2 DESCRIPTION OF THE PROPOSED PROJECT

2.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) presents information on the elements that constitute the proposed development and 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 description includes all phases of the development including the construction, commissioning, operation and decommissioning of the wind turbines and associated infrastructure.

The chapter describes the site location, the main components of the proposed development and details the activities and operations required to construct and operate the proposed project and to connect it to the National Grid. Details of the design of the proposed development (also included in **Chapter 3 – Civil Engineering**) are also provided in this Chapter, supported by excerpts from engineering drawings prepared by MWP accompanying the planning application. It should be noted that these drawings having been reduced in scale within the EIAR for more convenient examination. The larger drawings to a correct scale are cross-referenced and can be viewed in the planning application drawings pack.

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

- Civil Engineering (EIAR **Volume 2**, **Chapter 3 - Civil Engineering**)
- Construction Environmental Management Plan (CEMP) (EIAR **Volume 3, Appendix 2-1)**
- Turbine Delivery Route Assessment (EIAR **Volume 3, Appendix 3-1)**
- Peat Stability Risk Assessment (EIAR **Volume 3, Appendix 9-1)**
- Traffic Management Plan (EIAR **Volume 3, Appendix 15-2)**
- Planning Drawings accompanying the planning application.

2.2 OVERVIEW AND KEY COMPONENTS

The development proposed by Shronowen Wind Farm Limited (the Applicant), is a 12 No. turbine wind farm in the townlands of Tullamore, Coolkeragh, Dromlivaun and Ballyline West and all associated infrastructure including a connection to the National Electricity Grid (NEG).

The proposed development site is situated within the rural locale between Listowel and Ballylongford in North Co. Kerry. The Site is located in an area of open low peatland east of the R552 Regional Road, approximately 4km southeast of Ballylongford village and 6km north of Listowel town, see **Figure 2-1**.

An Bord Pleanála has deemed the development eligible as Strategic Infrastructure Development (SID) and the application will be made directly to the Board (ABP-306727-20). The Board are the competent authority for the purposes of the Environmental Impact Assessment (EIA).

The following sets out the elements of the project for which development consent is being sought and all other associated project components.

<table>
<tr><td>Proposed Development for which planning consent is being sought</td><td>Core Wind Farm Components
Twelve (12) No. wind turbines (maximum turbine tip height 150m) with associated foundations and crane hardstand areas.
New and upgraded internal site service roads (4.43km of existing tracks to be upgraded and 6.85km of new internal access tracks to be constructed).
Underground 33kV electric cabling systems between turbines within the wind farm site and wind farm substation.
One (1) No. permanent meteorological mast (90m height) and associated hardstand area.
Six peat deposition areas located across the wind farm site with a total volume capacity of 225,456m^3
New junction off the L-6021 at the north east of the site to facilitate construction and access.
New junction off the L-1009 on the west of the site to facilitate construction and access.
Grid Connection Components
One (1) No. proposed 110kV substation including: an outdoor electrical yard, two single storey buildings (one for the system operator and one for the wind farm operator) containing associated facilities (control, switchgear and metering rooms, welfare facilities, workshop and office).
A 225m long 110kV underground cable connection from the 110kV wind farm substation to the existing 110kV transmission line due east of the wind farm site.
Other Associated Components
Two (2) No. temporary construction site compounds (95m x 50m and 55m x 25m in size).
Associated surface water management system.
Felling of approximately 3.15ha of coniferous forestry to facilitate site development.</td></tr>
<tr><td>Other Associated Project Components subject to EIA for which planning consent is not being sought within the current application</td><td>Temporary works on sections of the public road network along the turbine delivery route (including hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and local road widening)
Replanting of permanently felled forestry in lands adjacent to Turbine T1 and T7.
An alternative 5.5km underground cable connection from the onsite wind farm substation to the previously granted Tullamore Solar Farm due south of the wind farm site (KCC Planning Ref 18/720 and ABP Ref. PL.08.302681).</td></tr>
</table>

To facilitate a grid connection and export of renewable electricity to the National Electricity Grid (NEG), the proposed development will connect to the existing 110kV transmission line to the east of the site by means of an underground cable connection from the wind farm substation. This is the preferred technical grid connection approach. An alternative option for grid connection is a 5.5km long underground cable route connection from the wind farm substation to the previously granted Drombeg Solar project to the south. This cable route option is located on existing local road network and would connect into the solar farms 110kV substation. The final selected grid route and connection strategy will be confirmed by way of a future grid connection offer process and as determined by EirGrid. Both the preferred and the alternative grid connection options are considered in this EIAR.

2.3 LOCATION, SIZE, DESIGN AND APPEARANCE

2.3.1 Existing Land-Uses

Existing land cover at the site is primarily peatlands with extensive areas of active peat cutting along with areas of worked out bog. There are some areas of intact blanket bog and open field pastures which abuts the peatland habitat. There are some areas of conifer plantation within the footprint of the proposed site layout.

2.3.2 Proposed Development Site Boundary and Wind Farm Layout

The proposed development site boundary encompasses a land area of 364ha and is shown on **Figure 2-2**. The land encompassed within the red line boundary is the subject of the planning application for the proposed wind farm and associated infrastructure. Although not a part of the proposed development, the alternative grid route is assessed and included in the EIAR.

Figure 2-3 shows the proposed development site layout and illustrates the positions of the turbines, access tracks, crane hardstand areas, permanent met mast, 110kV substation, peat deposition areas and temporary construction compounds. The development footprint within the application area of the proposed wind farm and grid connection route is approximately 27.54ha. Refer to **Planning Drawings 19876-MWP-00-00-DR-C-P01-5005 to 5010** for details of the overall wind farm layout.

This layout reflects the outcome of the iterative engineering and environmental analysis approach adopted during the wind farm design process which took into account a number of factors including minimising any risk in terms of ground conditions, peat depths, negative influences on the existing drainage, avoidance of sensitive ecological habitats, and any known archaeological features. The design rationale and evolution of the layout is described in **Chapter 3 - Civil Engineering**.

Figure 2-1 Site Location Map

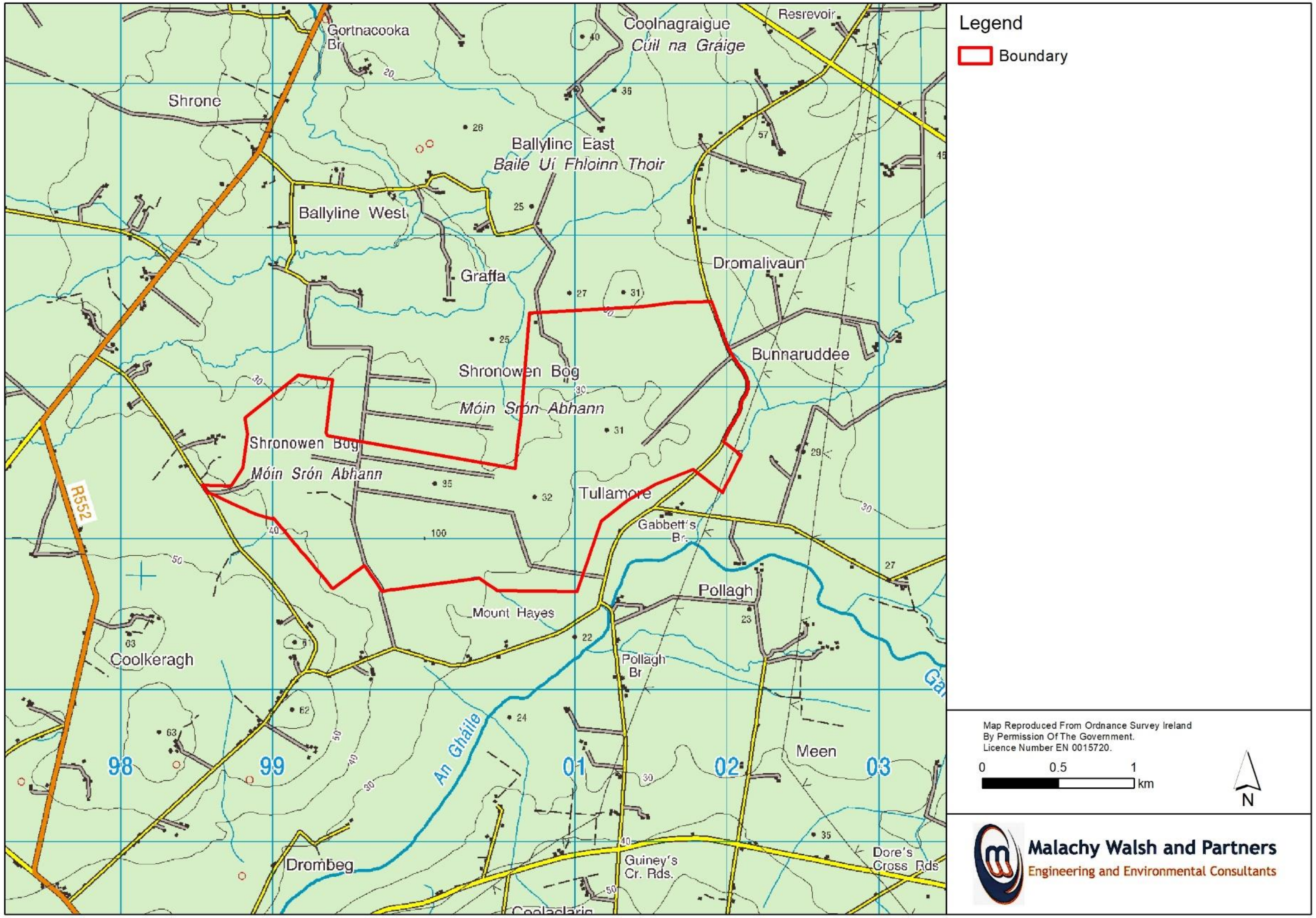

Figure 2-2 Planning Application Boundary

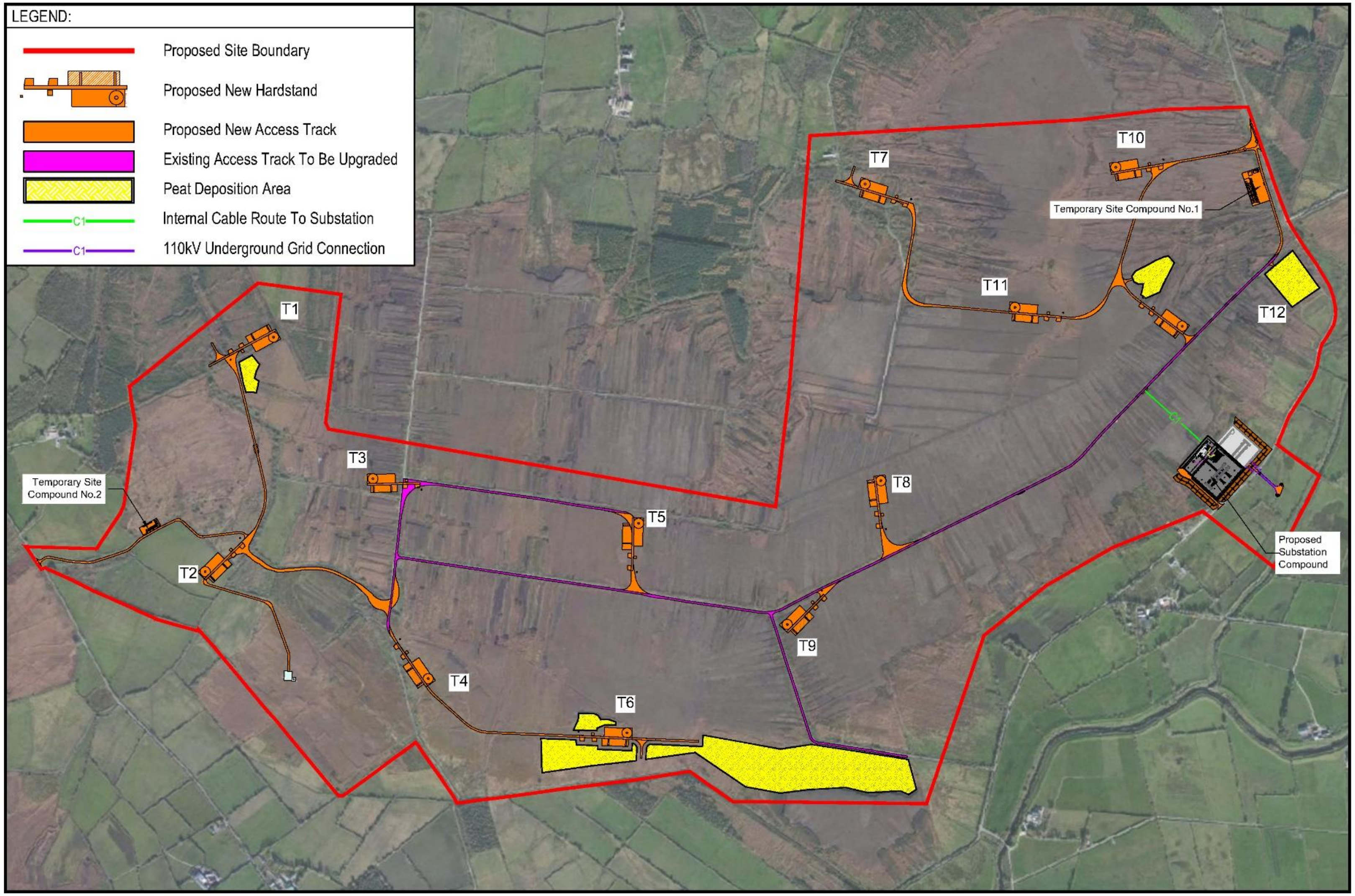

Figure 2-3 Proposed Site Layout

2.3.3 Wind Turbines

It is proposed to install twelve (12) No. wind turbines each with a maximum tip height of up to 150 metres. The final turbine type will be chosen in advance of the construction phase based on available technologies at that time, but it will not exceed a maximum tip height of 150m.

The turbine ultimately selected will be certified under the International Electrotechnical Commission IEC 61400-1 safety standards or equivalent and will be designed to withstand the environmental conditions encountered on site. The proposed turbines will be of a typical modern design, incorporating tubular towers and three blades attached to a nacelle. The tower supports a nacelle and rotor hub. Commercial wind turbine hubs and towers are typically made of steel, while the blades can be made of a matrix of glass-fibre reinforced polyester or wood-epoxy or a similar composite material. Requirements for finish and colour are detailed in the 2006 WEDG's 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 lighting on the turbines in a pattern that is acceptable to the Irish Aviation Authority (IAA) for aviation visibility purposes.

The co-ordinates of the proposed turbines are set out in **Table 2-1**.

Turbine Ref. No.	Maximum turbine tip height (m)	Grid Co-ordinates (ITM)	
		Easting	Northing
T1	150m	499186	640981
T2	150m	498997	640335
T3	150m	499459	640591
T4	150m	499612	640040
T5	150m	500191	640468
T6	150m	500159	639891
T7	150m	500815	641402
T8	150m	500858	640585
T9	150m	500600	640189
T10	150m	501505	641448
T11	150m	501228	641062
T12	150m	501689	641011

Table 2-1 Proposed Turbine Dimensions and Co-ordinates

2.3.4 Wind Turbine Foundations

Each wind turbine will have a reinforced concrete base pad foundation. The foundation base will typically be approximately 28m in diameter and installed to an excavation depth of approximately 6m below ground level, depending on ground conditions. Piled foundations may be required depending on the findings of the detailed geotechnical ground investigation which will be carried out prior to the construction phase. Once completed, a portion of the foundation (typically a 30m^2 concrete plinth with 4m access area around that for further access and maintenance) will be above ground.

Refer to **Chapter 3 Civil Engineering** and planning application **Drawing No. 19876-00-00-DR-C-5401-P01** for further details on foundations.

2.3.5 Hardstands and Laydown Areas

Each wind turbine will have an associated turbine hardstand area and temporary laydown area adjacent to the foundation. Turbine hardstands and temporary lay down areas are required to accommodate the delivery and temporary storage of the turbine components prior to their erection and to support the cranes during erection. The hardstand areas will be excavated and bear onto rock (or other suitable bearing stratum) with a foundation depth of 0.5-1.5m depending on the local bedrock profile and the varying depth of peat. The hardstand area will remain in place during the lifetime of the wind farm. The temporary lay down areas will be cleared of vegetation, graded and will be surfaced using compacted stone aggregate. These sections will be recovered with soil after all turbines have been erected. **Table 2-2** outlines the footprints of hardstand and temporary layout areas. **Figure 2.4** below shows the layout of a hardstand and laydown area. The proposed hardstand and lay down areas are further discussed in **Chapter 3, Civil Engineering**.

Item	Area (m²)
Main Hardstand	1,575
Hardstands For Assist Crane	258
Blade Layout Area - Supports	108
Hardstand For Boom Assembly	49
Area for Assembly / Mounting Hock	9
Total (hardstanding area)	**1999**

Table 2-2 Typical Turbine Hardstand and laydown area dimensions

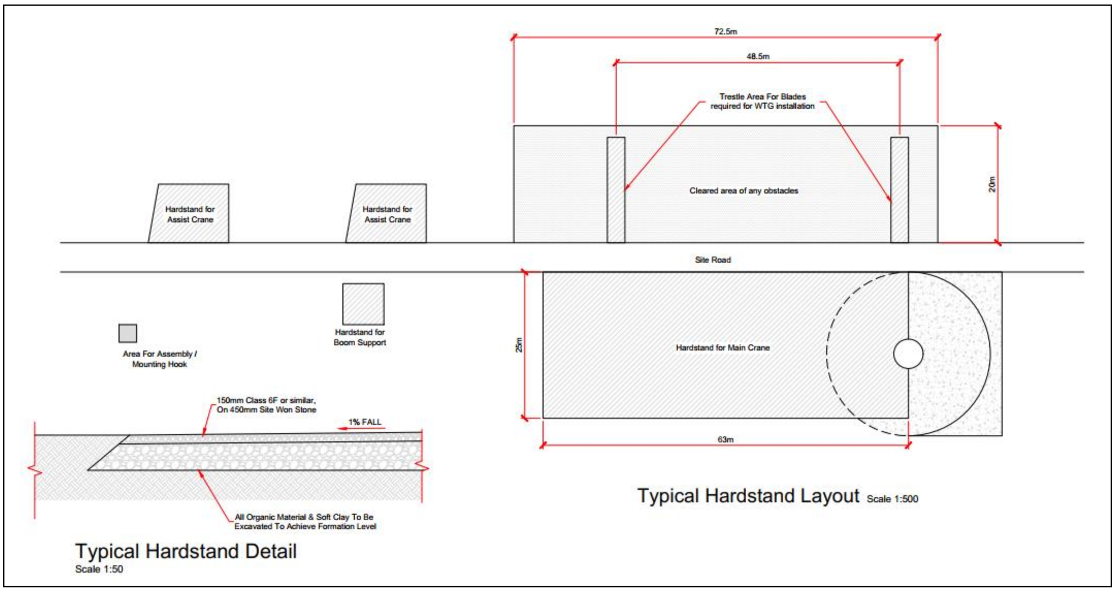

Figure 2-4 Typical Turbine Hardstand and Laydown Area

2.3.6 Permanent Meteorological Mast

A permanent meteorological mast will be erected within the proposed development lands to monitor the local wind regime while the wind farm is in operation. The permanent meteorological mast is to be located approximately 220m southeast of proposed turbine T2 and 180m due west of proposed turbine T4. The structure will be up to 90m in height. The mast will have a foundation of circa 25m^2 and hardstanding area of 100m^2. A schematic of a typical meteorological mast is shown in **Figure 2-5** and **Drawing 19796-MWP-00-00-DR-C-5402**. The meteorological mast will be equipped with tower mounted meteorological instruments and telecommunication equipment and will be surrounded by a galvanised steel palisade fence, 2.4m in height.

Figure 2-5 Typical meteorological mast on a wind farm

2.3.7 Underground Cabling

A network of underground cabling servicing each turbine with electrical power and signal transmission will be installed along internal service roads within the proposed development site. Cabling is placed in PVC ducting laid in trenches adjacent to the road edge and typical arrangement are shown on section included in the planning application drawings. Access to the cable ducting is provided by intermittent chambers and pull pits at defined locations adjacent to the road infrastructure.

2.3.8 Internal Site Service Roads

Internal site service roads/tracks are required to interconnect elements of the site and allow access to all wind turbines and wind farm infrastructure. A network of bog roads and tracks exist within the Shronowen site and these provide access for landowners, turbary rights owners and the general public. However, the existing tracks are of minimal scale and width and will require upgrading. The proposed wind farm layout will be comprised of upgraded existing tracks/roads and new sections of road. The upgraded and new roads will be a combination of ground bearing/excavated roads or floating roads depending on the depths of peat and local topography.

The wind farm road network will provide access to each of the turbines, substation compound, meteorological mast and peat deposition areas. The routing of internal site service roads/tracks is shown in **Figure 2-3**. Overall a total of 11.28km of road infrastructure will be required within the proposed development site. This is comprised of 6.85km of new internal service roads and 4.43km of existing internal access tracks being upgraded and widened. They will have a standard running width of circa 5m with surface water collection drains on either side, as described in Section 2.5.11. These roadways will be constructed using excavated and floating road techniques depending on the ground conditions. The methods of construction are outlined in EIAR Chapter 3.

2.3.9 Site Access and Traffic

Site access considerations were discussed with the Kerry County Council (KCC) Roads Department and a consultation letter was sent as part of the statutory and non-statutory consultation process. A meeting with the Area Roads Engineer in Kerry County Council was held in November 2020 to discuss the proposed project, traffic management and what impacts the project may have during construction stage. Ken Fitzgerald of MWP met with the area engineer on site and reviewed the proposed project layout, new access points, sightlines, traffic management, Traffic Impact Assessment requirements and aspects relating to duration and phasing of works. The delivery of wind turbine components with permits and night delivery was also discussed. Both grid options were discussed. Copies of the site extent and layout was provided for review and discussion. The main concerns related to the integrity of the narrow local roads that are adjacent to the wind farm and the effect that high volumes of construction traffic with materials and turbine components would have on the integrity of the local roads. The alternative underground cable route along the public road would require a traffic management plan with possible temporary road closures or stop and go system. Given the narrow road widths any cable trenching would effectively lead to full width road re-instatement along the underground cable route. The Area Engineer confirmed that they would make their submission directly to ABP as part of the consultation process associated with Strategic Infrastructure cases.

Primary access to the proposed development site will be provided via a new entrance off the local public road, L-6021 on the north western side of the proposed wind farm development site. This will be the main site entrance during both the construction and operational phases of the development.
A second temporary entrance to facilitate construction and access will be formed on the local public road L-1009 on the western side of the site. The layout of the site stretches in an east west configuration and thus having two entrances will assist during the construction stage of the development. Once the construction phase of the project is complete the western entrance will then be closed with controlled access. The eastern entrance off the L6021 will remain as the permanent access for the operational life of the wind farm development. See **Figure 2-6** below showing the location of each site entrance.

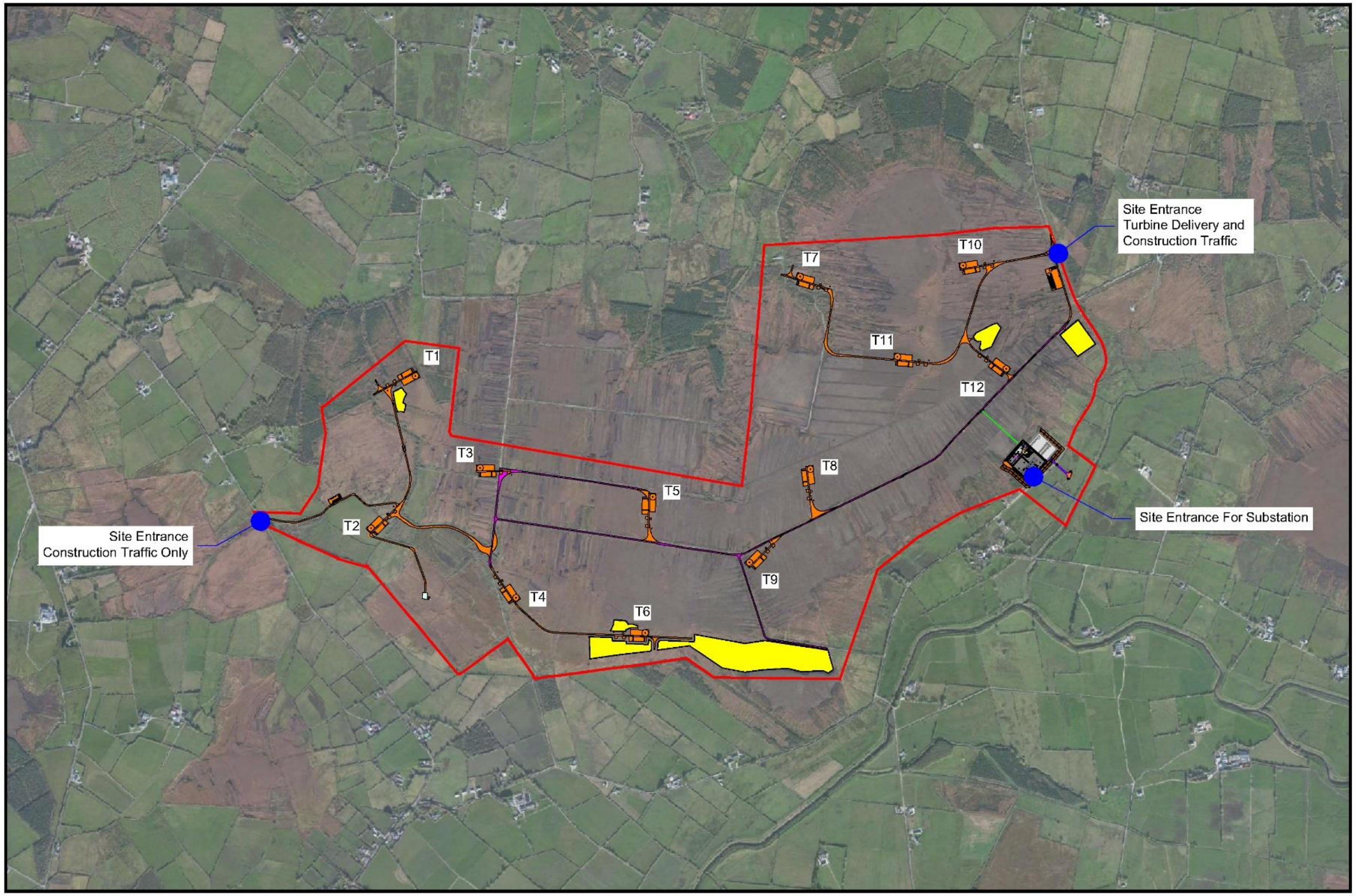

Figure 2-6 Site Entrances

2.3.10 Temporary Construction compounds and welfare facilities

Two (2) No. temporary construction compounds will be set up upon commencement of the construction phase. The locations of the temporary compounds are shown on **Drawing 19796-MWP-00-00-DR-C-P01-5407 and 5408.**

Construction compound No.1 is located adjacent to the main and permanent wind farm entrance at the east of the site on the L-6021. The compound is approximately 95 x 50m in size and is adjacent to turbine T10 and will have a footprint of 4750m² (0.47ha). Construction compound No. 2 is located on the western section of the wind farm site near T2, and is approximately 55m x 25m in size with a footprint of 1375m² (0.13ha).

The compounds 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 (an enclosed wastewater holding tank capable of handling the demand during the construction phase). The holding tanks will be emptied as required by a licensed permitted contractor. Upon completion of the construction phase, the compounds, including wastewater tanks, will be decommissioned by backfilling the area with the material / peat arising during excavation and landscaping with topsoil.

2.3.11 Peat Deposition Areas

There are six proposed peat deposition areas located across the site and they are located strategically so as to minimise the movement of excavated material from where it is removed. The site layout stretches in an east-west direction and the provision of a number of peat deposition areas across the site minimises peat movements and traffic during construction phase. Each peat deposition area has been selected based on an examination of suitable cut over or local depression that are suitable for the permanent storage of peat. In placing excavated peat material in these locations there is also the positive aspect of returning ground levels back to their original natural level. All selected areas were selected taking account of flat topography, good containment given local ground conditions, no risk of slippage due the flat topography and the avoidance of any natural drains.

Table 2-3 below sets out the area and volume of each deposition area.

Deposition Area	Area (hectares)	Storage Volume (m^3)
Deposition Area 1	0.42	8,386
Deposition Area 2	0.38	7,512
Deposition Area 3	1.64	32,720
Deposition Area 4	6.84	136,716
Deposition Area 5	0.79	15,738
Deposition Area 6	1.22	24,384

Table 2-3 Peat Deposition Zones – Areas and Storage Volumes

Figure 2-8 below shows the location of the peat deposition areas within the overall wind farm development site. Once excavation and construction works are complete, the peat deposition areas will be graded and vegetated with locally occurring vegetation feedstock. The deposition areas will be fenced in for a period of 12 months post construction to allow for revegetation.

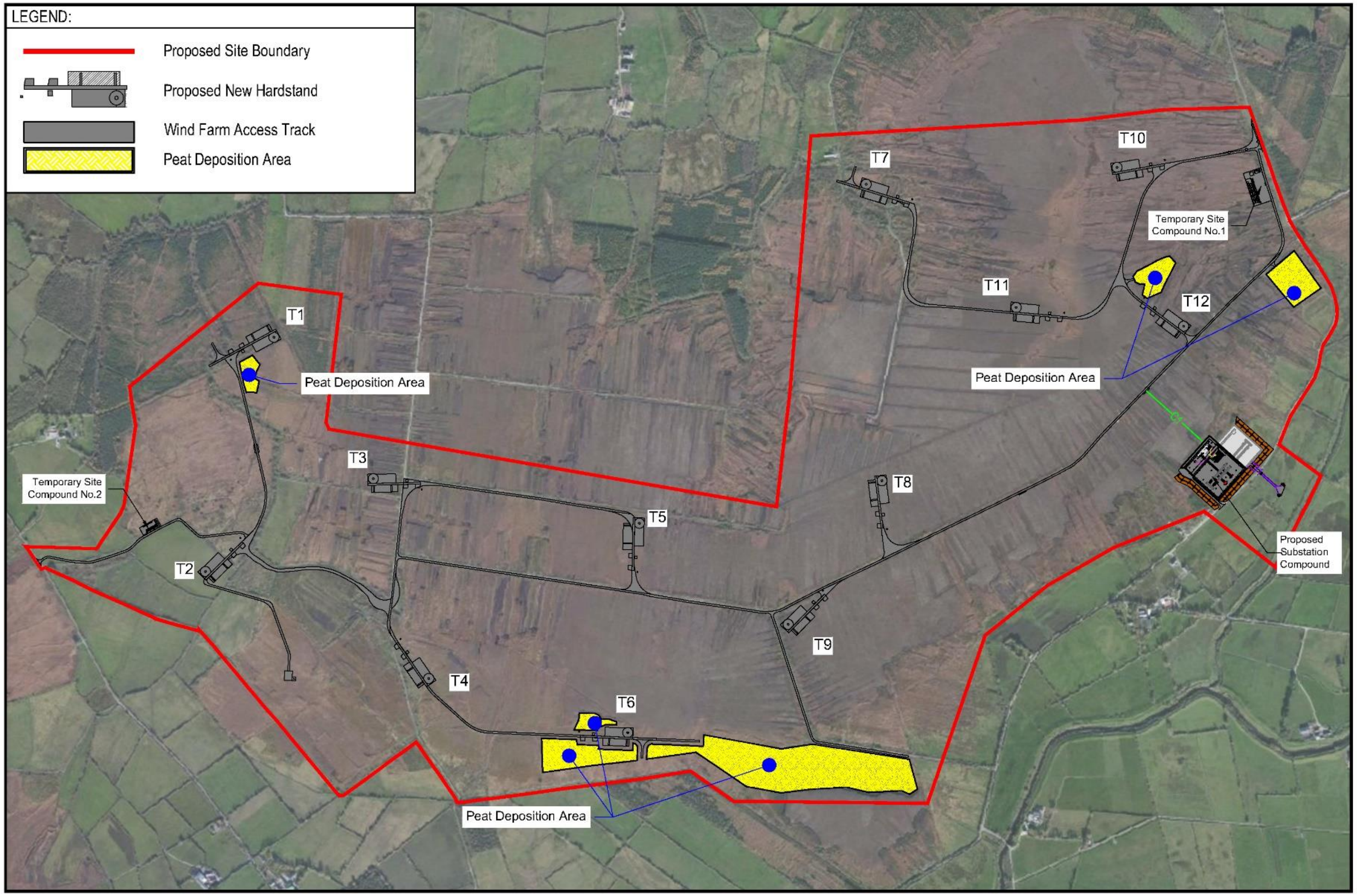

Figure 2-8 Proposed Peat Deposition Areas

2.3.12 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 works areas including all internal site access roads, storage areas, crane hardstand areas and site construction temporary compounds. Details of the proposed site drainage system are described in Chapter 3 of the EIAR and shown on **Drawings 19876-MWP-00-00-DR-C- P01-5011 to 5016 and 5404 to 5405.**

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

- 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 roadway and to intercept clean over land surface water flows from crossing internal roadways.
- To achieve separation, clean water drains will be positioned on the upslope and dirty water drains positioned on the downslope of road sides, with road surfaces sloped towards dirty drains.
- Clean water will be piped under both the access roads and downslope collection drains to avoid contamination. Piping the clean water under the service road 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.

2.3.13 Conifer Felling

Felling of commercial conifer forestry is required within and around wind farm infrastructure to accommodate the construction of the turbine foundations, hardstands, access tracks and turbine assembly at turbines T1 and T7.

It is proposed to fell a distance of 93m, (in line with the required clearance for bats) around turbines. Overall felling of 3.15ha of forestry will be required to facilitate construction of Turbine T1 and T7.

All tree felling 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). 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 a proposed felling licence will be complied with.

Figure 2-9 Areas to be Felled (excerpt from Planning Drawing 19876-MWP-00-00-DR-C-P01-5019)

2.3.14 Replacement Forestry

To allow for forestry removed as part of the project, replacement forestry will be planted in lands at the north of the site adjacent to T7 and are shown on Figure 2-10 below.

These lands, or similarly approved lands, will be used for replanting should the proposed development receive planning permission.

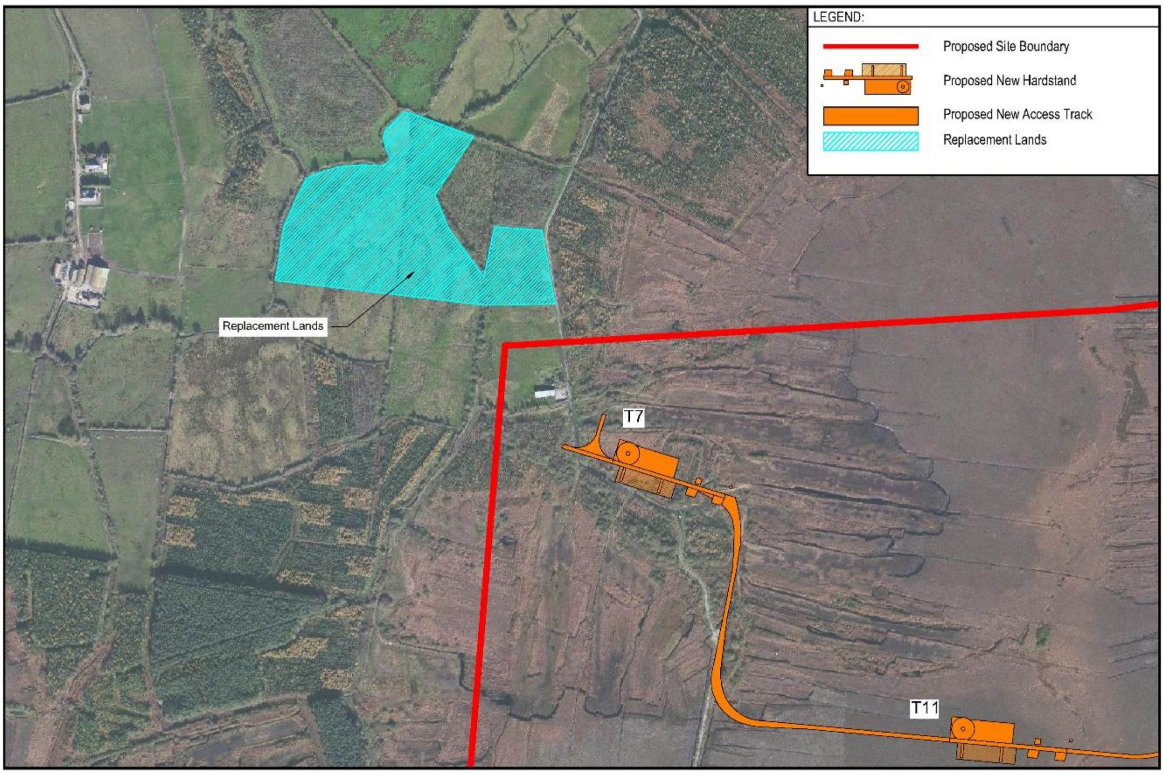

Figure 2-10 Forestry Replanting Site

2.3.15 Grid Connection Options and Infrastructure

There are two potential options for connection to the National Grid. The preferred connection from the proposed wind farm substation will be by means of a 225m long underground 110kv cable to the existing 110kV Tarbert to Tralee 110kV OH line that is located to the east of the wind farm. This will require the installation of two new lattice towers within the existing OHL. The existing OHL conductor will be terminated at these two lattice towers in order to facilitate the OHL connection to the proposed 110kV wind farm substation. This preferred grid connection option is included within the redline boundary of this application for planning permission.

The location and extent of the grid connection is shown on **Figure 2-11** below.

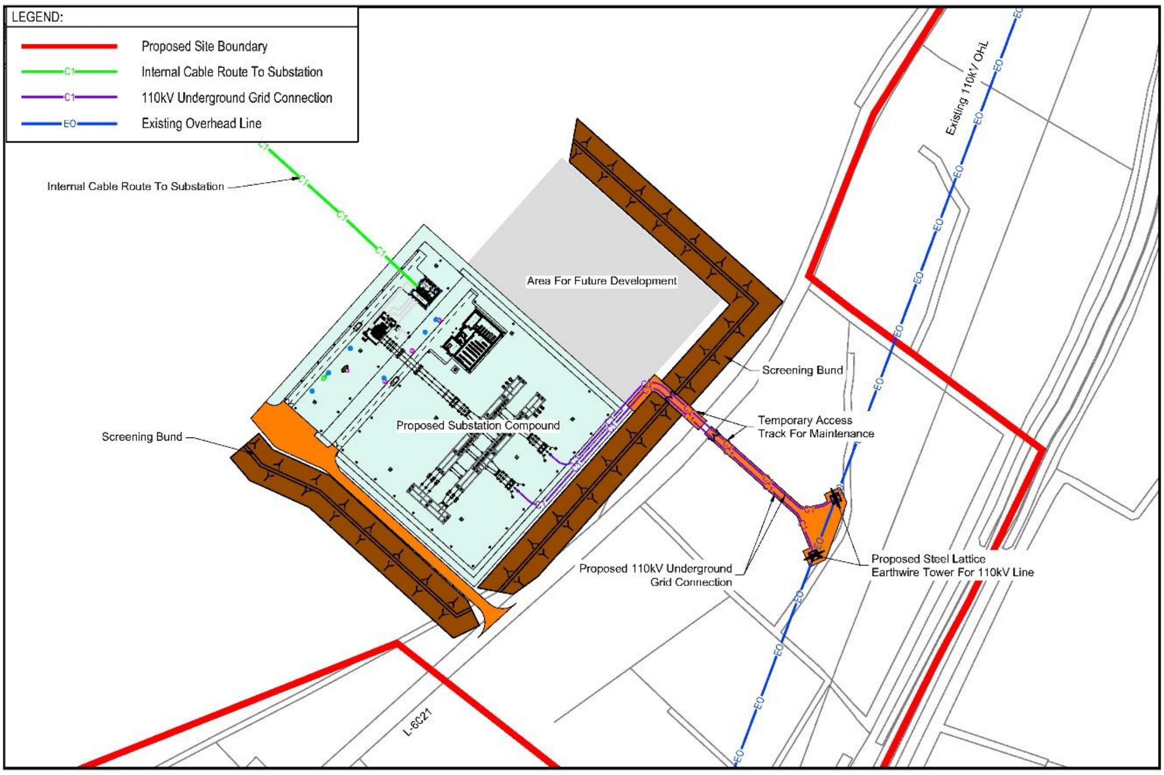

Figure 2-11 Preferred Grid Connection Infrastructure Layout

An alternative option for grid connection is an underground cable route connection from the wind farm substation to the previously granted Tullamore Solar project to the south (KCC Planning Ref 18/720 and ABP Ref. PL.08.302681). This alternative cable route option is located along existing local road network and would connect into the permitted solar farm's 110kV substation. The route of the alternative underground cable route connection is shown in Figure 2-12 below. This alternative grid connection option is not contained within the redline boundary of the site for which planning permission is sought. Both the preferred and the alternative grid connection options have been considered in this EIAR.

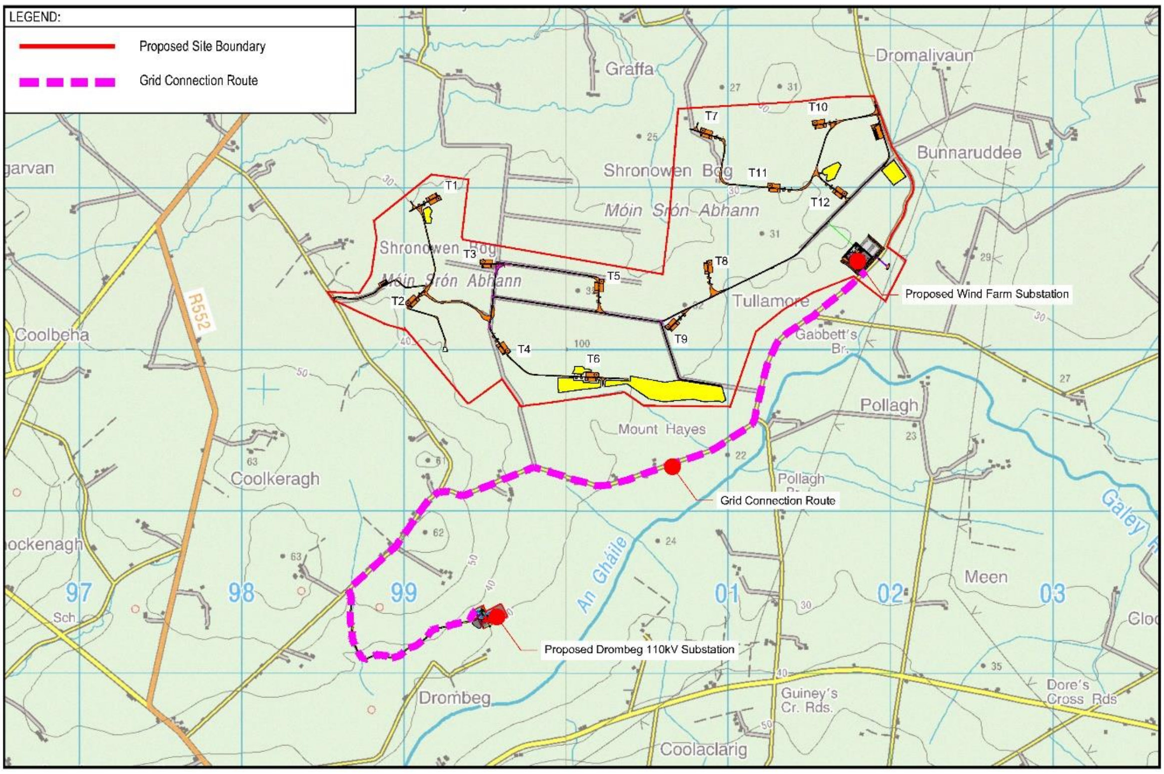

Figure 2-12 Alternative Grid Connection Infrastructure Layout

2.3.16 Wind Farm Substation

The proposed 110kV wind farm substation will occupy an area of approximately 13,356m^2 (1.35ha) and will comprise an outdoor electrical yard and two single storey buildings (one for the system operator and one for the wind farm operator). In addition, there is an area for future expansion for the substation if required by Eirgrid and this has an area of 7300m^2.The system operator building will be 440m^2 in area and contain a control room, a battery room, a store room, an office / canteen and a toilet. The wind farm operator building (or IPP substation building) will be 111m^2 in area and contain a storeroom, a communications room, a control room, a staff room, an office, a switchgear room and a toilet.

Both substation buildings will be approximately 6.1m in height, with pitched roofs and an external blockwork and plastered finish.

There will be a very small water requirement for toilet flushing and hand washing and therefore it is proposed to harvest water from the roofs of the buildings. The discharge from the toilet within each building will go to a holding tank located within the substation compound where the effluent will be temporarily stored and removed at regular intervals. Parking 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. A soil berm will be provided to the perimeter of the substation facility outside of the palisade fencing to provide screening to the substation. The berm will be planted with a mix of native trees.

Access to the proposed 110 kV substation compound will be directly from the L6021 Local Public Road. Layout drawings of the proposed substation compound and buildings are provided in Drawings **19876-MWP-00-00-DR-C-P01-5409 to 19876-MWP-00-00-DR-C-5409.** A typical substation compound similar in scale and design to that proposed in this application is shown in **Figure 2-12.**

Figure 2-12 Typical Substation Compound

2.4 CONSTRUCTION WORKS

2.4.1 Proposed Works

The construction of the proposed development will principally comprise of the following works:

- Felling of two areas of coniferous forestry plantation to facilitate construction works;
- Construction of two site entrances and any sections of internal access roads to facilitate access to the temporary construction compound and peat deposition areas;
- Construction of two temporary construction compounds including fencing (for security and ecology, water and archaeological exclusion zones), site offices, parking, material laydown and storage areas, etc;
- Upgrading and widening of existing internal tracks to a wind farm road standard and construction of new wind farm roads, including all excavation, peat movement, importation and placement of stone and associated materials.
- Establishment of six permanent peat deposition areas on site.
- Earthworks and drainage infrastructure associated with construction of new and upgraded internal access roads, crane hardstand, turbine foundations and substation compound;
- Construction of upgraded and new drainage/watercourse crossings for construction of internal access roads and underground cables;

- Excavation of turbine bases and permanent met mast foundations, and associated turbine hardstand areas;
- Construction of wind turbine foundations and hardstands
- Installation of sections of underground cabling between turbines;
- Installation of sections of underground cabling from wind turbines to wind farm substation
- Construction of the 110kv substation compound;
- Construction of 225m underground 110kv cable connection from the wind farm substation to the existing overhead 110kv transmission line to the east of the site.
- Works to the local public road network required to facilitate access for turbine component deliveries to the wind farm, temporary works on sections of turbine delivery route including hedge trimming, temporary removal of signage/lamp posts and street furniture
- Turbine delivery, installation and commissioning; and
- Meteorological mast delivery, installation and commissioning.
- Construction of alternative grid connection route in the event that the preferred underground connection is not selected by Eirgrid

Construction works will be carried out in a phased manner in order to:

- Minimise disruption to the local community;
- Minimise environmental impact; and
- Create the safest working conditions possible.

2.4.2 Construction Methods

Details on the construction methods are fully set out in EIAR **Chapter 3 Civil Engineering** and in **Volume 3 Appendix 2-1 CEMP**. The following table provides a summary of the types of proposed construction techniques for the various elements of the project.

Table 2-4. Proposed Construction Techniques

Element	Construction Technique
Wind Turbine Foundations and Hardstands	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. Localised sheet steel piling may be required to facilitate peat excavation for formation of the hardstand and turbine base footprint. All excavated peat will be removed and deposited in the peat storage areas on site. An engineered concrete foundation will be installed in the excavated/piled structure location. 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 and/or peat stripping, excavation and or piling, grading, foundation construction, final grading and landscaping of temporary works areas.
Permanent Meteorological Mast	Construction includes removal of vegetation, topsoil and peat stripping, excavation, grading, foundation construction, final grading and landscaping of temporary works area.

Element	Construction Technique
Site Access	Sightlines improvements at the two new site access junctions will be required. Construction activities include vegetation clearing, topsoil and/subsoil stripping, aggregate placement and grading, and landscaping of temporary works areas.
Internal Roads	Upgrading, widening and new excavated roadways: Construction activities will include vegetation clearing, topsoil and/or peat stripping, excavation, placement of geogrid/ geotextile layer and aggregate, compaction, grading, berm placement and landscaping.
	Floating Roads: Construction activities will include removal of major protrusions, placement of geogrid/ geotextile layer, log layer where required, importation and placement of stone and aggregate, compaction, grading, berm placement and landscaping.
Internal Underground Site Electrical Cables	To the extent possible, underground electrical collector cables will be co-located with access roads to minimize the area of construction disturbance. Underground cable installation construction activities include topsoil stripping, trenching, installing electrical cables, and revegetation of disturbed areas unless the cables are under the roads.
Substation Compound and grid connection	Construction includes removal, topsoil stripping, and excavation of peat or soil overburden, grading, foundation construction, building construction, final grading and landscaping of temporary works area. Construction of extended substation expansion area with a finished hardcore stone surface. The preferred 110kv underground cable connection to the existing 110kv transmission line will require an excavated trench with ducting from the substation compound to the transmission line. This cable trench will cross the local road and travel through an agricultural field to the location of two new steel lattice tower structures on the transmission line. The works will include excavation, ducting bed and surround to ducts with concrete and backfill of trenches with suitable material.
Temporary Construction Compounds	Construction includes topsoil stripping, excavation of overburden and peat, grading, aggregate placement, compaction and landscaping.
Peat Deposition Areas	Removal of vegetation and preparation for receiving peat and bulk soil material. Construction of soil retention berms. Final grading of stored material, planting and re-vegetation of surfaces with natural and local plant species
Water Crossings	No in-stream works. Existing crossings: widening using pre-cast piping New crossings: Clear span crossings
Temporary Turbine Delivery Route Works	Construction activities include temporary widening by vegetation clearing, topsoil and/subsoil stripping, aggregate placement and grading, and landscaping of

Element	Construction Technique
	temporary works areas along with hedge or tree cutting, and temporary relocation of powerlines/poles, lampposts, signage

2.4.3 Turbine Delivery

A turbine delivery route assessment has been undertaken for this project. A full detailed report is provided in **Appendix 3-1**. **Figure 2-13** shows the turbine delivery route proposed for this project. The components will be delivered to Foynes Port in Co Limerick by sea and transported to site along the national, regional and local road network as follows:

- Starting at Foynes Port;
- Travelling westwards along the N69 coastal road towards Tarbert.
- At Tarbert follow the R551 in a south westerly direction to the intersection of the L-6021;
- Then due south west along the L-6021 to Leanamore Cross roads.
- Follow the L-6021 in a southern direction to the new proposed site entrance.

The majority of the proposed route to the proposed development site has previously been used for turbine component delivery to the operational Leanamore Wind Farm (Planning Refs 11/299). An Autotrack assessment drawing as shown in **Appendix 3-1** for the wind turbine blades has revealed a requirement for some minor and temporary works in order to achieve delivery. In some cases, temporary accommodation works are required along the turbine delivery route such as hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and local road widening. Any updates to existing road infrastructure will be carried out in advance of turbine deliveries and following consultation and agreement with Kerry County Council.

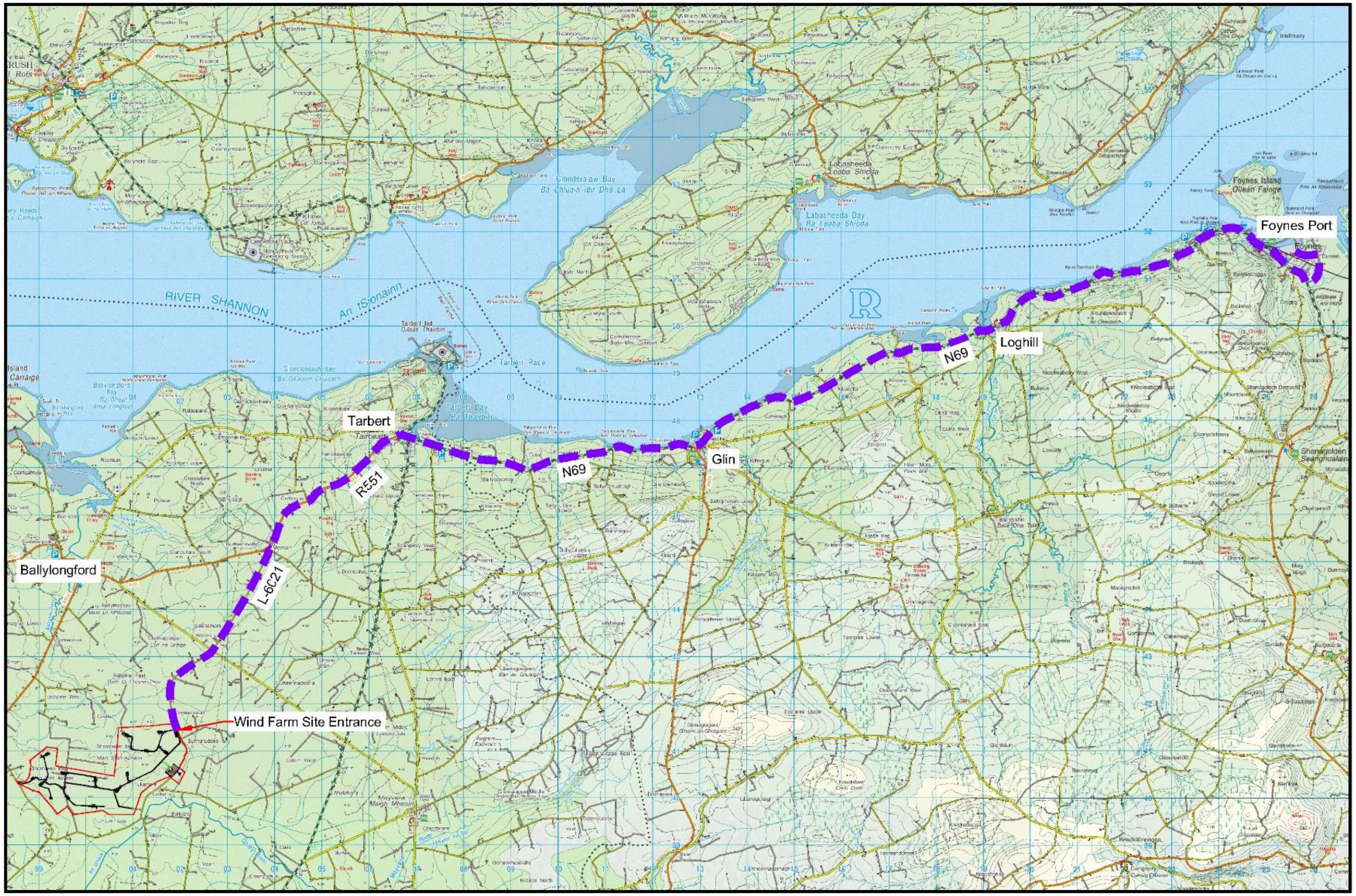

Figure 2-13 Proposed Turbine Delivery Route

2.4.4 Traffic Management

A detailed Traffic Management Plan (TMP) has been prepared and is included in **Appendix 15-2**. This plan will be further updated and adopted by the appointed contractor prior to construction commencing. Given that this project may not be constructed until 2024 it will be necessary to engage with the Roads and Transportation section of Kerry County Council and with An Garda Siochana and to reflect traffic volumes and local road use at the time.

The purpose of developing and implementing an agreed Traffic Management Plan for the construction phase works is to minimise the impact of the works on local residences and users of the public road networks. The wind farm site will have two entrances, one on the eastern side and one on the western side. The existence of two access points allows for managed and controlled one-way systems of traffic management with vehicle entering form the eastern side and exiting via the western entrance. Delivery of turbines at the later stage in the project will enter the site using the eastern entrance only and once the loads are delivered the trailers and trucks can exit the site via the same eastern entrance and travel back to the national road network. In the event An Bord Pleanála (the Board) decides to grant approval for the proposed development, the final TMP will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by the Board. The Traffic Management Plan will be updated at the construction stage (or the update commenced during planning compliance stage) to ensure controls are in place with all suppliers coming to the project site.

2.4.5 Construction Environmental Management Plan (CEMP)

A Construction and Environmental Management Plan (CEMP) has been prepared and will be updated through pre-construction and construction and 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 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 monitoring is to continue into the operational phase these commitments will be communicated and transcribed into operational process documentation.

A CEMP is included in **Appendix 2-1**. 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 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. Chapter 17 of this EIAR documents all of the mitigation measures proposed in support of the application.

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 peat will be delayed until just before construction begins rather than stripping the entire site months in advance particularly during road 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.
- Best practice for excavation in peat is that the acrotelm (top 50cm of peat), which contains the seed bank, is stored and maintained separately from the catotelm (i.e. peat below the acrotelm layer). Wherever good quality acrotelm is identified, it will be stored for re-use in accordance with best practice. Once works are complete, the acrotelm can be used to cover exposed areas of peat. Exposed areas of the site that are slow to re-vegetate may need to be replanted with suitable vegetation. This can be by natural regeneration or by reseeding. Natural regeneration relies on colonisation of bare ground by native species from adjacent habitats. For this method, a roughened surface will be provided that can trap seeds and soil to provide initial regeneration areas.

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 spoil, stored in the footprint of the excavation areas, will then be directed for use in backfilling, landscaping and restoration or placed in the deposition areas on site.

- 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 peat deposition areas for permanent storage.
- Stockpiled materials will be located 50m away from drainage systems and silt retaining measures (silt fence, / silt curtain or other suitable materials) to reduce risk of silt run-off shall be installed along the downgradient edges of stockpiled earth materials.

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 to be place under refuelling point during all refuelling to absorb drips.
- Mobile bowsers, tanks and drums should be stored in secure, impermeable storage area, 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

- Storage of fuels/oil will be located 50m for watercourses.
- Fuel containers will be stored within a secondary containment system e.g. bund for static tanks or a drip tray for mobile stores.
- 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 tanks 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 container. 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) Road maintenance

The road surface can become contaminated with clay or other silty material during construction. Road 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 road surface with the front bucket of an excavator and disposing of the material at designated locations within the site.

i) Construction Vehicle Wash

A Construction Vehicle Wash will be used to wash vehicles 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 vehicle wash area will be cleaned regularly so as to avoid the buildup of residue.

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 so as 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.

2.4.6 Duration and Timing

It is envisaged that the proposed development will commence in 2024 with an 18 month construction period. The start date is dependent on planning being granted, receipt of a grid connection offer from EirGrid, funding, RESS, or other route to market, and all permits being in place.

An approximate programme of work is outlined in **Table 2-5** below. A number of these phases will however run concurrently as outlined as follows.

- As the internal site access roads are constructed up to each turbine, hard-standing areas for the crane, turbine foundations and building foundations will be prepared.
- Once the roads 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 in the latter stages of the project.

Table 2-5 Preliminary Construction Programme

Phase	Activity	Duration
Phase 1	Clear felling (to be complete ahead of construction site mobilisation)	2 months (prior to construction)
Phase 2	Prepare site, Pre-construction activities, construct two site entrances, construction of two temporary compounds and set up the six permanent peat storage areas	2 months
Phase 3	Access road construction and Drainage plan implementation	3 months
Phase 4	Hard standing construction for turbines	2 months
Phase 5	Turbine Foundation construction	4 months
Phase 6	Trenching and ducting (underground electrical collection system)	2 months
Phase 7	110kv Substation construction	4 months
Phase 8	Permanent meteorological mast erection	1 month
Phase 9	Preferred 225m long underground cable connection from the wind farm substation to the existing 110kV Line to the east	1 month
Phase 9A	Alternative underground cable route to grid via public road	3 months
Phase 10	Turbine delivery	3 months
Phase 11	Turbine erection	4 months
Phase 12	Wind Farm Commissioning	4 months

2.4.7 Major Temporary Features

Temporary features on site include the 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 peat or soils on site. Any surplus peat material will be placed within the material deposition area.

2.4.8 List of Plant

Mechanical machinery and electrical equipment typically used for construction projects will be required to facilitate the proposed development. The following is a non-exhaustive list of plant that is typically used for wind farm and heavy civil engineering work and may be used in this proposed development:

- 30-50T Excavators;
- 15-30T Excavator;
- Rubber Tired 15-20T Excavator;
- 3-10T Mini Diggers;
- Low Ground Pressure Excavators (Bog master);
- 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; and
- Water bowsers.

2.4.9 Construction Working Hours

Typically construction will occur within the hours 07.00am – 7.00pm, Monday to Friday and 07.00am to 2.00pm on Saturdays. Due to the requirement for the concrete pours to be continuous, the working day may extend outside normal working hours in order to limit the traffic impact on other road users, particularly peak period school and work commuter traffic. Such activities are limited to the day 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 in order 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 the Local Authority.

Works along public roads would be from 9.00 a.m. to 5.00 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 Siochana for the delivery of oversized wind turbine components (i.e. blades, nacelles and towers).

No work on Sunday or bank holidays unless preapproved by the Local Authority.

2.4.10 Construction Personnel

During the construction phase, the number of on-site construction personnel will vary for each phase of the development. Overall, it is envisaged that the proposed development would generate employment for up to 60 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.

2.5 COMMISSIONING

Wind farm commissioning can take approximately two to four 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 NEG as designed.

2.6 OPERATION

During the operation of the wind farm, the turbine manufacturer, the Developer or a service company will carry out regular monitoring and maintenance of the turbines and the substation. Routine inspection and preventive maintenance visits will be necessary to ensure the smooth and efficient running of the wind farm.

2.6.1 Operating Conditions

The proposed development is expected to have a lifespan of circa 30 years. During the operational phase, the wind turbines will primarily operate automatically, responding by means of anemometry equipment and control systems to changes in wind speed and direction. The proposed development 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 3m/s with optimum generation at approximately 12.5m/s. The turbines are expected to have a cut out wind speed of 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 problems and diagnoses failures. If a problem causes a wind turbine to shut down, the wind turbine will either be restarted by the SCADA system, a remote operator, or service personnel will perform the necessary repairs and then manually restart the wind turbines.

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 out of the wind.

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 bring shadow flicker to within acceptable levels. The draft revised "*Wind Energy Development Guidelines*" (December 2019) proposes that no existing dwelling or affected property should experience shadow flicker as a result of the wind energy development. Fitting of turbines with shadow flicker control modules ensures that the proposed wind farm can comply with existing guideline thresholds and the draft revised guidelines on shadow flicker. This is detailed in EIAR **Chapter 12, Shadow Flicker**.

2.6.1.1 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. During the life of the project, it is envisaged that at least 20 permanent jobs will be created due to the existence of the project during its 30 year operational life.(Refer to SEAI A Macroeconomic Analysis of Onshore Wind Deployment to 2020). Each turbine would be subject to a routine maintenance programme involving a number of checks and changing of consumables, including oil changes. In addition, there will be a requirement for unscheduled maintenance, which could vary between resetting alarms to major component changes requiring a crane. Typically, maintenance traffic will consist of four-wheel drive vehicles or vans. The electricity substation components and site tracks will also require periodic maintenance in accordance with appropriate operation maintenance plans, procedures and health and safety plan.

2.6.1.2 Grid Maintenance

It is unlikely that the 110kv underground cable connection link to the existing 110kv Kilpaddoge to Tralee transmission line will require much maintenance during its operation. The underground cable connection will be under the control of Eirgrid and any operational or maintenance aspects will be completed by them. In the event that the alternative underground cable route connection is utilised, no ongoing maintenance will be required. Any interaction with the underground cable route connection would relate to upgrading or replacement or dealing with a localised integrity issue. The grid connection will ultimately be an Eirgrid transmission asset and as such will managed by them.

2.7 DECOMMISSIONING PHASE

At the end of the estimated 30 year lifespan of the proposed development, the Developer will make the decision whether to apply for permission to repower the wind farm, or to decommission the turbines. Any further proposals for development at the site during or after this time will be subject to a new planning application, and will be subject to environmental assessment. If planning permission is not sought after the end of life of the turbines, the site will be decommissioned and partially reinstated with all 12 No. wind turbines and towers removed. Removal of infrastructure will be undertaken in line with landowner(s) and regulatory requirements and best practice applicable at the time. The information below outlines the likely decommissioning tasks based on current requirements and best practice.

Prior to the decommissioning work, the following will be provided to Kerry County Council for approval:

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

If the site is to be decommissioned, cranes of similar size to those used for construction will disassemble each turbine. The towers, blades and all components will then be removed.

Wastes generated during the decommissioning phase will be taken off site and disposed of at an authorised waste facility. Any materials suitable for recycling will be disposed of in an appropriate manner.

At present it is anticipated that underground cables connecting the turbines to the substation will be cut back and left underground. 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.

The new 110kV substation will remain in place as it will be under the ownership of ESB/EirGrid and will operate as a grid asset in North Kerry going forward.

Hardstand and turbine foundation areas will be left in situ and covered with soil to match the existing landscape. Access roads will be left for use by the landowners and local population who have established access rights to Shronowen Bog.

2.8 THE USE OF NATURAL RESOURCES

2.8.1.1 Aggregate

Large amounts of aggregates, concrete, and steel will be used during construction. The majority of aggregate materials required for the construction of the roads, hardstands and the substation and battery compound will be sourced from local authorised quarries in the North Kerry/West Limerick Area, where possible.

Material to be delivered to site will mainly consist of higher grade materials not available to be won on this site, limestone capping material for roads and hardstands, and concrete for the construction of the 12 No. turbine bases, permanent met mast foundation and substation infrastructure. Sub base material for roads will also have to be imported as there is no rock resource on site given the nature and depth of peatland habitat. Table 2-5 below sets out the main quantities of materials required including imported stone, concrete and steel.

Table 2-5. Quantities and Volumes of Construction Materials

Stone / Aggregate	Quantity (m^3)
Internal access roads	45,935
Turbine bases and crane hardstands	144,115
Deposition area berms	15,855
Substation compound + future expansion area + screening berms	70,400
Overhead Cable Route (from substation to grid – internal circuit included in internal access roads) Underground Cable to Drombeg Option	800 4430
Met mast	968
Temporary site compounds	6430
Total Volume of Stone/Aggregate Required	288,133
Site won **Aggregate**	0
Imported Aggregate	288,133
Concrete	**Quantity (m^3)**
Turbine bases	9600m^3
Substation facility foundations and pads	50 m^3
Met mast foundation	30 m^3
Reinforced steel for turbine bases (12 @ 85 tonnes each)	1020 tonnes
Total Volume of Concrete Required	9680m^3

Concrete and additional aggregate materials will be sourced from authorised facilities. The following quarries in County Kerry and Limerick are in proximity to the proposed site:

- Ardfert Quarry Products;
- Mc McAuliffe Sand and Gravel Quarry, Kilmeedy Co Limerick
- O'Connell Quarries, Ballycar, Ardnacrusha, Co Limerick.

These are the most likely source to be used, but this will be confirmed by the appointed contractors.

2.8.1.2 Water

Water needs for construction activities will be limited to concrete truck chute washing, wheel wash, dust suppression and sanitary facilities. This water requirement will be sourced from on-site rainwater collection systems and settlement ponds.

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 50 litres per day. This water will be supplied as bottled water.

2.9 THE PRODUCTION OF WASTE

2.9.1 Excavated Soils, Subsoil and Peat

It has been calculated that there will be approximately 146,700 m^3 of material excavated during the construction of Shronowen Wind Farm, of this 131,200 m^3 will be peat and the remaining 15,500 m3 will be soils, subsoil and stone. All soils and sub soils generated from excavation works will be retained on site and reused in bunding, landscaping and localised earthworks. Where suitable, acrotelm peat will be used for reinstatement around turbines and felled areas. Excess peat and spoil material will be stored on site in six designated peat deposition zones. Road excavation, if required, can generate small quantities of tarmacadam which will require off-site disposal by a permitted waste contractor.

2.9.2 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/permitted waste facility for treatment and disposal. Table 2.6 outlines some known waste facilities which are approved to accept this waste stream and may be utilised.

During the construction time 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 100 litres per day. 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 only.

2.9.3 General Wastes

Construction phase waste may consist of hardcore, concrete, spare steel reinforcement, shuttering timber and unused oil, diesel and building materials. This waste will be stored in the construction compound and collected at the end of the construction phase 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 a licensed landfill facility.

The power generation aspect of the proposed development would not produce any waste emissions or pollutants. The general operation and maintenance of the proposed development has the potential to produce a minimal amount of waste. Wastes arising during the operation phase of the project 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 all relevant or applicable waste regulations. The remaining wastes will all be removed from site and reused, recycled or disposed of in an authorised facility in accordance with best practice.

2.10 EMISSIONS AND NUISANCES

The anticipated residues and emissions likely to be generated during the project lifetime are summarised in **Table 2-7** below. These environmental effects have been identified, assessed and proposals for management of the anticipated nuisances and/or emissions are presented throughout relevant chapters of this EIAR.

Table 2-3 Emissions and Nuisances

Project Phase	Aspect	Potential Emission/Nuisance	Assessment Provided
Construction/ Decommissioning	Air	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 2 Chapter 10 Air and Climate**
	Noise	Traffic flows, excavation/blasting mechanical machinery and electrical equipment typically used for construction projects would generate noise emissions.	**EIAR Vol 2 Chapter 11 Noise**
	Water	Surface water runoff and discharges from construction working areas are likely during construction, although overall the quantity of surface runoff would not change overall as a result of the construction work. Occasional and low quantity discharges could arise from pumping in order to dewater foundation excavations. This would be discharged to the system water management drainage system. Pollution	**EIAR Vol 2 Chapter 8 Water**

Project Phase	Aspect	Potential Emission/Nuisance	Assessment Provided
		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 development are presented in EIAR Volume 4: Appendix 2-1: CEMP.	
	Traffic	The additional traffic, especially heavy goods vehicles associated with the construction phase, has the potential to cause nuisance to those using the local road networks	**EIAR Vol 2 Chapter 5 Population and Human Health, EIAR Vol 3 Appendix 15-1 and 15-2.**
Operational	Air	Due to the nature of the project no significant point source or diffuse air emissions would be produced during its operation.	**EIAR Vol 2 Chapter 10 Air and Climate**
	Noise	Potential noise nuisance from operational turbines and a proposed 110kV substation.	**EIAR Vol 2 Chapter 11 Noise**
	Water	No water emissions or pollution sources have been identified for the operational phase.	**EIAR Vol 2 Chapter 8 Water**
	Shadow Flicker	In certain conditions, the movement of wind turbine blades could give rise to shadow flicker nuisance at nearby residential receptors.	**EIAR Vol 2 Chapter 12 Shadow Flicker**

2.11 CUMULATION WITH EXISTING LAND USES AND/OR APPROVED PROJECTS

The project, as described in this chapter, is assessed in the impact assessment chapters of this EIAR. Cumulative effects are also considered in individual chapters of the EIAR, as relevant, based on the land use and projects identified in this section.

The proposal was considered in combination with other plans and projects in the area that could result in potential cumulative impacts. Other plans considered include;

- Kerry County Development Plan 2015 – 2021

2.11.1 Minor Developments

A search of Kerry County Council's on-line planning enquiry system determined that there are several current grants of planning permission for the townlands of Ballyline West and Dromalivaun. These permissions are for minor development works typical; of a rural setting with dispersed dwellings and where agriculture is the dominant activity including afforestation, dwelling houses with ancillary works (WWTS, extensions, landscaping, etc.), farm structures (silage pits, sheds, compost pile, etc.).

2.11.2 Agriculture, Turf and Forestry

The dominant activity in the area extending away from the proposed development site is intensive dairy farming. Peat cutting is carried out on parts of the site, while there are areas of cutover bog, as well as some areas of intact peatland. Surrounding land uses are mainly agricultural with some small areas of coniferous forestry.

2.11.3 Other Renewable energy projects - wind farms and solar energy projects

Wind and solar farm projects within 15 km of the proposed development site are listed in **Table 2.12.1**.

Table 2.1: Wind and Solar within 15 km

Wind Farm Name	Status	No. of Turbines	Distance and Direction from Shronowen Wind Farm
Ballylongford	Granted	6	c. 2.2km to the north west
Carhooeargh	Granted	2	c. 7km to the south east
Larha	Existing	2	c. 5.5km to the north west
Moneypoint	Existing	5	c. 10.2km to the north east
Muingnaminnane	Existing	6	c. 14.5km to the south east
Dromada	Existing	12	c. 15.7km to the south east
Tullahennel	Existing	10	c. 2.4 km to the north west
Leanamore	Existing	9	c. 2.5 km to the north east
Toberatooreen	Existing	7	c. 6.5 km to the south east
Beennanaspuck	Existing	3	c. 9 km to the south east
Curraghderrig	Existing	2	c. 8 km to the north west
Beale Hill	Existing	5	c. 10.7 km to the north west
Finuge (Stack's Mountain Wind Farm)	Permission granted	10	c. 11 km to the south west
Athea[1]	Existing	16	c. 11 km south east
Pallas	Existing	20/26	c. 14 km to the south

There are two wind farms with planning permission but not yet constructed in the surrounding area, one due south west of Ballylongford Village which was granted planning permission in 2020 and one due south of Listowel at Finuge. Drombeg Solar farm project with an output of up to 50MW is located 2km due south of the proposed wind farm site. There are two 110kv lines located to the east of the proposed development site. Both lines emanate from Kilpaddoge substation in Tarbert and follow a route south towards the Town of Tralee. The surrounding land includes some pastures and lands principally occupied by agriculture with significant areas of natural vegetation.

This area of north Kerry is also characterised by industrial scale energy infrastructure including Tarbert Power Station, the Kilpaddoge Eirgrid substation, and High Voltage overhead line infrastructure which converges at Tarbert.

[1] Includes the Tooradoo Cratoloe West, Tooradoo and Upper Athea wind farm projects

2.11.4 EPA licensed facilities

EPA licensed facilities within the area are listed in **Table 4.2**

Table 4.2: IEL and IPPC licensed facilities

Name	Licence No.	Proximity
Kerry Ingredients (Ireland) Limited (Listowel)'	P0393-03	8.7 km south-west of the site
'Horan Pig Enterprises'	P0308-01	9.9 km north-east of the site
SSE Generation Ireland Limited (Tarbert)'	P0607-02	10.2 km north-east of the site
Celtic Circuits Limited'	P0428-01	6.7 km south-west of the site

The Ballylongford Kerry Urban Wastewater Treatment (UWWT) Plant has a tertiary N removal point located in Ballylongford Bay (RegCD D0459). The Listowel UWWT Plant has a secondary treatment facility south-west of the site (RegCD D0179).

The potential for cumulative effects of other wind developments are considered in the relevant chapters of this EIAR. The closest wind farms to Shronowen are considered in the cumulative noise assessment. Cumulative impacts on the Shannon catchment area are unlikely as most of the other wind developments are already operational and the recently permitted developments are at a remove of >3km.

Chapter 13 Landscape and Visual Assessment, has included the other wind farm developments (within 30km of the site) in the cumulative assessment The potential for cumulative effects of other wind developments are considered in the relevant chapters of this EIAR. The closest wind farms to Shronowen are considered in the cumulative noise assessment. Cumulative impacts on the Shannon catchment area are unlikely as most of the other wind developments are already operational and the recently permitted developments are at a remove of >3km.

Chapter 13 Landscape and Visual Assessment, has included the other wind farm developments (within 30km of the site) in the cumulative assessment. Shadow flicker will not result in effects as Shadow Flicker Control Measures will ensure there is no shadow flicker from Shronowen, and therefore, there can be no cumulative impact.

Cumulative effects are considered in individual chapters of the EIAR as relevant based on the land use and projects identified above.

2.12 RISK OF MAJOR ACCIDENTS AND DISASTERS

2.12.1 Construction Stage

As in all construction activities, there is a wide range of potential risk 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.

All work on site will be carried out in compliance with all relevant Legislation and Work Practices including:

- Safety, Health & Welfare at Work (Construction) Regulations 2013;
- Safety, Health & Welfare at Work Act 2005;
- Safety, Health & Welfare at Work (General Applications) Regulations 2007 to 2016; and
- Irish Wind Energy Association Best Practice Guidelines.

to ensure that the construction areas, site environs and public roads remain safe for all users. The Construction and Environmental Management Plan (CEMP), (refer to **Appendix 2-1** of the EIAR) 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 Project.

<u>Peat Stability</u>

Extensive walkovers and surveys of the site including 109 peat probes across the site determined that the Proposed Development site is principally covered in peat, ranging in depths between 0.00 and 6.7m. The peat depths varied across the site and different section of the road infrastructure will have both excavated and floated designs. In addition, a number of the turbine base and hardstands are located in deep peat areas, circa 6 to 7m in depth so will require a localised driven sheet pile wall to facilitate construction and peat containment. The site overall is located in flat open topography with little or no slope present. In order to have a risk of peat slide a number of factors have to come into play, slope, deep peat, poor quality or poorly cohesive peat, water and some driver to instigate pressure. On this site we do not have the combination of criteria required and so the risk is low.

However, a Stage 1 peat stability risk assessment was completed. Stage 1 was based on desk study information, site reconnaissance and assessment of contour data. Stage 1 concluded that there was no risk of peat slide as the existing topography and ground conditions did not trigger a risk.

2.12.2 Operational Stage

<u>Fire/ Fuels</u>

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.

<u>Lightning Strikes</u>

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.

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. These checks are specified particular to the turbine model purchased for the project. The separation distances of turbines from public roads and residences are well beyond fall over distances that would present a risk of significant accidents.

Severe Weather

There is potential for the Proposed Development to be impacted by severe weather including increased wind storms. However, wind turbines are designed to withstand extreme weather conditions with brake mechanisms installed within the turbines so that they only operate under specific wind speeds and will shut-down during high wind speed events. Therefore, there is very low risk to the Proposed Development from high wind speeds.

Flooding

Flood risk is considered in EIAR Chapter 8 to determine whether the site is at risk from extreme fluvial flooding events. This assessment concluded that the site is not at risk from extreme flooding.

The site does not have any significant watercourse and is also removed at some distance from any large rivers or watercourse networks. The site is also located inland at a significant distance from the coast, thus there is no risk of coastal or fluvial flooding.

The assessment also considered the increase risk of downstream flooding as a result of the proposed development. The assessment considers that forest felling, new and upgraded site access tracks, turbine hard-standing areas and other new, hard surfaces have the potential to contribute to a low level of increase in surface water run-off. The assessment however determined that the risk of an increase in downstream flooding is low due to the small percentage increase in run-off contributing to the catchments as a result of the wind farm development. The proposed development is at a distance of approximately 0.6km from the nearest recorded location by the Office of Public Works (OPW) where flooding has occurred historically. In addition the entire site is located within a heavily modified bog land which has extensive areas of cutover bog and active peat cutting. The bog has an extensive network of drains that capture and direct surface and groundwater to two small streams that rise within the body of the bog lands. There are no rivers or streams running through the site of significance. The nearest substantial river is due east of the development site. This location has records of historical flood events, but is of sufficient distance from the site to not pose any risk to the proposed infrastructure. In addition the river has a protective flood embankment and the levels of the embankment provide protection and eliminate any risk to the proposed flooding.