and subsoils will be managed within the site, with material primarily reused for bunding, landscaping, and localised earthworks, while any remaining volumes will be placed in the designated permanent deposition areas and used to infill the borrow pits. The **CEMP** (EIAR, **Volume III**, **Appendix 2A**) includes a waste management plan.

Table 2-10: Excavation and Material Volumes

Item	Unit	Quantity
Total Excavation Volume	**m^3**	**321,758**
Excavated Material from the Wind Farm Site	m^3	296,918
Excavated Material from the External Grid Route	m^3	24,840
Total Aggregate Volume	**m^3**	**167,591**
Imported Aggregate	m^3	67,740
Site Won Aggregate	m^3	99,852
Total Concrete Volume	**m^3**	**35,586**
Total Reinforcement Volume	**Tonnes**	**2,882**

2.11.2 Domestic Waste-Water Effluent

Wastewater from welfare facilities on site will drain to integrated wastewater holding tanks associated with the toilet units. The stored effluent will then be collected on a regular basis from site by a permitted waste contractor and removed to a licenced waste facility for treatment and disposal. There are licensed, operational wastewater treatment plants in Limerick.

During the construction period, wastewater production is estimated to be 3,000 litres per day.

Although primarily controlled remotely, during the operational phase, maintenance personnel will visit the substation building on a regular basis. The daily average wastewater production during the operational phase is estimated from the average number of workers on site, which is expected to be 2 workers, resulting in a typical wastewater production rate of 60 litres per day on days where substation maintenance and monitoring is undertaken. This is likely to take place once per year over a short period. The regional manager will likely visit the customer control building two times per month. The wastewater generated during the operational phase will be managed by a holding tank which is of twin-hull design and fitted with an alarm to indicate levels and when it is due for empty. The holding tank will be emptied by a permitted contractor and treated at a licenced facility.

2.11.3 General Wastes

Construction phase waste is anticipated to consist of hardcore, concrete, spare steel reinforcement, shuttering timber and unused oil, diesel and building materials. This waste will be segregated and stored in the construction compound and collected regularly during the construction phases and taken off site to be reused, recycled and disposed of in accordance with best practice procedures at an approved facility. Plastic waste will be taken for recycling by an approved contractor and disposed or recycled at an approved facility. Domestic type waste generated by contractors will be collected on site, stored in an enclosed skip at the construction compounds and disposed of at an appropriately authorised facility. A list of licenced waste facilities and service providers is provided in the RWMP (EIAR, **Volume III**, **Appendix 2B**).

The power generation aspect of the proposed development will not produce any waste emissions or pollutants. The general operation and maintenance of the proposed development is expected to produce a minimal amount of waste. Wastes arising during the operation phase of the proposed development include but are not limited to lubricating oils, cooling oils, and packaging from spare parts.

The containment and disposal of such oils will be carried out by an approved contractor. Such operations will be carried out in accordance with the Waste Management (Hazardous Waste) Regulations, 1998 as amended. The remaining wastes will all be removed from site and reused, recycled, or disposed of in an authorised facility in accordance with best practice.

2.12 Emissions and Disturbances

The anticipated residues and emissions likely to be generated during the project lifetime are summarised in **Table 2-11**. These environmental effects have been identified, assessed and proposals for management of the anticipated disturbances and/or emissions are presented throughout relevant chapters of this EIAR.

Table 2-11: Emissions and Disturbances

Phase	Aspect	Potential Emission/Disturbance	Assessment Provided
Construction	Air Quality & Climate	The main emissions to atmosphere during the construction stage of the project is from fugitive dust associated with the following activities: • Groundworks associated with the construction of the project infrastructure; • Transportation and unloading of crushed stone around the site; • Vehicular movement over potentially hard dusty surfaces such as freshly excavated and constructed access tracks and crane hardstanding areas; • Vehicular movement over material potentially carried off site and deposited on public roads. The movement of machinery, construction vehicles and the use of generators during the construction phase will also generate exhaust fumes containing predominantly carbon dioxide (CO_2), sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and particulate matter (PM_{10}).	EIAR **Vol II Chapter 10** Air Quality & **Chapter 11** Climate
	Noise	Traffic flows, excavation/blasting mechanical machinery and electrical equipment proposed to be used for construction projects will generate noise emissions.	EIAR **Vol II Chapter 13** Noise and Vibration

Phase	Aspect	Potential Emission/Disturbance	Assessment Provided
	Water	Surface water runoff and discharges from construction working areas are likely during construction, although overall the quantity of surface runoff will not change overall as a result of the construction works. Occasional low quantity discharges could arise from pumping in order to dewater foundation excavations. This would be discharged to the water management drainage system. Pollution sources could arise as a result of soil erosion or from oil/ fuel or chemical storage and use. Proposals for management of water quality and quantity from the proposed project are presented in EIAR **Volume III**, **Appendix 2A CEMP**.	EIAR **Vol II Chapter 09** Water
	Traffic	The additional traffic, especially heavy goods vehicles associated with the construction phase, has the potential to cause disturbance to those using the local road networks.	EIAR **Vol II Chapter 05** Population and Human Health, **Chapter 16** MA -Traffic
Operational	Air Quality & Climate	Due to the nature of the project no significant point source or diffuse air emissions will be produced during its operation.	EIAR **Vol II Chapter 10** Air Quality & **Chapter 11** Climate
	Noise	Potential noise from operational turbines and a proposed new 110kV on-site substation. Any perceived noise will be in compliance with limits.	EIAR **Vol II Chapter 13** Noise and Vibration
	Water	No water emissions or pollution sources have been identified for the operational phase.	EIAR **Vol II Chapter 09** Water
	Shadow Flicker	In certain conditions, the movement of wind turbine blades could give rise to shadow flicker at nearby residential receptors. Any perceived shadow flicker at receptors will be eliminated through the installation of control modules in line with national guidance.	EIAR **Vol II Chapter 15** Shadow Flicker
Decommissioning	Air Quality & Climate	The main emissions to atmosphere during the decommissioning stage of the project is from fugitive dust associated with the removal of the wind turbines and other buildings. No significant earthworks are likely as the access tracks and underground cable ducts will likely be left in-situ and the substation will continue to form an operational part of the national grid. The dust generating activities will be much lower than those for the construction phase. The movement of machinery, construction vehicles and the use of generators during the decommissioning phase will also generate exhaust fumes containing predominantly carbon dioxide (CO_2), sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and particulate matter (PM_{10}).	EIAR **Vol II Chapter 10** Air Quality & **Chapter 11** Climate
	Noise	Traffic flows, excavation/blasting mechanical machinery and electrical equipment proposed to be used for the decommissioning phase will generate noise emissions.	EIAR **Vol II Chapter 13**

Phase	Aspect	Potential Emission/Disturbance	Assessment Provided
			Noise and Vibration
	Water	Short term alterations to local surface water flow paths and water quality.	EIAR **Vol II Chapter 09** Water
	Traffic	The additional traffic associated with the decommissioning phase, has the potential to cause disturbance to those using the local road networks.	**Chapter 16** MA -Traffic and Transport

2.13 Cumulation with Existing Land uses and / or Approved Projects

The potential for cumulative or in-combination effects is considered throughout this EIAR. A cumulative impact arises from incremental changes caused by other past, present or reasonably foreseeable future actions together with the proposed development.

The proposal is situated in a highly modified, intensively managed, agricultural landscape. The main activities with which the proposed wind farm could potentially interact synergistically with are considered to be agriculture, afforestation, roadworks and other wind farms/renewable developments. The potential for cumulative impacts is included in the relevant chapters.

The grid connection and substation are included within the project and assessed throughout this EIAR, they are therefore not considered separately in the cumulative assessment. The TDR works are temporary in nature, with the exception of, some works requiring planning permission which have been incorporated within the planning application boundary and are treated as part of the proposed development. Accordingly, for the purposes of the cumulative assessment, the TDR works, grid connection, and substation are assessed as components of this EIAR and are not considered cumulatively.

2.14 Risk of Major Accidents and Disasters

It is considered that there is no risk for the project to cause major accidents and/or disasters or vulnerability of the project to potential disasters/accidents, including the risk to the project of both natural disasters and man-made disasters for the following reasons:

2.14.1 Construction Stage

As in all construction activities, there is a wide range of potential risks of accidents and hazards associated with wind farm construction. While many risks are similar in nature to those for other industries, wind farm construction works take place in exposed windy locations and involve transport of heavy equipment, heavy cranage and specialised electrical installation.

2.14.1.1 Health and Safety

All work on site will be carried out in compliance with all relevant legislation and work practices, to ensure that the construction areas, site environs and public roads remain safe for all users. This legislation includes:

- Safety, Health and Welfare at Work (Construction) Regulations S.I. No. 291/2013 as amended;
- Safety, Health and Welfare at Work Act 2005 as amended;
- Safety, Health and Welfare at Work (General Applications) Regulations 2007 to 2023; and
- Irish Wind Energy Association Best Practice Guidelines.

The CEMP (EIAR Volume III, Appendix 2A) outlines the safety procedures that will be implemented during the construction phase. The effective implementation of the CEMP will help to reduce the risks associated with the construction phase of the proposed development.

2.14.1.2 Landslide

A scoping exercise was carried out to determine whether a detailed Peat Landslide Hazard and Risk Assessment is required for this site. This scoping exercise reviewed whether peat was present onsite. No peat is mapped as present on or near the surface on the GSI maps for the site. However, during site investigations, a small area of peaty type soil was noted in the north-eastern corner of the site. Site investigations found small patches of peat at depths of 0.25m-0.80m. These deposits were found to be limited in extent and thickness beneath the surface of the site. The outcome of the scoping determined there was no risk of instability from peat. Further information is provided in Chapter 08 Land and Soils.

Overall, there is no risk of instability of the site, access tracks, turbine bases, or grid connection from peat.

2.14.2 Operational Stage

2.14.2.1 Fire/ Fuels

The presence of electrical generating equipment and electrical cables along with the storage and use of various oils (diesel fuels, lubricating oils, hydraulic fluids) can create the potential for fire and/or ground contamination. This potential exists within the turbine tower, nacelle, substation, electrical transmission structures and operations maintenance buildings. Modern wind farm design will minimise the use of combustible materials. Lightning and surge protection will cover the nacelle and rotor blades, as well as electrical equipment, including cables. Each element of equipment has strict and exact operational protocols that provide for the elimination of risk. The protocols set out the flammability or chemical properties of each of the oils, lubricants and fuels that may be used within equipment on site. The proposed development will be operated to the specifications of the chosen turbines and in accordance with all electrical standard operating procedures.

2.14.2.2 Lightning Strikes

A lightning strike could cause a fire or could cause severe damage to blades which may lead to blade failure. To protect wind turbines from damage caused by a lightning strike and to provide grounding, each turbine will be equipped with an electrical grounding system.

2.14.2.3 Turbine Structural Failure

Turbine structural failure includes tower collapse, blade failure or separation. Risk may arise due to stress, wear and tear.

Rigorous safety checks are conducted on the turbines during operation to ensure the risks posed to staff, landowners and general public are negligible. The turbines are also centrally monitored and controlled to identify and avoid risks. These checks are specified particular to the turbine model procured for the proposed development. The separation distances of turbines from public roads and residences are beyond fall over distances and will therefore not present a risk of significant accidents.

2.15 Impact of Climate Change

2.15.1 Severe Weather

Regarding extreme weather, the EPA report *'Research of Regional Climate Model Projections for Ireland'* forecasts an increase in storm frequency and wind intensity by mid-century. It is also noted that wind turbines are designed to withstand extreme weather conditions with brake mechanisms installed to ensure the turbines only operate under specific wind speeds and will shutdown during high wind speed events. The risk of extreme weather during operation is moderate, with minor effects, and is therefore considered not significant (Refer to Chapter 11 Climate).

2.15.2 Flooding

Flood risk is considered in EIAR Volume II, Chapter 09 Water. To determine the potential for flood risk at the development site, a Flood Risk Assessment (FRA) was carried out. The detailed FRA identified potential risk of fluvial flooding from the Morningstar River in the northern area of the development site. A hydraulic model was developed and indicates the majority of the site is located within Flood Zone C (low risk). Some of the turbines in the northern area are located in Flood Zone A/B with a medium to high risk of flooding.

To offset risk of flooding the following design measures are recommended:

- design flood level for the proposed substation is the 0.1% AEP MRFS flood level plus 500mm freeboard.
- The design flood level for the proposed 17 no. turbines is the 1%AEP MRFS flood level plus 300mm freeboard

The FRA demonstrates that the flood levels upstream and downstream are not adversely affected by the proposed development and will not adversely affect flood risk elsewhere.

The Flood Risk Assessment is included in Appendix 9B

References

Department of the Environment, Heritage and Local Government (2006) *Wind Energy Development Guidelines.*

Department of Housing, Planning and Local Government (2019) *Wind Energy Development Guidelines Public Consultation – Draft.*

Safety, Health and Welfare at Work (Construction) Regulations. S.I. Health and Safety Authority, 2013.

Limerick City and County Council (2022) Limerick Development Plan 2022-2028.