Drumlins Park Wind Farm

Chapter 3: Description of the Proposed Development

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3.1 Introduction

The purpose of this chapter is to provide a description of the proposed development in sufficient detail, which, when taken together with the descriptions of the existing environment provided in this EIAR, will allow an independent reader to understand the significant environmental impacts likely to arise from the proposed development.

The description considers the location of the proposed development together with its main physical characteristics including design, size, scale and land-use requirements of all relevant phases of the existence of the project from its construction through to operation and decommissioning. This chapter should also be read in conjunction with the technical plans and drawings submitted with the planning application and photomontages provided in **Annex 9.1** of this EIAR.

Further descriptions of specific elements of the proposed development and the existing baseline environment are also provided in individual chapters of this EIAR as they relate to particular environmental factors including, for example, in combination with other proposed developments; the nature and quantity of materials and natural resources used; and the potential production of residues, waste, pollution, noise and nuisances etc.

The description of the proposed development also addresses other off-site/secondary developments which occur as a direct result of the proposed development, including the alternative grid connection routes and infrastructure together with alternative haul route for turbine components and importation of materials and aggregates to facilitate construction.

The proposed development will be commissioned as a single construction phase and the construction period is likely to last for approximately 12-18 months. The description of the proposed construction phase includes land-use requirements; proposed site construction works; off-site/secondary developments; description of materials, plant and equipment used to facilitate construction together with a description of potential emissions; waste and traffic etc.

3.2 Project Duration

A ten year planning permission is being sought by the developer for this proposed development. That is, planning permisison would remain valid for ten years following the final grant. The Wind Energy Development Guidelines for Planning Authorities 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*". A ten-year planning permission is considered appropriate for a development of this nature to ensure all other required licenses and consents are in place.

The operational lifespan of the development is proposed to be 30 years following the full commissioning of the wind farm. Any further operation beyond 30 years would be subject to a further planning application and EIA. This EIAR therefore assumes that full decommissioning will take place at the end of the project lifespan. Any future expansion would be subject to a further planning application.

3.3 Site Location & Context

The proposed development is located in northwest County Monaghan, approximately 2km southwest of the village of Newbliss, 5km south of the town of Clones and 7km northwest of the town of Cootehill, County Cavan. The proposed development site is situated approximately 5km from the international border between the Republic of Ireland and Northern Ireland. The location of the proposed development, in a regional context, is illustrated in **Figure 3.1**.

The local area is typical of this part of Ireland, with settlement patterns largely comprising dispersed rural dwellings often accompanied by agricultural holdings and buildings. In total, there are 123 no. dwellings located within 1.8km of a proposed wind turbine.

The proposed development site and surrounding environment are typical of a rolling drumlin landscape, with undulating terrain interspersed by small loughs and small watercourses but with no significant watercourses present.

The site comprises a mosaic of small-to-medium sized agricultural fields consisting predominately of improved and semi-improved grassland. Field boundaries consist of generally dense hedgerow with hawthorn, gorse and blackthorn the common species.

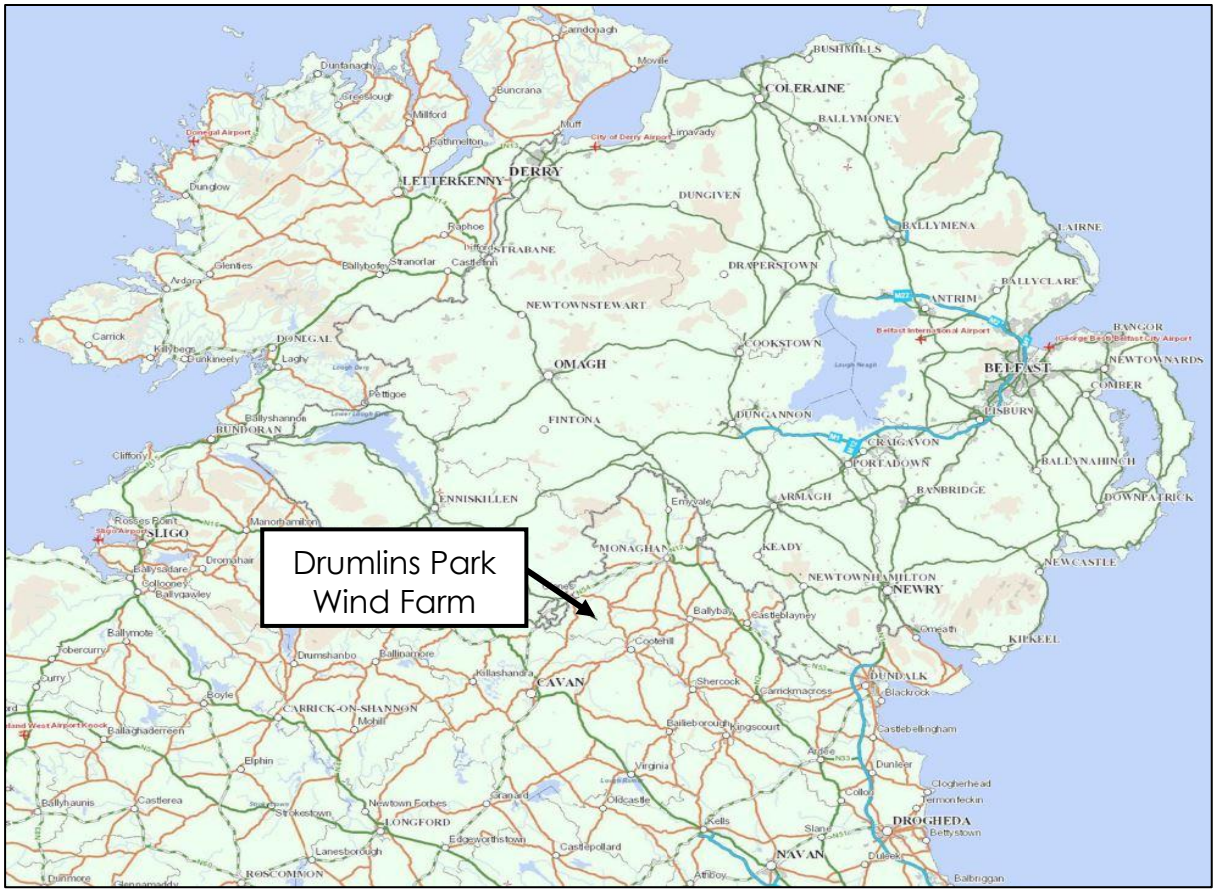

Figure 3.1: Proposed Development Site Location

Plate 3.1: General View across the Proposed Development Site

3.4 Description of the Proposed Development

The proposed development assessed within this EIAR comprises a wind farm, including all associated development works to accommodate its construction, installation, operation, maintenance and the export of electrical power to the national grid. This will include:-

- 8 no. wind turbines with a maximum tip height of up to 180m;
- All associated foundations and crane hardstanding areas;
- All associated underground electrical and communications cabling;
- Provision of new internal wind farm site access tracks and associated site entrances to local public roads;
- 1 no. temporary construction compound;
- 1 no. meteorological mast of up to 101m in height;
- Occasional upgrade works to public roads along the turbine component haul route;
- 3 no. grid connection and substation options; and
- All associated site development and reinstatement works including provision of drainage infrastructure.

The proposed development will comprise a substation and attendant electricity line to connect the proposed wind farm to the national grid. However, as the point of connection is not precisely known at this time, 3 no. off-site grid connection options have been assessed in the interests of ensuring that the entirety of the project is assessed within this EIAR (see **Chapter 2** and **Section 3.4.3** below). The location of the proposed development and grid connection options are illustrated in **Figure 3.2** (see also **Annex 3.1**) below.

It should also be noted that this EIAR includes an assessment of permanent and temporary off-site works which will be required along the proposed turbine component haul route to facilitate access of oversized abnormal loads. These upgrade works are described further at **Section 3.4.1** below.

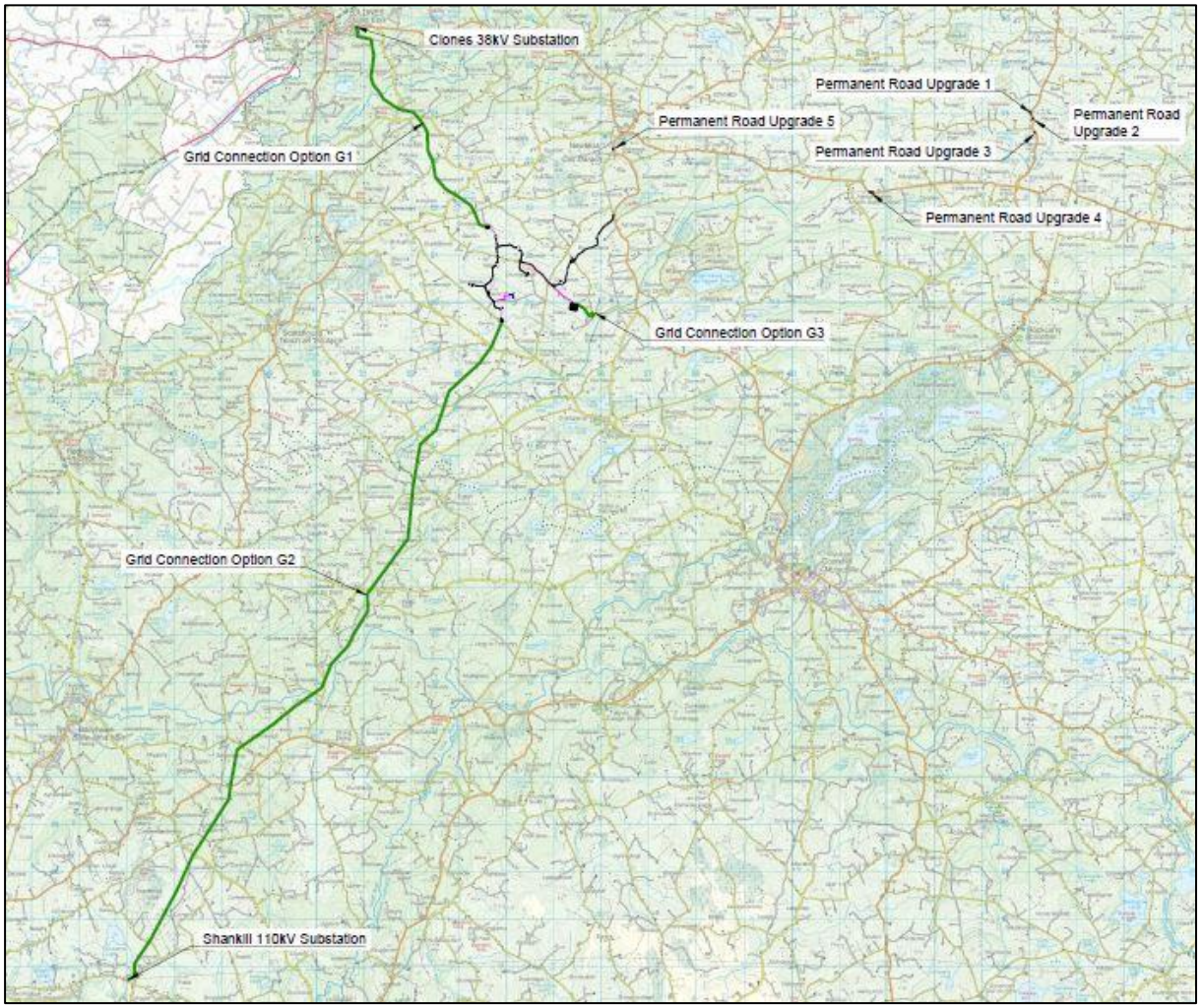

Figure 3.2: Proposed Development Site and 3 no. Off-Site Grid Connection Options

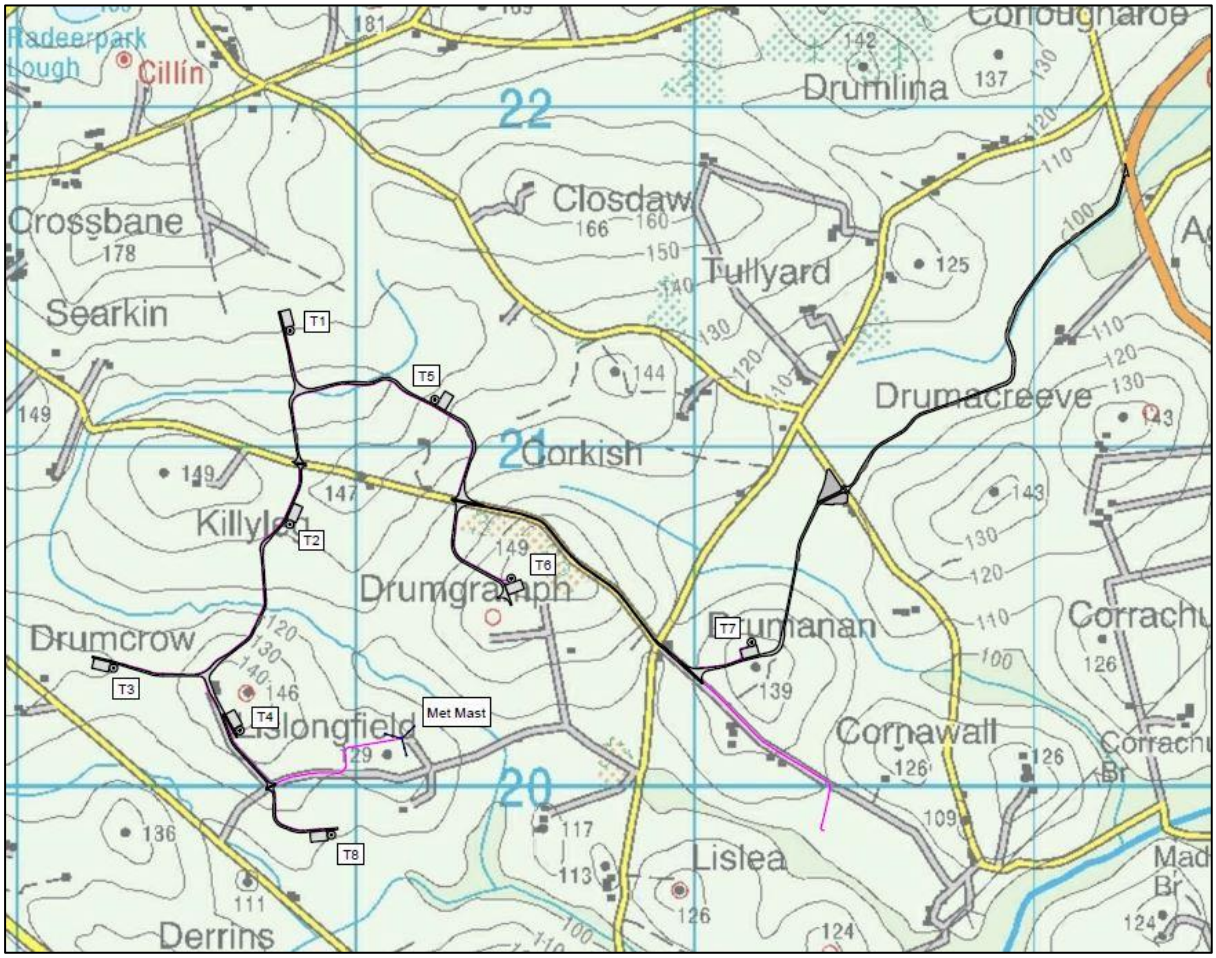

Figure 3.3: Proposed Wind Farm Site Layout (see also Annex 3.2)

Each element of the proposed development is discussed in turn below and all relevant technical plans, drawings and other particulars are included in the accompanying planning application. This EIAR should, therefore, be read in conjunction with the relevant planning application's plans and particulars; as discussed at **Chapter 1, Section 1.18**, not all elements of the overall proposed development will be included within a single planning application

3.4.1 Wind Turbines

As discussed in **Chapter 2**, the proposed wind turbine design and layout has been informed by a number of factors including environmental constraints, maximising energy yield and maintaining sufficient inter-turbine separation distances to minimise wake effects and maintain correct operational performance. The coordinates of the proposed wind turbines are set out in **Table 3.1** below.

ID	Easting*	Northing*	Max Overall Tip Height (m)	Approximate Altitude (mAOD)
T1	653742	821348	180	140
T2	653741	820777	180	132
T3	653221	820353	180	134
T4	653594	820169	180	138

T5	654169	821144	180	143
T6	654394	820617	180	142
T7	655103	820429	180	131
T8	653864	819861	180	111

Table 3.1: Proposed Wind Turbine Coordinates and Existing Ground Levels

**Note: Coordinates provided In Irish Transverse Mercator (ITM)*

***Note: Micrositing and any immaterial deviations to the proposed turbines within an overall development envelope (overall height or red line boundary) are fully assessed and incorporated into this EIAR.*

The proposed wind turbines will have a maximum overall tip height of up to 180 metres (m). The turbines will each consist of a three-bladed rotor attached to a nacelle (hub) which contains the mechanical drive train and electrical generation mechanisms, mounted on a steel/concrete tower of tubular construction.

The blades will be constructed of glass reinforced plastic. The colour of the proposed turbines and blades will be white, off-white or light grey in accordance with the Wind Energy Development Guidelines for Planning Authorities 2006, or as determined by the Planning Authority.

The turbines will be geared to ensure that all turbines rotate in the same direction and will typically have a cut-in wind speed of 3 metres-per-second (m/s) and a cut-out speed of 25 m/s. At the cut-out speed the turbine will automatically shut down. The typical components of a standard wind turbine are illustrated in **Figure 3.4**.

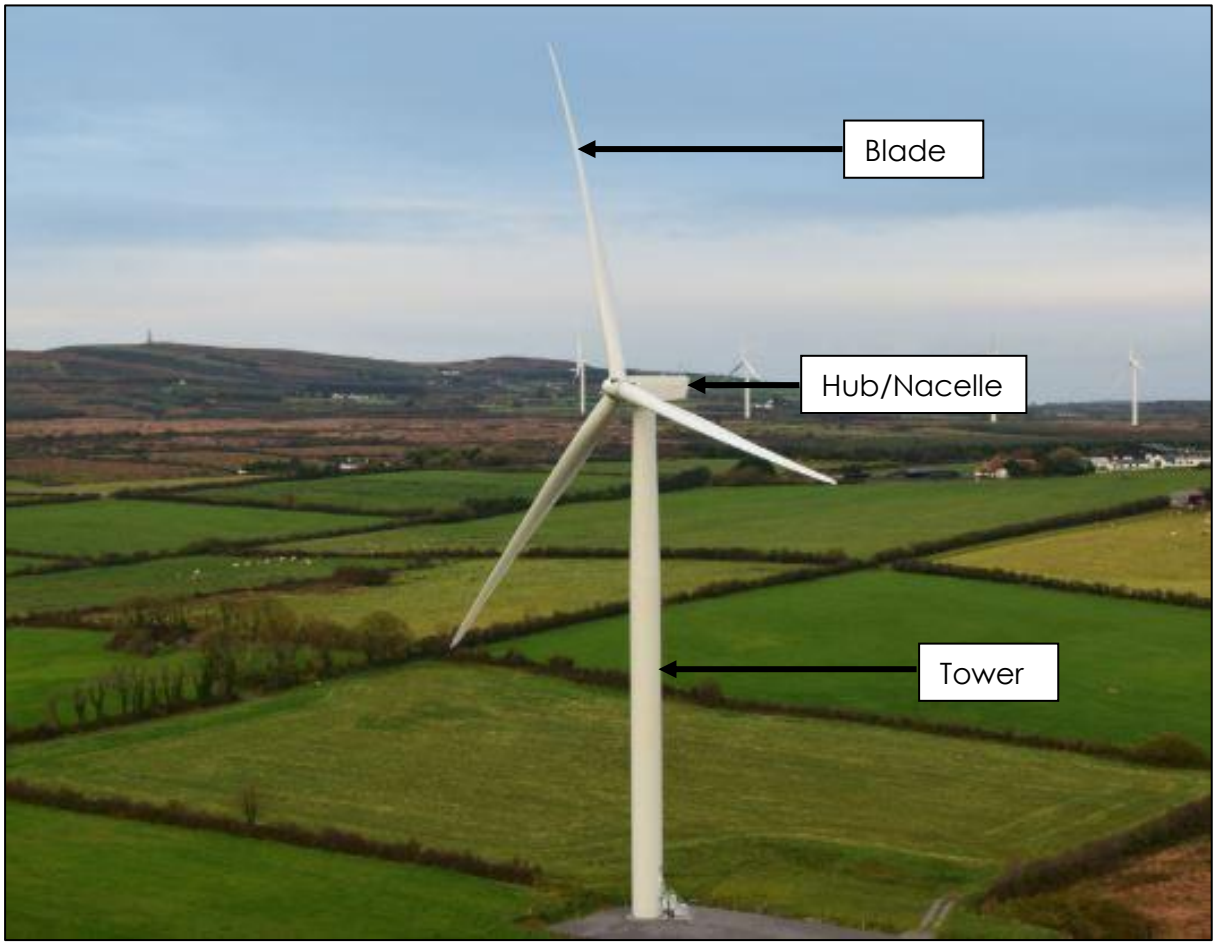

Figure 3.4: Typical Wind Turbine Components

A planning application for wind turbines is somewhat different that a typical planning application for development in that the primary features of the application are machines (turbines) rather than structures with predetermined fixed dimensions, and a range of different options and different manufacturers are available. Turbine technology evolves very rapidly and, given the often lengthy time required for planning and other statutory consent processes, it may be the case that individual turbine models become unavailable due to the rapid technological advancement and obsolescence. It may also be necessary for suppliers of potential turbine models to be subject to a competitive tendering process, which may result in a different turbine model being eventually installed as part of the proposed development.

It is therefore necessary to incorporate some degree of flexibility in the description of the proposed wind turbines while, at the same time, providing sufficient information to enable all likely significant impacts on the environment to be fully assessed in the EIAR. This approach, known as the 'Rochdale Envelope',[1] allows for the description of the proposed wind turbines to be defined within a number of key parameters for the purposes of EIAR, and based on a cautious 'worst-case' scenario. This approach is also provided for the in the EPA's Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports 2017 (p.41/42)

[1] R. V Rochdale MBC ex parte Milne (No. 1) and R. V Rochdale MBC ex parte Tew [1999] and R. V Rochdale MBC ex parte Milne (No. 2) [200].

In order to provide for a robust assessment, two candidate turbine models were selected as most likely to be suitable for the proposed development site having regard to available wind speeds and other technical criteria. These turbine templates were consequently used as the basis for the environmental assessments included in this EIAR. The typical specifications of these two turbine models are provided in **Table 2.2** below.

Option	Potential Turbine Model	Output (MW)	Hub Height (m)	Rotor Diameter (m)	Max Overall Tip Height (m)
Option TU1	General Electric GE 5.5-158	5.5	101	158	180
Option TU2	General Electric GE 4.0-130	4.0	115	130	180

Table 3.2: Candidate Turbine Models

Combining the two candidate turbine models, the maximum hub height to be installed in the subject site shall be 115m with a maximum rotor diameter of 158m and within an overall maximum tip height of 180m. A drawing of the maximum height envelope of a typical proposed wind turbine is provided at **Annex 3.3**. Any immaterial deviations to these maximum dimensions, within this overall maximum tip height envelope, are also fully assessed and incorporated in this EIAR.

It is intended that the precise turbine model to be installed on the subject site, shall be agreed with the Planning Authority prior to the commencement of development by way of condition of consent. In *People Over Wind v. An Bord Pleanála (2015 ICEA 272)* it was ruled that such matters of detail may be left over for agreement post consent, on the proviso that the results to be achieved by any mitigation measures are specified and the proposed development cannot proceed unless those results will be fully achieved.

Each assessment contained in individual chapters of this EIAR has therefore been undertaken on the basis of the candidate turbine predicted as likely to result in the 'worst-case' significant effects. This may vary depending on the environmental factor under consideration. The candidate turbine used for each specific assessment is clearly stated in each chapter, as appropriate. References throughout this EIAR to the relevant candidate turbines must therefore be read in this context and should not necessarily be construed as the specific model of wind turbine to be finally installed as part of the proposed development.

Similarly, the rated maximum output for each turbine, based on the candidate models selected, is 5.5MW, resulting in a total rated output of 44MW for the proposed development. Again, given the rapid advancement of turbine technology, turbines with a greater rated output could be installed within the abovementioned maximum physical dimensions. The rated electrical output of wind turbines is controlled by the capacity of the generator contained within the nacelle and not by any physical element of the turbines. Therefore, an increased rated output would not alter the physical configuration of the turbine and would have the effect only of generating additional renewable energy within the same design envelope. Notwithstanding the above, the total output of the wind farm shall strictly not exceed 49.9MW; 50MW being the threshold above which development

proposals must be submitted to An Bord Pleanála for consideration under the Seventh Schedule of the Planning & Development Act 2000 (as amended).

3.4.2 Turbine Foundations

Each turbine tower is secured to a steel ring foundation which can comprise either a reinforced concrete raft foundation or a piled foundation. The precise type of foundation to be used for each turbine will depend upon the specific ground conditions at each location. This shall be established through detailed technical design and post-consent geotechnical investigations prior to construction, as is normal best-practice in all construction projects.

Initial geotechnical investigations carried out to date at each of the turbine locations demonstrate that the subsoil conditions are generally benign and suitable for the construction of standard turbine raft foundations (see **Chapter 6**). Accordingly, complex construction engineering methods, including piled foundations, are unlikely to be necessary. However, this will be confirmed during further post-consent investigations. Again, it is established EIA practice that such details may be left over for agreement post consent, on the proviso that the results to be achieved by any mitigation measures are specified and the proposed development cannot proceed unless those results are fully achieved.

The size of turbine foundations will be dictated by the turbine model ultimately installed on the subject site. However, the typical foundation depth for each turbine will be c.3m. This depth may immaterially vary depending on the specific geotechnical conditions at each turbine location. Each turbine foundation will occupy an area of approximately 24m x 24m and construction will involve approximately 1,500m^3 of excavated subsoil material.

Once the turbine foundation has been excavated and the base fill emplaced, the bottom section of the tower or 'can' is installed. Reinforced steel rebar is built around and through the can before concrete is poured into the foundation in accordance with the turbine manufacturer's specifications. A typical turbine foundation is shown at **Figure 3.5** below. It is proposed that, where possible, concrete, aggregates and other materials for foundations shall be sourced locally, which will reduce the total distance travelled by HGVs drawing construction materials to the subject site (see **Chapter 13**) and associated emissions (see **Chapter 8**).

Figure 3.5: Typical Turbine Foundation

Excavations will be undertaken by conventional mechanical methods and no blasting will be required. Rock, topsoil and vegetation removed during construction of turbine foundation bases will be appropriately stockpiled (see **Chapter 6**) and, in so far as is practicable, re-used to reinstate the foundation and provide additional ballast. Any excess material arising will be utilised for reinstatement purposes (e.g. for landscaping or the creation of trackside berms) elsewhere within the proposed development site or deposited at the dedicated spoil deposition areas.

3.4.3 Turbine Hardstands

Hardstand areas shall be established adjacent to each turbine to facilitate crane operations for turbine erection and, occasionally, for maintenance and final decommissioning. Each hardstand area shall typically be 50m x 30m for the construction phase and will consist of levelled and compacted (unsealed) hardcore. However, the precise size, arrangement and position of the hardstands will be determined by the chosen turbine supplier as dictated by the selected turbine model (see **Section 3.3.1**). This may necessitate some immaterial deviations in the precise alignment of the hardstands.

The crane hardstands will be retained in situ during the operational phase of the proposed development to accommodate any occasional crane activities in the event of a major component change-out. The location of the hardstanding area may also be immaterially altered in accordance with the micro-siting tolerance threshold (see **Section 3.3.9**).

Temporary set down areas will be located immediately adjacent to each hardstand during the construction phase to accommodate the temporary storage of turbine components following their delivery to the proposed development site and crane components during crane assembly. Following the erection of the turbines, these set down areas will be reinstated with excavated material, re-seeded and allowed to revegetate.

3.4.4 On-Site Access Tracks

A total of approximately 5.5km of on-site access tracks will be required for construction purposes and for site access during the operational phase. The access tracks shall be similar to normal agricultural tracks but with a slightly wider typical running width of approximately 5m. Good quality agricultural access tracks already exist within the site and these existing tracks will be utilised where possible. Existing tracks will be upgraded and new tracks constructed, where necessary, to provide continuous access to the proposed turbine locations.

Access tracks will be unsealed and constructed of crushed stone material to allow for permeability. While initial site investigations do not indicate the presence of any rock on site, any material arising from the excavation of foundations etc. will, where possible, be reused in the construction of access tracks. However, it is likely that the majority of material will be imported to the proposed development site from local quarries (see **Chapter 13**).

A textile layer may be needed in some locations to avoid any subsequent vehicle access problems. Some cut/fill in the construction of the access tracks may be necessary to ensure that horizontal and vertical alignments are suitable to accommodate abnormal HGV loads and adequate drainage. The selected wind turbine manufacturer shall be consulted during the detailed post-consent design process to ensure that the access tracks are suitable to accommodate turbine components. This may necessitate some immaterial deviations in the precise alignment of the access tracks.

Passing bays and turning heads shall also be provided along the access tracks to accommodate turning of long loads and passing traffic, as required. Additional excavated strips will be required alongside the access tracks to accommodate drainage and cable trenches. Where excess material arises from the construction phase, it will be utilised in the construction of trackside berms.

A total of 11 no. site entrances will be required to facilitate access throughout the site. 3 no. existing agricultural access points will be upgraded to accommodate construction traffic and abnormal HGV loads while a further 8 no. new site entrances will be constructed. All site entrances will be constructed/upgraded in accordance with the requirements of the Local Authority, particularly regarding the provision of appropriate site visibility splays to ensure traffic safety[2].

Following the construction phase, the specifications of the site entrances will no longer be needed to accommodate abnormal HGV movements. Accordingly, they will be reduced in size to standard agricultural access points and appropriately fenced off and gated to prevent unauthorised access. The reinstatement of site entrances will also incorporate the replanting of hedgerows. Hedgerows will be

[2] Visibility splays will be provided in accordance with Table 15.5 of the Monaghan County Development Plan 2019-2025

appropriately sited to allow for future growth while ensuring, at all times, that visibility splays are maintained during the operational phase.

Figure 3.6: Typical Access Track

No major watercourses are present within the site. However, a number of drainage ditches and lower order watercourses/streams do exist. Where it is necessary for access tracks to cross these drains/watercourses, the relevant bodies (e.g. Inland Fisheries Ireland, Office for Public Works (OPW)[3]) will be consulted prior to construction. As appropriate, a Section 50 Licence application will be made to the OPW prior to the installation of culverts/bridging structures over relevant watercourses.

Following the construction phase, access tracks, passing bays and turning heads that are not required during the operational phase will be reinstated, wherever

[3] The OPW is responsible for the implementation of the regulations in European Communities (Assessment and Management of Flood risks regulation SI 122 of 2010 and the Arterial Drainage Act, 1945, including Section 50.

possible. It is likely, however, that the majority of the tracks will be required during the operational phase for maintenance operations and will be used as part of ongoing agricultural activities on the subject site.

3.4.5 Earthworks

No borrow pits will be developed as part of the proposed development and no blasting of any rock will take place on-site to generate material for construction works. All materials for the construction of the on-site access tracks and foundations will be sourced, where possible, from standard construction activities (e.g. excavations) within the site. However, initial site investigations have indicated that there is unlikely to be sufficient material won from within the site and thus the majority of aggregates are likely to be imported to site (see **Chapter 13**).

It is proposed to develop 2 no. spoil deposition areas where excess soil and subsoil, which cannot be utilised for reinstatement or is unsuitable for landscaping purposes on site, will be stored permanently. The locations of the deposition areas have been selected due to the absence of any environmental constraints, separation distance to watercourses and generally flat or gently sloping gradient. Spoil will be transported to these locations where is will be placed in layers in accordance with best-practice methods. Appropriate drainage management measures will be implemented to ensure that the deposited spoil does not become waterlogged.

Following the completion of construction, the deposition areas will be graded to match the profile of surrounding land and will be reseeded. In the event that excess material arises which cannot be accommodated within the deposition area, this shall be removed from site and disposed of at a licensed waste disposal facility. Works at the spoil deposition areas will be monitored, on a weekly basis during the construction phase and monthly for a six month period thereafter, by an appropriately qualified geotechnical engineer.

3.4.6 Transformers & Cables

Each turbine will utilise its own transformer, which will be located either inside the nacelle or immediately adjacent to the base of the turbine tower (outside). Depending on the final turbine model selected, transformers will either be oil-filled (and bunded to prevent spillage) or of a solid cast resin type, which is effectively non-polluting should a spillage occur. The transformers will increase the electrical voltage on site and on-site electrical cables will connect the turbines to the wind farm substation for onward connection to the national grid.

All on-site electrical cables will be placed underground and be of a solid polymeric construction with either aluminium or copper conductors. All electrical cables will follow the alignment of the on-site access tracks, insofar as is practical. Trenching will be by a mechanical digger. The proposed depth of the cable trench is approximately 1m with a width of approximately 0.5m. The excavated material from the excavation of trenches will be side-cast alongside the trench and reinstated following the laying of cables.

3.4.7 Meteorological Mast

A temporary meteorological (anemometer) mast currently exists in the southern part of the proposed development site for measuring wind speed and meteorological conditions. This mast is 80m in height and has been installed in accordance with the provisions of Class 20A of Schedule 2, Part 1 of the Planning and Development

Regulations 2001 (as amended). The meteorological mast has recorded an average wind speed for the site of approximately 7.5m/s at 101m (adjusted). It is proposed that this mast will be removed and replaced with the permanent mast.

ID	Easting*	Northing*	Max Overall Tip Height (m)	Approximate Altitude (mAOD)
Permanent Meteorological Mast	654072	820145	101	123

Table 3.3: Meteorological Mast Coordinates

*Note: Coordinates provided in Irish Grid (IG)

The proposed permanent mast to be installed on the subject site will be up to 101m in height and will consist of a steel guy-wired lattice structure to which various measurement instruments will be attached. The purpose of the mast is to monitor wind speeds and climate conditions for the efficient operation of the proposed development. The recorded meteorological data is sent remotely to a computer system located off-site so that the data can be analysed to extrapolate the long-term wind resource at the site. The mast is also required to carry out power curve performance tests, a typical condition of the wind turbine warranty.

Some ground works, including the construction of a concrete foundation and anchors, will be required to erect the mast. The mast will remain on-site during the operational phase of the development (permanent as per the life span of the wind farm). Mast components will be brought to site using 4x4 vehicles and thus no specific site entrance or access track construction works are required.

3.4.8 Temporary Construction Compound

During the construction period, a temporary construction compound will be required. The compound will be located along the proposed main arterial access track in the townland of Drumacreeve (see planning application drawings) and will have an approximate area of 4,750m^2 (0.47 hectares) comprising:-

- Temporary cabins to be used for the site office, the monitoring of incoming vehicles and temporary welfare facilities for the construction staff, including temporary toilets and potable water;
- Parking for construction staff, visitors and construction vehicles;
- Secure storage for tools, plant and small parts;
- Waste management area where waste will be sorted and collected by a licensed service provider;
- Safe bunded storage of components and materials including fuels, lubricants and oils; and
- Security fencing around the compound.

Temporary portaloo chemical toilets to be provided for construction staff will be sealed units to ensure that no discharges escape into the local environment. These will be supplied and maintained by a licensed supplier. Potable water (for drinking, food preparation, hand washing etc.) will be supplied on-site by water dispensers and this will also be sourced and maintained by a licensed supplier.

The construction compound will be marked out and fenced to prevent encroachment onto non-designated areas. Following the completion of all

construction activities, the compound will be decommissioned with all structures removed and fully re-instated. Reinstatement will involve removing crushed stone and underlying geotextile, covering with topsoil and reseeding.

3.4.9 Micrositing

The immaterial micrositing of turbines, access tracks and other elements of the proposed development, following post-consent detailed site investigations and geotechnical analyses, also forms part of the proposed development.

A micrositing allowance of 20m in any direction is proposed for wind turbines in accordance with Section 5.3 of the Wind Energy Development Guidelines for Planning Authorities 2006. It is anticipated that the agreed tolerance micrositing distance will form a condition accompanying a grant of planning permission.

It is also proposed that hardstands, underground cables and access tracks may be micro-sited within the planning application boundary subject to compliance with the mitigation measures included in this EIAR.

These immaterial micrositing deviations have been incorporated, and fully assessed, throughout this EIAR, and will have no likely significant impacts on the substantive conclusions of this EIAR.

In accordance with mitigation measures outlined at **Chapter 10** (Cultural Heritage), micrositing will not be permitted for turbines T4, T6 and T7 should it result in turbines being located within 50m of the Recorded Monuments in their vicinity. The micro-siting of ancillary infrastructure, associated with T4, T6 and T7 will not be permitted within 10m of the Recorded Monuments in their vicinity.

3.5 Off-Site & Secondary Developments

3.5.1 Turbine Delivery Route

Detailed consideration has been given to a number of alternative turbine delivery haul route options to the site as part of the EIAR process (see **Chapter 2**) while a detailed appraisal of the most likely haul route is provided in **Chapter 13**. While the final selection of a precise haul route will be dependent on the chosen turbine supplier and the port of entry, it has been determined most likely that turbine components will enter via Dublin Port. It is envisaged that the turbines will then be transported from Dublin Port by specialised Heavy Goods Vehicles (HGVs) for the transport of turbine components by way of the M50, M1, N33, N2, R937, N54, R162, R188, R183 and R189 before accessing the site via a new arterial access track within the subject site.

The environs of the proposed development site is relatively well served by the public road network. However, many of the local roads in the vicinity are not of a sufficient horizontal or vertical alignment to accommodate the transport of large turbine components. Accordingly, constructing a new off-road arterial access track from the R189 is considered the only feasible option to deliver turbine components to the subject site.

In order to facilitate the delivery of turbine components, however, upgrade works will be required at various locations between Dublin Port and the main site entrance on the R189. A total of 18 no. locations have been identified where works to the public road will be required, 13 no. temporary works and 5 no. permanent works.

Dublin Port to Monaghan Town

From Dublin Port to Monaghan Town, the turbine delivery haul route follows motorways and national routes and, thus, no permanent upgrade works will be required. It will, however, be necessary to temporarily remove street furniture including road signs, bollards and street lighting and to undertake temporary works to existing roundabouts to accommodate oversized vehicle loads, including the temporary removal of vegetation. Further details of the required temporary works are included in a Site Access Study (see **Annex 3.4**).

The implementation and management of temporary works, which will be fully reinstated following the delivery of turbine components, will be agreed in advance with the relevant local authority prior to the movement of any abnormal loads in the form of a Traffic Management Plan and/or Road Opening License application, as is the normal course. Where mature vegetation is removed at any roundabout, it will be replaced with plants of a similar size/maturity to match existing growth.

Monaghan Town to the Subject Site

From Monaghan Town to the proposed main site entrance, the road network comprises regional roads which are generally capable of accommodating oversized loads. However, temporary works will be required at 4 no. locations and permanent works at 5 no. locations. Further details of these locations and works required are provided at **Annex 3.4**. As above, all temporary works will be fully reinstated to the satisfaction of the Local Authority.

Table 3.4 below details the locations and nature of permanent upgrade works along the proposed turbine delivery haul route (per **Annex 3.4**).

Location	Description of Temporary Roadworks
Location 12: Bend on R188 (Rakean Townland)	HGVs transporting turbine components will approach this left-hand bend from the north. Works will be required on the inside of the bend to facilitate turning and will require removal of the inner bank and hedgerow to allow the blade to oversail and to accommodate the HGV swept path. Stock proof fencing will be erected and the excavated area will be reinstated with granular material but, at the Municipal District Office's request, will not be surfaced with tarmacadam. The Municipal District Office has also requested that the inner bank is not reinstated and upgrade works be retained as it will result in an improvement to road safety.
Location 13: Bend on R188 (Rakean Townland)	HGVs will approach this right-hand bend from the north. Road widening will include the removal of a bank to the north of the bend to facilitate the trailer wheels while hardcore will be placed to the south of the bend to accommodate the HGV swept path. Following the completion of component deliveries, hardcored areas will be reinstated with excavated material and reseeded where appropriate.
Location 15: Vertical Crest on R188 (Lismagonway Townland)	Due to the nature of this crest on the road, some vertical alignment works will be required to allow the turbine components pass safely. It is proposed to reduce the vertical profile of the crest by up to 450mm across a distance of up to 50m. The carriageway will be topped with tarmacadam and finished, to the requirements of the Local Authority.
Location 17: Bend on R183 (Aghadrumkeen	HGVs will approach this junction from the east. It will be necessary to remove the hedgerow on the inner bend to facilitate the turbine

Townland)	blades. Stock proof fencing will be erected and the excavated area will be reinstated with granular material but will not be surfaced with tarmacadam. The Municipal District Office has also requested that the inner bank is not reinstated and upgrade works be retained as it will result in an improvement to road safety.
Location 20: Bend on R189 (Newbliss Townland)	HGVs will approach this left-hand bend from the north. Works will include the removal of road signs, trimming of trees to northwest of public road, removal of 1 no. tree on inner bend, and the temporary placing of hardcore to ensure sufficient road running width. Additionally, an existing bridge parapet wall will be temporarily removed / lowered to allow the turbine blades to oversail. Following the completion of component delivery, all hardcore areas will be reinstated and the bridge parapet wall will be re-constructed.

Table 3.4: Permanent Haul Route Upgrade Works

Upgrade works are also proposed to the L62012 and L62013 local roads which are located within the proposed development site. Each carriageway is largely unpaved at present and in poor condition. These public roads will provide access from the main arterial access track (and T7) to turbines T1-T6 and T8. Upgrade works will comprise the widening of the carriageway running width to up to 5m to accommodate construction traffic and abnormal loads. The carriageway structure will be formed, and subsequently paved, using materials approved by the Local Authority and carried out to the required specification. At certain locations along these roads, hedgerow and banks on the inner bend of corners will also be removed to accommodate abnormal loads. Following construction, all hedgerows requiring removal will be replaced in an appropriate manner to ensure continued road safety. Construction Method Statements for the proposed temporary and permanent works at each location will be prepared prior to the commencement of construction and agreed, in writing, with the Local Authority.

During the delivery of turbine components to site, all HGVs will be accompanied by escort vehicles. An Garda Síochána will also be informed prior to turbine component transportation as, due to proposed HGV manoeuvres (contra-flow and reversing), it will be necessary to temporarily close junctions as the components pass through.

3.5.2 Aggregates Sources & Construction Materials Haul Route

Where construction materials and aggregates cannot be sourced on-site from construction excavations, they will be obtained from local quarries/suppliers. Only fully licensed quarries which have been subject to EIA and have appropriate planning permission for the volumes of material to be extracted will be used. These aggregates are slated for extraction in the normal course of the relevant quarry's business and therefore will have no additional likely significant environmental impacts above and beyond those normally entailed in the operation of the quarry.

Candidate quarries, which may be selected to supply materials following a competitive tendering process, are identified at **Annex 2.5** and the likely haul routes to the proposed development site indicated. Suppliers will be instructed to utilise the extensive regional road networks in counties Cavan and Monaghan to access the site (via main site entrance on the R189) and to avoid local roads insofar as possible. Further details of the construction materials haul route and vehicle volumes are provided in **Chapter 13**.

3.5.3 Substation & Grid Connection

The Wind Energy Development Guidelines for Planning Authorities 2006 state that:-

> *"it is not always possible due to reasons outside the applicants control to provide details of the grid connection and in these instances details of indicative and feasible options for grid connection lines and facilities should in general be adequate for a planning authority to consider a wind energy application as the precise capacity required for connection will not be known until planning permission is obtained."*

However, a High Court judgement of December 2014 (*O'Grianna & Ors v An Bord Pleanála*) determined that, for the purposes of EIA, the grid connection cannot be separated from the balance of a project, and therefore the cumulative effect of both the wind farm and its grid connection must be assessed in order to comply with the EIA Directive. It should be noted that the *O'Grianna* case does not require that the proposed development and its connection to the national grid be part of a single planning application, but assessed in a single EIAR.

The point of connection to the national grid will ultimately be decided by Eirgrid or ESB Networks, as the independent electricity Transmission System Operator (TSO) with statutory competent responsibility. The precise means of connection will be dependent on a range of factors and at the discretion of the TSO. However, as set out in **Chapter 2**, on the basis of detailed analysis, including an assessment of the existing grid network, grid capacity in the region and discussions with Eirgrid, 3 no. grid connection alternatives have been identified as follows:-

- **Option G1:** Construction of a 38kV substation on the proposed development site and installation of a 38kV part overhead electricity line (OHL) and part underground electricity line (UGL) to the existing Clones 38kV substation on the national grid, which lies approximately 5km to the northwest;
- **Option G2:** Construction of a 38kV substation on the proposed development site and installation of a 38kV OHL to the existing Shankill 110kV substation on the national grid, which is located approximately 16km to the southwest; and
- **Option G3:** Construction of a 110kV substation approximately 500m to the south of the nearest turbine and connection to the existing Lisdrum to Shankill 110kV overhead line by way of approximately 500m of UGL and the erection of 2 no. strain towers.

An assessment of all 3 no. options has been included in this EIAR in accordance with the *O'Grianna Judgement*. All three options will remain open until such time as direction is provided by Eirgrid/ESB. The final selected grid connection option will be subject to a separate future planning application. Site location and route drawings of each of the grid connection options are provided at **Annex 2.3** and further details provided below.

(i) Option G1: 38kV On-site Substation and OHL/UGL to Clones 38kV substation

The 38 kV substation, to be located in the townland of Crossbane, will contain connection points and associated equipment such as incoming and outgoing circuit breakers, earth fault, protection devices, the grid transformer, metering equipment, computer and server. For safety and security reasons, the substation would be enclosed by a steel palisade fence of up to 3m in height and screened with landscaping.

The proposed substation (switchroom & compound) would extend to an area of c. 1,058m^2. The switchroom would comprise a single storey building, constructed of blockwork and finished in sand and cement render, slate roof covering and steel doors. The substation would also require the installation of a short section of underground cabling to connect to the proposed wind farm underground electricity cables. These works would be similar to those outlined at **Section 3.3.6**.

The switchroom will also contain welfare facilities for staff during the operational phase of proposed development. The substation will not require a dedicated water source due to infrequent use and the low volumes that will be required (toilet facilities and hand washing). Accordingly, the switchroom design will incorporate a rainwater harvesting system. Wastewater from the switchroom will be stored in a sealed tank and will be tankered off-site as required by a local licensed waste collector. Water supply and waste water management proposals of this nature are common practice for wind farm developments.

The proposed electricity grid connection will comprise a predominately overhead line (OHL) over a distance of c. 5km to the Clones substation, with short sections of underground line (UGL) at either end to facilitate connection to the respective substations. OHL infrastructure of this nature comprises a simple 'pole and wire' arrangement with 3 no. electrical lines suspended from wooden poles.

Various pole designs, which are commonplace in the Irish landscape, will be used in the construction of the OHL. The construction methodology requires a c. 2.5m deep excavation, by mechanical digger, which will be reinstated with excavated material following the erection of the poles. The locations of poles are highly flexible and can be microsited to account for the presence of any localised issues along the route.

The full suite of pole sets which could be used are detailed at **Annex 3.5** and described below.

- Type A Single Intermediate Pole: This structure consists of a single wooden pole with a 4m cross-arm holding conductors horizontally 2m apart. Pole lengths range from 12 to 16m and are buried to a depth of 2.3m. The precise pole height will be dependent of ground conditions and terrain, but will not exceed 16m.
- Type B Intermediate Portal Suspension Structure & Portal Strain Structure: This structure consists of 2 no. wooden poles 2m apart with a 4m cross-arm holding conductors horizontally 2m apart. Pole lengths range from 12m to 16m and are buried to a depth of 2.3m. The precise pole height will be dependent of ground conditions and terrain, but will not exceed 16m.
- Type C Light Angle Suspension Structure & Light Angle Strain Structure: This structure consists of 2 no. wooden poles 2m apart with a 4m cross-arm holding conductors horizontally 2m apart. Pole lengths range from 12m to 16m and are buried to a depth of 2.3m. The OHL route can be deviated by up to 20° using these structures. The precise pole height will be dependent of ground conditions and terrain, but will not exceed 16m.
- Type D Heavy Angle Portal Structure: This structure consists of 2 no. wooden poles 2.5m apart with a 4m cross-arm structure holding conductors 2m apart. Pole lengths range from 12m to 16m and are buried to a depth of 2.3m. This structure also includes 2 no. stay wires extending from the cross-arm at 45° to facilitate deviations in the OHL route of up to 60°. The precise pole height will

be dependent of ground conditions and terrain, but will not exceed 16m.

- Type E Three-Pole Structure: This structure consists of 3 no. wooden poles 2m apart with a 4m cross-arm holding conductors horizontally 2m apart. Pole lengths range from 12m to 16m and are buried to a depth of 2.3m. This structure facilitates the transfer of the transmission line from UGL to OHL. The structure also includes 3 no. stay wires (1 no. per pole) extending from each pole at 45°. The precise pole height will be dependent of ground conditions and terrain, but will not exceed 16m.

The installation of UGL is required at either end of the OHL to facilitate connection to the respective substations. The UGL will be installed in pre-laid ducts, located within an excavated trench. The UGL will be of a solid polymeric construction with either aluminium or copper conductors. Cable installation trenching will be by a mechanical digger, with full reinstatement of the top layer to its original wearing course (where located in public road) or with excavated topsoil and reseeded (where located in private lands).

Ducts would be laid in a granular bed and backfilled with surround material in accordance with ESB Networks' *Functional Design Specifications for 38kV Overhead Lines*. The required depth of the trench would be approximately 1.2m and the width of the cable trench would be 0.6m. Once the ducts are installed, the electrical cables would be pulled through. An elevation drawing of a typical 38kV UGL trench is provided at **Annex 3.6**.

(ii) Option G2: 38kV On-site Substation and OHL to Shankill 110kV substation

The proposed 38kV substation, to be located in the townland of Lislongfield, will be of an identical design and scale as that outlined for Option G1 above. The design of the electricity line (both OHL and UGL) will also be similar to that described above, requiring similar structures, and will extend to a distance of c. 16km.

(iii) Option G3: New 110kV 'Loop In/Loop Out' Substation

The existing Lisdrum to Shankill 110kV OHL is located c. 1km to the south of proposed turbine T7. This grid connection option would involve the construction of a 110kV 'loop in-loop out' substation in the townlands of Cornawall and Drumanan. The substation would be connected to the proposed wind farm via low-voltage underground cabling located within the carriageway of the L62013 public road. The construction methodology would be similar to that outlined at **Section 3.3.6**.

The proposed 110kV substation (including 1 no. switchroom, 1 no. control building and compound) will extend to an area of c. 14,100m^2. The switchroom building would be c. 95m^2 with an overall height of up to 5m; while the control building would extend to c. 375m^2 with an overall height of up to 5m. The substation would contain connection points and associated equipment such as incoming and outgoing circuit breakers, earth fault, protection devices, the grid transformer, metering equipment, computer and server. The switchroom and control buildings would be constructed of blockwork and finished in sand and cement render, blue/black slate roof covering and galvanised steel doors.

The switchroom will also contain welfare facilities for staff during the operational phase of development. The substation will not require a dedicated water source due to infrequent use and the low volumes that will be required (toilet facilities and hand washing) and thus the switchroom design will incorporate a rainwater

harvesting system. Wastewater from the switchroom will be stored in a sealed tank and will be tankered off-site as required by a local licensed waste collector. Water supply and waste water management proposals of this nature are common practice for wind farm developments. For safety and security reasons, the substation would be enclosed by a steel palisade fence of up to 3m in height and screened with landscaping to reduce visual impact.

From the substation, a 110kV UGL will be located within the carriageway of the L62013 and across private lands to the existing 110kV OHL. At this location, the OHL will be 'broken into' and the UGL will connect. This connection will be facilitated by 2 no. strain towers of up to 16m in height. Once the connection has been made, electricity being transmitted on the existing OHL will loop through the 110kV substation thus facilitating the export of electricity from the wind farm to the national network.

Figure 3.7: Typical 110kV substation

3.6 Construction Phase

The construction phase is likely to last for approximately 12-18 months from commencement of detailed site investigations through to the installation and commissioning of the turbines and ending with site reinstatement and landscaping.

The construction phase of the development will comprise a 6 no. day week with normal working hours from 07.30 to 20.00 Monday to Friday and 07.30 to 18.00 on Saturdays. It may be necessary to undertake works outside of these hours to avail of favourable weather conditions (e.g. during time of low wind speed to facilitate turbine erection etc.) or during extended concrete pours (e.g. where turbine foundation pours must be completed within 24 hours). Where construction activities

are necessary outside of the normal working hours, local residents and the Planning Authority will receive prior notification.

No construction works are envisaged during the operational phase. Works during this phase will typically involve the routine inspection and servicing of the turbines and ancillary structures, as necessary. In exceptional circumstances there may be a requirement for more substantial works e.g. replacing a turbine blade, or gearbox/generator replacement. Intermittent maintenance of the wind farm site will be undertaken as necessary, including access tracks, hardstandings and substation.

Further details of the construction phase and specific mitigation measures to be implemented are provided in each chapter of this EIAR as they relate to each environmental topic.

3.6.1 Construction Method

The construction method will consist of the following general sequence:-

- The construction of the site entrances, ensuring that requisite traffic visibility splays are provided;
- Upgrade works to the L62012 and L62013 will be commenced;
- Progressive construction of internal on-site access tracks;
- Construction of the temporary construction compound for off-loading materials and equipment, and to accommodate temporary site offices;
- Construction of bunded areas for oil, fuel and lubricant storage tanks;
- As the internal access tracks progress to each turbine location, foundation excavations for the turbines will commence and foundations laid. The hardstanding areas will be constructed as track construction advances;
- The selected substation and grid connection option will be commenced;
- Upgrade works along the turbine component haul route will be commenced;
- Once the on-site access tracks are completed, the trenching and laying of underground cabling will begin;
- Installation of turbines will commence once the on-site access tracks, hardstands, foundations and drainage measures are in place and the road upgrade works are complete. It is anticipated that each turbine will take approximately 1 no. week to install. Two cranes will be used for this operation. As each turbine is completed, the electrical connections will be made;
- Decommissioning of the temporary meteorological mast and installation of the permanent meteorological mast will then take place; and
- Progressive site reinstatement, restoration and landscaping including removal of temporary construction compound and turbine storage areas; erection of post-and-wire fencing around turbines, access tracks and at site entrances; and erection of gates and vegetation at site entrances.

Once the turbines are installed, the substation and electrical system completed, the turbines will be tested and commissioned.

A detailed Construction & Environmental Management Plan (CEMP) will be prepared in advance of all construction activities and will incorporate all mitigation measures proposed in this EIAR. An outline CEMP has been prepared and is provided at **Annex 3.7**.

The construction phase will be supervised by a range of environmental and engineering specialist personnel including a Project Supervisor for the Construction Stage (PSCS), Ecological Clerk of Works (ECoW), Archaeological Clerk of Works

(ACoW), among others, who will liaise closely with the appointed Contractor's on-site Environmental Manager to monitor and to ensure that all applicable measures are implemented. The detailed CEMP, which will incorporate further technical information following the undertaking of post-consent detailed design, will be submitted to the Planning Authority for approval prior to any works commencing on the proposed development site. The CEMP shall also provide additional details of intended construction practices including:-

- Specific design details of the temporary construction compound including identification of areas for the storage of construction waste, site offices and staff facilities;
- A detailed Traffic Management Plan for the timing and routing of construction traffic to and from the construction site and associated directional signage, to include in particular proposals to facilitate and manage the delivery of oversized loads and alternative arrangements to be put in place for pedestrians and vehicles in the case of the temporary closure of any public road or footpath during the course of site development works;
- Implementation stage details of the proposed construction methods, including detailed measures regarding the management of spoil at the dedicated deposition areas, certified by a suitably qualified civil engineer;
- Specific measures to prevent the spillage or deposit of clay, rubble or other debris on the public road network;
- Details of appropriate measures for construction stage noise, dust and vibration, and any monitoring of such levels;
- Storage and containment of all construction related fuel and oil within specially constructed bunds to ensure that fuel spillages are fully contained. All such bunds shall be roofed to exclude rainwater;
- Appropriate provision for re-fuelling of vehicles;
- Off-site disposal of construction/demolition waste and construction-stage details of how it is proposed to manage excavated soil:
- Detailed design measures to ensure that surface water run-off is controlled such that no silt or other pollutants enter watercourses in full compliance with the measures outlined in this EIAR; and
- Further details of the intended hours of construction.

The CEMP will also take full cognisance of and incorporate the measures outlined within any specific environmental management plans proposed as part of this EIAR and will also incorporate any specific requirements set out in conditions of consent, subject to a grant of planning permission.

3.6.2 Site Entrances

Given the pre-existing extensive local road network in the vicinity of the proposed development site, 11 no. site entrances are proposed, 3 no. of which are already in existence and will be upgraded. The 8 no. proposed entrances and 3 no. entrances to be upgraded will be of sufficient width to facilitate turbine delivery and to provide adequate traffic visibility splays, and may involve the removal of short sections of road boundaries and hedgerows. At the site entrance adjacent to the proposed temporary compound, in the townland of Drumacreeve, it is proposed to 1 no. small abandoned agricultural building to ensure visibility splays can be provided.

All drains will be appropriately culverted to ensure there is no likely significant impact on any existing drainage features. Following the delivery of turbine components, the

scale of site entrances will be reduced but will be reinstated such that they remain capable of accommodating abnormal loads in the event of a major component change-out during the operational phase of development. The reinstatement of site entrances will comprise the erection of post and rail fencing, gates and the planting of hedgerows. Hedgerows will be appropriately located to allow for future growth while ensuring, at all times, that appropriate visibility splays are maintained during the operational phase.

3.6.3 Hardstanding Areas and On-Site Access Tracks

The areas of hardstanding for crane operations and on-site access tracks will generally be constructed as follows:-

- Topsoil and subsoil will be removed and stored in separate mounds in appropriate areas adjacent to the crane site/access tracks;
- Crushed stone will be laid on a geo-textile mat (where required) and compacted in layers to an appropriate depth;
- Where access tracks are required to cross any drainage ditches, these will be piped and spanned with an appropriate bridging structure. Where access tracks cross a watercourse, bottomless culverts will be installed (where possible) to prevent any interference with the hydraulic capacity of the watercourse; and,
- Areas of temporary hardstanding (for turbine component storage and crane assembly) will be reinstated following the construction phase by removing aggregates, replacing the excavated spoil and reseeding. The crane hardstandings and on-site access tracks will be retained during the operational phase to facilitate access for maintenance personnel and in the event of a major component change-out.

3.6.4 Temporary Construction Compound

Topsoil will be removed from the required area and side cast for temporary storage adjacent to the compound area. The compound base will be made up of well graded aggregates, compacted as necessary. A designated waste management area and fuels and chemicals storage area will be provided along with site offices, parking, staff welfare facilities and equipment storage areas. The compound will be fenced with temporary security fencing to restrict access. Following the completion of the construction phase, the temporary construction compound will be fully removed and the compound will be reinstated with excavated material and reseeded.

3.6.5 Construction Drainage Management & Disposal

Construction works will be carried out in accordance with the 'Land & Soil' and 'Water' assessments and mitigation measures included in this EIAR in order to prevent any likely significant impacts on nearby watercourses by debris, silt and oils (see **Chapters 6** & **7**). Sources for likely significant effects on the hydrological environment during construction include increased volumes of surface water runoff; the generation of silt laden surface water runoff from excavations and the temporary storage of stockpiled materials; potential for surface water and groundwater contamination due to leakage oils/fuel from site vehicles; spillage during refuelling operations; and leakage from chemical, waste and fuel storage areas.

Specific mitigation measures are presented in the relevant chapters of this EIAR in relation to each of these issues. The precise implementation and siting of these measures will be determined, subject to planning permission being granted, following the post-consent detailed design process and will be included within the CEMP to be agreed with the Planning Authority prior to the commencement of construction.

During the construction phase, temporary stockpiles of excavated materials will be stored appropriately in designated areas of the site (a minimum of 50m from nearby watercourses or drains), in order to minimise the risk of silt laden surface water runoff entering surrounding water courses. All surface water runoff from stockpiles, excavations or from dewatering operations will be passed through an appropriate attenuation mechanism, such as a silt trap or stilling pond. Other surface water protection measures which may be implemented as appropriate include silt fences, silt bags and siltbusters. Silt or sediment laden waters will not discharge directly to any surface water features and will be appropriately attenuated before being discharged in a manner which ensures that erosion does not occur, for example via buffered outfalls.

3.6.6 Chemical Storage and Refuelling

Storage areas for oils, chemicals and fuels will comprise bunded areas of hardstand of sufficient capacity within the temporary construction compound. Bunds will have a watertight roof structure and will be supplied by a licensed manufacturer to enable adequate safe storage for the quantities of material required. An adequate supply of spill kits will be readily available in order to clean up any minor spillages should they occur. A hydrocarbon interceptor will be installed within the surface water drainage system during the construction phase to trap any hydrocarbons that may be present. A 50m buffer will be observed around all surface water features and no fuel/chemicals shall be handled or stored within this zone.

From the construction compound, fuel will be transported to works area by a 4x4 in a double skinned bowser with drip trays under a strict protocol and carried out by suitably trained personnel. The bowser/4x4 will be fully stocked with spill kits and absorbent material, with delivery personnel being fully trained to deal with any accidental spills. The bowser will be bunded appropriately for its carrying capacity. As above, a 50m buffer will be observed around all surface water features and no refuelling will be permitted within this zone.

3.6.7 Construction Waste Management

Waste will be generated during the construction phase and the main items of anticipated construction waste are as follows:-

- Hardcore, stone, gravel, concrete, plaster, topsoil, subsoil, timber, concrete blocks and miscellaneous building materials;
- Waste from chemical portaloo toilets;
- Plastics; and
- Oils and chemicals.

Waste disposal measures proposed include:-

- On-site segregation of all waste materials into appropriate categories including, for example, topsoil, bedrock, concrete, bricks, tiles, oils /diesels, metals, dry recyclables e.g. cardboard, plastic, timber;

- All waste materials will be stored in skips or other suitable and sealed receptacles in a designated area of the construction compound;
- Wherever possible, left over materials (e.g. timber off-cuts) and any suitable demolition materials shall be re-used on-site;
- Uncontaminated excavated material (rock, topsoil, sub-soil, etc.) will be re-used on-site in preference to importation of clean inert fill;
- Bedrock may be encountered during foundation excavation. If bedrock is encountered it will be utilised for infill during construction;
- All waste leaving the site will be transported by permitted contractors and taken to suitably licensed or permitted facilities and will be recycled, recovered or reused, where possible; and
- All waste leaving the site will be recorded in accordance with legal requirements and copies of relevant documentation maintained.

3.6.8 Construction Employment

It is estimated that up to 120 no. people will be employed during the 12-18 month construction phase. The actual number will depend on the activities being undertaken at any given time and will vary throughout the course of the construction programme. Employment will be the responsibility of the construction contractor but it is likely that the workforce will include labour from the local area.

3.6.9 Construction Traffic

Vehicular traffic required for the construction phase is likely to include:-

- Articulated trucks (HGVs) to bring initial equipment onto site and later to bring the turbine components, electrical cables, steel reinforcement for foundations, anemometer mast, and ancillary equipment;
- Tipper trucks and excavation plant involved in site development and excavation works;
- Cranes to erect the turbines;
- Miscellaneous vehicles and handling equipment, including vehicles associated with construction workforce.

Likely significant impacts from construction traffic could include temporarily increased local traffic levels and traffic noise. Construction traffic on the local road network will be managed in accordance with a Traffic Management Plan and the requirements of the Local Authority. This may include the installation of temporary road signage and traffic lights, as appropriate. Noise arising from construction traffic would be localised, temporary and of a short term duration.

Deliveries of turbine components will take place at times to avoid peak traffic periods, and are likely to occur during night-time hours. All abnormal loads will be accompanied by an advance escort vehicle. Once the turbines are operational, the traffic movements will be greatly reduced to, on average, once/twice per week by a light commercial vehicle for maintenance purposes. There may be an occasional need to replace some turbine components but these are unlikely to be frequent.

Traffic mitigation measures will be implemented during the construction phase, as follows:-

- Signage at site entrances giving access information;
- Temporary traffic restrictions kept to minimum duration and extent;

- Diversions put in place to facilitate continued use of roads, where restrictions have to be put in place;
- Construction traffic management – one way systems where possible and strictly enforced speed limits;
- Provision of a designated person to manage access arrangements and act as a point of contact to the public;
- All temporary road alterations and public road upgrades to be carried out in full consultation with the Local Authority; and
- No hedgerows or potential breeding habitats to be removed during the breeding season.

3.7 Operational Phase

The proposed operational phase of the development is 30 years. During this period the wind turbines will be operational and, other than routine maintenance and monitoring, there will be no other activities on site and agricultural activities can continue as normal. On average the proposed development will be serviced once/twice per week by a light commercial vehicle for maintenance purposes. In exceptional circumstances there may be a requirement to replace a turbine component, which would require more substantive works on site.

Waste will be generated during the operational phase including, for example, cooling oils, lubricating oils and packaging from spare parts or equipment. All waste will be removed from site and reused, recycled or disposed of in accordance with best-practice and all regulations in a licensed facility.

Further details on the operational phase and specific mitigation measures are provided in each chapter of this EIAR as they relate to each environmental topic.

3.8 Decommissioning Phase

The proposed operational phase of the development is 30 years. At the end of this period several options will exist:-

- Continued operation of the existing turbines;
- Refurbishment/replacement of the turbines and continued operation; and
- Decommissioning of the wind farm.

Any further operation beyond 30 years would be subject to a further planning application and EIA. In its scope, this EIAR assumes full decommissioning of the proposed development will take place after 30 years. All structures above ground level shall be demolished and removed from the site for reuse/recycling; however, access tracks are likely to be retained for continued use by landowners for agricultural purposes.

A Decommissioning Management Plan will be agreed with the Local Authority in advance of decommissioning works. Further details on the decommissioning phase and specific mitigation measures are provided in each chapter of this EIAR as they relate to each environmental topic.

3.8.1 Wind Turbines

Wind turbines are comprised of the tower, nacelle and blades which are modular items that can be disassembled. This will involve a process which will be similar to the construction phase, but in reverse. If the turbines are to be sold on or reused elsewhere they shall be removed from site by specialist vehicles similar to those used

during their transportation to site. If wind turbine components are not to be reused then they shall be scrapped. This shall involve the removal of all components to an approved waste handling/recycling facility where components will be sorted according to their material of construction. Turbine components are mainly inert steel/ferrous metals which can be reused or recycled.

3.8.2 Turbine Foundations

Wind turbine foundations shall be grubbed up to a depth of 1m below ground level using conventional mechanical diggers. Exposed rebar and holding down bolts shall be burned off and removed off site to an approved waste handling facility for recycling or disposal. The broken concrete can be processed to provide an aggregate material to be used elsewhere in construction projects. Alternatively it may be used on site as an inert fill to make up levels as part of a wider decommissioning/restoration plan, reducing the need for the importation of additional soil onto the site. Excavations shall be backfilled with excavated material, soiled over and seeded out.

3.8.3 Hardstands & Access Tracks

Hardstands shall be grubbed up to a depth of 1m below ground level and the excavated material shall be used to regrade the hardstand area to match existing ground contours and profile. Additional inert material derived from demolition in other areas of the site may be used if sufficient material is available. Once the area has been profiled to match the surrounding ground, 50mm of topsoil shall be spread over the reinstated area. This area shall then be seeded out. If it is decided not to retain the access tracks on site for agriculture purposes, then these shall be removed using a similar methodology.

3.8.4 Transformers & Cabling

The decommissioning of transformers will depend entirely on any future use of the wind turbine. If the turbine is to be used elsewhere, the transformer will be removed from site for refurbishment and future use. If the turbine is to be scrapped, the transformer will be removed to an approved waste handling/recycling facility and stripped of any useable parts with the remainder being recycling.

Excavations shall be carried out to expose any cables buried in trenches to a depth of 1m below ground level and the cable removed. The majority of cables used in wind farm construction contain a core of either copper or aluminium. Both of these materials can be recycled. Any cable off-cuts shall be removed off site to an approved waste handling facility where the cores shall be recycled and the remaining material shall be disposed of at an approved facility. Excavations carried out to expose cables shall be backfilled with excavated material, soiled over and seeded out.

3.8.5 Electrical Substation & Grid Connection

The precise decommissioning arrangements will depend on the substation and grid connection constructed. In the event that the 110kV substation and associated cabling is the method of connection selected by the TSO, the substation would be under the control of Eirgrid and would most likely remain *in situ*. Electrical cabling connecting the wind farm to the substation would be removed and reused or recycled.

If the method of connecting to the national grid is via a 38kV substation and electricity line to either Clones of Shankill, the decommissioning methodologies would be similar in both instances. The decommissioning of the substation will involve the strip-out and removal of steel, conductors, switches, transformer and other materials and equipment that can be reconditioned and reused or sold as scrap. A soft strip of the buildings shall ensure that all fixtures and fittings are removed prior demolition.

Demolition of the structures shall take place using conventional demolition methods. Foundations and building services shall be grubbed up to a depth of 1m below ground level. The demolition waste shall comprise mainly rubble (bricks, block, broken concrete, plaster etc.) and timber. Rubble can be processed to provide an aggregate material to be used elsewhere in construction projects. Alternatively, it could be used on site as fill elsewhere on the subject site.

Timber and other waste shall be segregated according to material type with a view to recycling where possible or disposal. All demolition materials which cannot be reused on site shall be removed off site to a licensed waste handling facility for recycling or disposal. Excavations shall be backfilled with suitable material, soiled over and seeded out.

Decommissioning of the grid connection will involve either the removal of OHL from wooden poles or UGL ducting, as applicable. The majority of cables used in wind farm grid connections contain a core of either copper or aluminium, both of which can be recycled. All cables will be removed from site to an appropriate licensed facility for recycling. Where wooden poles have been erected; these shall be removed from site and may be reused or recycled. Where UGL has been installed, the electricity cables would be removed for reuse or recycling while ducting will remain *in situ* to avoid the requirement for further excavations.

3.8.6 Meteorological Mast

The decommissioning of the meteorological mast will involve the removal of wind measuring equipment, the separation of the lattice mast sections and their removal from site for re-use in other projects or for recycling. The mast foundations shall be grubbed up to a depth of 1m below ground level and the excavated material shall be used to re-grade the area to match existing ground contours and profile. Excavations shall be backfilled with excavated material, soiled over and seeded out.

3.8.7 Monitoring

A monitoring period of two years immediately following the decommissioning and restoration activities will be implemented. The monitoring period allows for the subject site to experience seasonal changes and to determine if additional restoration works are required. If, during this time, any failure of works or reinstatements carried out were to occur, they shall be made good using similar methods as described above, or as agreed with the Local Authority.