Cush Wind Farm

Environmental Impact Assessment Report

Chapter 3: Description of the Project

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Contents

3.1 Introduction

The purpose of this chapter is to provide a description of the project in sufficient detail, which, when taken together with the descriptions of the existing (baseline) environment provided in each chapter of this EIAR, will allow an independent reader to understand the likely significant environmental effects.

The description considers the location of the project 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. The project described in this chapter was arrived at following the consideration of various reasonable alternatives described in **Chapter 2**.

Further descriptions of specific elements of the project 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 developments; the nature and quantity of materials and natural resources used; and the potential production of residues, waste, pollution, noise and nuisances.

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. The description of the project also addresses other off-site/secondary developments which occur as a direct result of the project, including, for example, the importation of materials and aggregates to facilitate construction of the project.

As described in **Chapter 1**, **Section 1.20**, not all elements of the project will be the subject of a single planning permission (development consent). This chapter should also be read in conjunction with the technical plans and drawings submitted with the relevant planning application.

3.2 Project Duration

The project will be commissioned in a single construction phase and the construction period is likely to last for approximately 15-18 months.

The operational lifespan of the project is proposed to be 35-years following its full commissioning. Any further operation beyond 35-years would be subject to a further planning permission and EIA. This EIAR therefore assumes that full decommissioning will take place 35-years after commissioning[1].

3.3 Site Location & Context

The project is located in rural County Offaly, approximately 4km north of the town of Birr and c. 28km south-west of Tullamore (see **Figure 3.1**) in the townlands of Cush, Galros West, Boolinarig Big, and Eglish. The proposed temporary haul route alteration works to the N52/562 junction at Kennedy's Cross are located in the townland of Ballindown, County Offaly. The project will have an overall site area of approximately 290 hectares (ha).

The N62 national secondary route bisects the project site and it is proposed to access

[1] A ten-year planning permission is being sought by the Developer i.e. full commissioning may be up to 10-years following a grant of planning permission.

the project from the N62 during the construction phase (see **Section 3.6.2** below).

The project site and surrounding topography are typical of the midlands region and comprise a generally flat landscape with occasional gentle undulations, with ground elevations ranging between 47m and 63m OD (Ordnance Datum). The most elevated section of the proposed project site is found along the eastern fringes where agricultural grassland rises up to 63m OD (met mast location). The ground slopes in a general westerly direction from this eastern section to the lowest point on the far west of the project site which follows the valley of the Rapemills River.

Current land use within the project site is made up predominantly of peat bogs, agricultural pasture/grassland and forestry[2], including commercial and woodland planting (of various species) and scrub[3]. Areas to the north and northwest of the project site comprise cutover private bog; areas to the east and west of the N62 exhibit commercial and woodland forestry plantation; and areas to the south and southeast are predominantly agricultural pasture. The wider landscape is characterised by large tracts of industrial cutaway peatlands and agricultural scrub; however, improved agricultural pasture is dominant in areas bordering the east and west of the project site.

The primary drainage feature within the project site is the Rapemills River which flows in a westerly direction through the southwestern portion of the site for c. 1.2km. The Rapemills River is deep (approximately 2m) with steep banks and up to 5m in width.

A tributary stream of Rapemills River, referred to as the West Galros Stream by the EPA emerges from forestry on the eastern portion of the project site, crosses the N62 and then merges with the Rapemills River close to the western boundary of the project site.

The underground grid connection (c. 5.6km in length) follows public roads for c. 4.7km with an off-road section through private lands (off-road) for c. 0.65km. Approximately 200m of the route is located within the wind farm site. The off-road section of the grid connection is through rough grassland/recolonising bare ground. The existing ESB owned Clondallow 110kV substation is located 1.7km to the southwest of the wind farm site.

Settlement patterns in the local area are typical of this part of Ireland, largely comprising dispersed rural dwellings often accompanied by attendant agricultural holdings and outbuildings. In total, there are 106 no. dwellings located within 2km of a proposed wind turbine.

[2] Forestry & woodland across the project site includes mixed broadleaved woodland, conifer plantation, and an area (south of T2) which includes bog woodland (non-Annex I) – full details on habitats found within the project site are provided in **Chapter 5**.

[3] See the Environmental Protection Agency's (EPA) 2018 Corine mapping database.

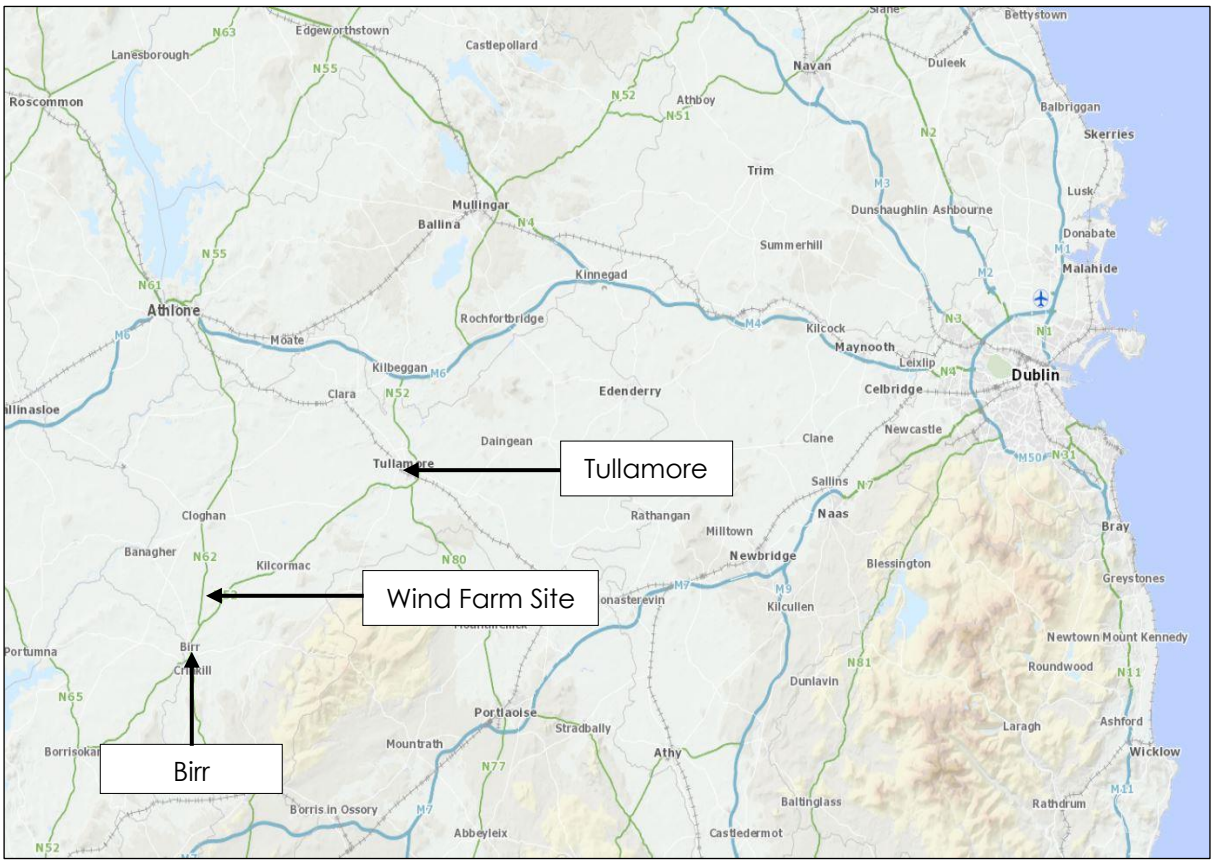

Figure 3.1: Project Site Location

Plate 3.1: General View Across the Project Site

3.4 Description of the Project

The project 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 hub height of 114 meters (m), a rotor diameter of 172m, and an overall tip height of 200m;

- All associated turbine foundations and crane hardstand areas;
- Wind farm control building incorporating a medium voltage switchgear room;
- All underground internal electrical and communications cabling;
- Provision of new internal site access tracks and use of, and upgrades to, existing agricultural/forestry tracks;
- Upgrade of 2 no. site entrances from the N62 national secondary road for use during the construction phase only;
- Upgrade of 2 no. site entrances from the L30033 and L300321 local roads, respectively, for the operation phase only;
- 1 no. guy-wired meteorological mast with an overall height of 30 metres;
- 2 no. temporary construction compounds;
- 3 no. dedicated spoil deposition areas for the storage, as required, of excavated material;
- Felling of up to 23 hectares (ha) of forestry to facilitate the construction and operation of wind farm infrastructure; and,
- All associated and ancillary site development, excavation, construction, landscaping and reinstatement works, including provision of site drainage infrastructure and environmental mitigation measures.

Off-site or secondary elements of the project which are included for assessment in this EIAR and are included in the current SID planning application, include:-

- Temporary alteration works to public roads along the turbine component haul route, including a vehicle turning area at the N52/N62 junction.

Off-site or secondary elements of the project which are included for assessment in this EIAR but are **not** included in the current SID planning application and will be subject to a separate licensing and/or consenting process, include:-

- A 110 kilovolt (kV) electrical substation and all associated electrical equipment, including 2 no. control buildings and battery electricity storage system;
- The installation of c. 5.6km of underground electricity cable to facilitate connection of the proposed electricity substation to the existing 110kV substation at Clondallow, County Offaly; and,
- The planting of 23ha of forestry on lands in the townlands of Drumagelvin, Drumleek South, Lisdonny and Moy, County Monaghan.

The location of the project is illustrated in **Figure 3.2** (see also **Annex 3.1**) below. Each element of the project is discussed in turn below.

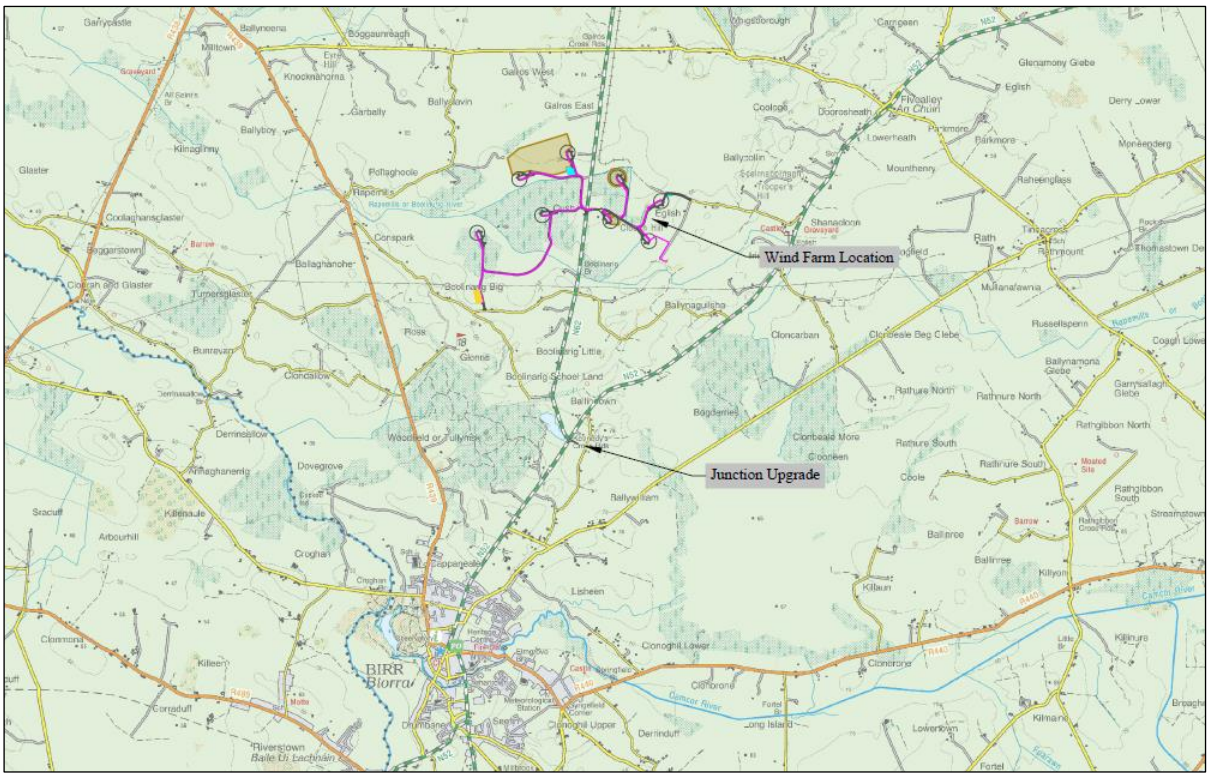

Figure 3.2: Layout of the Project

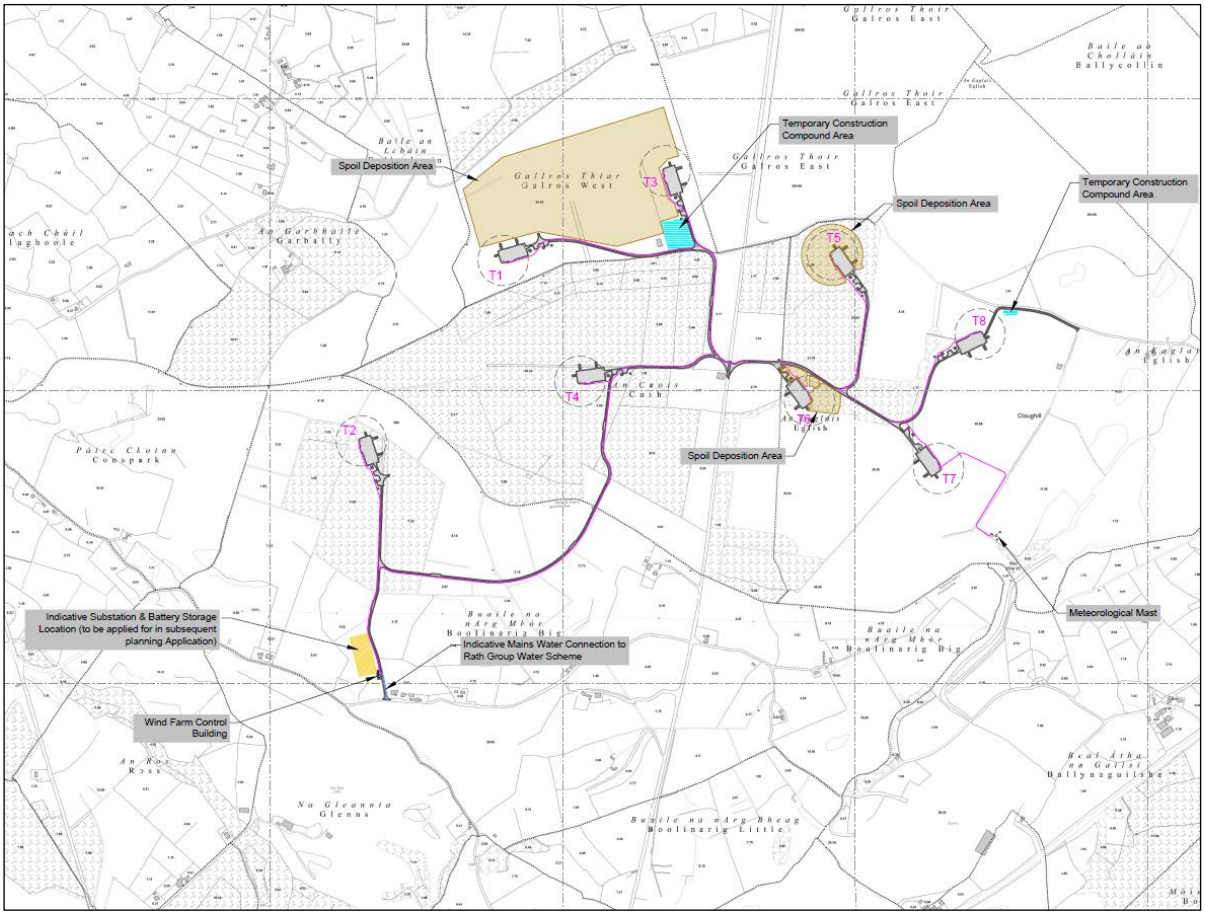

Figure 3.3: Proposed Project (Wind Farm) Site Layout (see also Annex 3.2)

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*	Overall Tip Height (m)	Approximate Ground Level (mAOD)
T1	606797	710446	200	47
T2	606312	709829	200	47
T3	607351	710753	200	48
T4	607060	710033	200	47
T5	607922	710465	200	47
T6	607844	709967	200	49
T7	608286	709735	200	52
T8	608427	710195	200	51

Table 3.1: Proposed Wind Turbine Coordinates, Overall Tip Heights & 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 an overall tip height of 200m. The rated electricity output for each turbine, based on the proposed turbine model selected, is 7.2MW, resulting in a total rated output of 57.6MW for the project.

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 otherwise determined by An Bord Pleanála. For information purposes, the typical components of a standard wind turbine are illustrated in **Figure 3.4**.

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 25m/s. At the cut-in speed the turbine begins to rotate and at the cut-out speed, the turbine will automatically shut down.

Each turbine will have its own electricity transformer, which will be located inside the turbine tower. 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 and on-site electrical cables will connect the turbines to the wind farm control building located adjacent to the southwestern boundary of the wind farm site for onward connection to the national electricity grid (see **Section 3.5.3**).

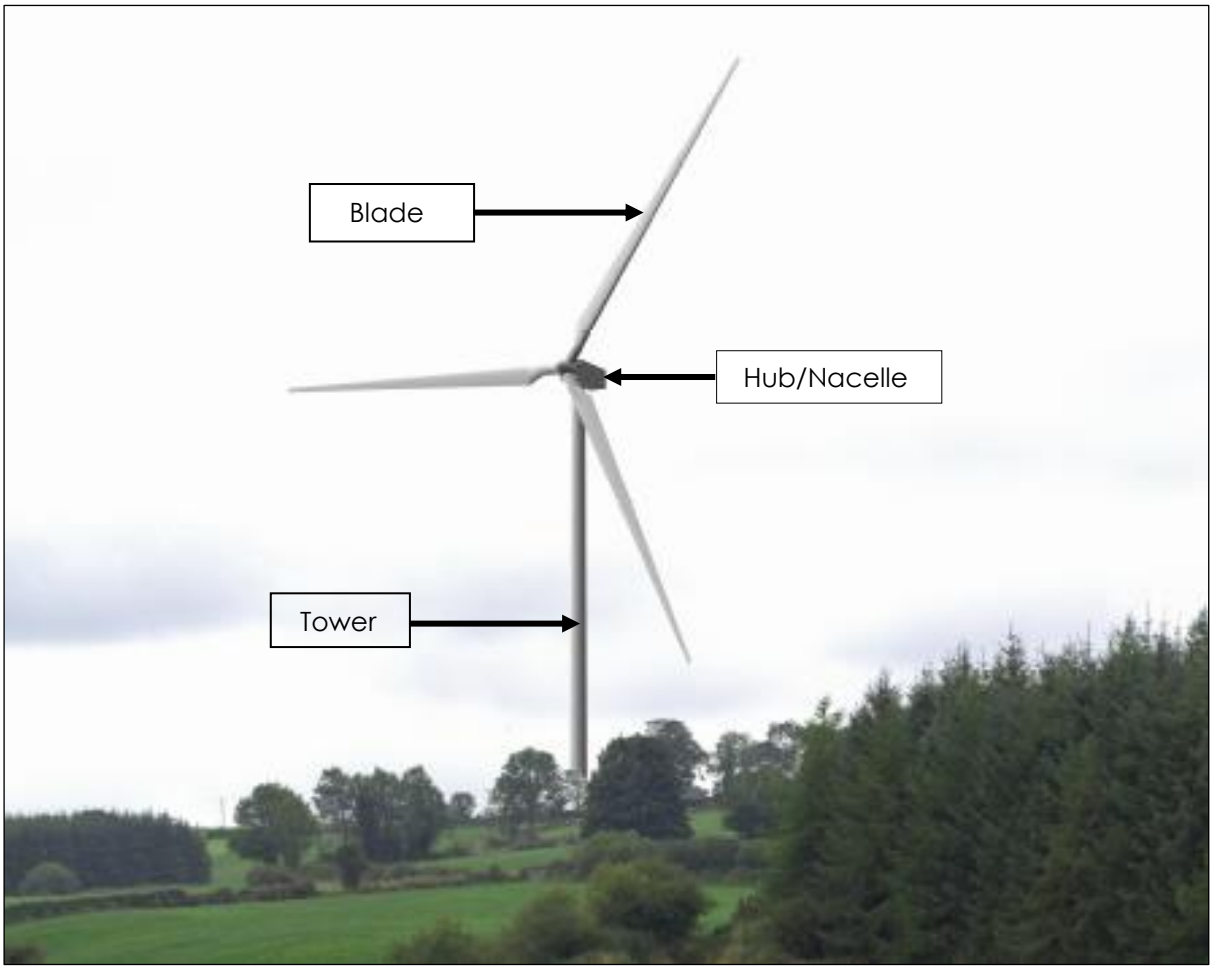

Figure 3.4: Typical Wind Turbine Components

Details of the proposed turbine model and dimensions are provided at **Table 3.2** below. A drawing of the proposed wind turbine model is provided at **Annex 3.3**.

Turbine Model	Output (MW)	Hub Height (m)	Rotor Diameter (m)	Overall Tip Height (m)
Vestas V172-7.2MW	7.2	114	172	200

Table 3.2: Proposed Turbine Model and Dimensions

Each assessment contained in individual chapters of this EIAR has therefore been undertaken on the basis of the proposed turbine model and dimensions, as set out above.

It is important to note, however, that turbine technology advances rapidly with component dimensions constantly changing to maximise efficiency. Furthermore, the process for securing planning permission and other subsequent consents can take a significant period of time. It may therefore be the case that, at the time of construction, the abovementioned proposed turbine model is no longer available in the market. Accordingly, while this EIAR assesses the likely significant environmental

effects of the proposed turbine model and its principal dimensions, as presented above, it also fully incorporates an assessment of any immaterial deviations thereof (in terms of hub height and rotor diameter). Any proposal to immaterially deviate from the above dimensions will be subject to a separate future consent process. Any such consent would be required to demonstrate that the deviations to the turbine model and dimensions are immaterial, including by reference to this EIAR and any conditions of planning consent.

3.4.2 Turbine Foundations

Each turbine tower is secured to a steel ring foundation which can comprise either a reinforced concrete (gravity) 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 standard 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 suitable for the construction of standard turbine gravity foundations (see **Chapter 6**, **Annex 6.1** and **Annex 6.2**); however, this will be confirmed during further post-consent investigations. Again, it is established EIA practice that such technical details may be left over for agreement post consent, on the provision that the results to be achieved by any mitigation measures are specified and the project cannot proceed unless those results are fully achieved (*People Over Wind & anor -v- An Bord Pleanála [2015] IEHC 271*).

The depth of excavation required for each wind turbine foundation will vary depending on precise ground conditions. The diameter of a standard gravity raft foundation will be c. 28.9m; whilst the diameter of a piled foundation would, if deemed to be required, be c. 22m. Foundation depths will range between 3m and 5m in depth, depending on ground conditions at each turbine location.

Excavations will be undertaken by conventional mechanical methods. No blasting will be required. The total volume of excavated material at each foundation, not including hardstand areas and access tracks, will be approximately 3,475m^3 depending on local ground conditions. Vegetation, topsoil, peat and subsoil removed during the construction of turbine foundations will be side-cast and 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, firstly, for reinstatement purposes elsewhere within the project site (e.g., landscaping of hardstands and access tracks) or, as required, deposited at the dedicated spoil deposition areas (see **Section 3.4.9.2** & **Annex 3.4**).

Once the turbine foundation has been excavated and the base fill emplaced, the bottom section of the tower, or 'can', will be 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. As described in **Section 3.5.2** 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 heavy goods vehicles (HGVs) hauling construction materials to the subject site (see **Chapter 13**) and associated emissions (see **Chapter 8**).

Figure 3.5: Typical Turbine Foundation

3.4.3 Turbine Hardstands

Hardstand areas shall be established adjacent to each turbine to facilitate crane operations for turbine erection, for occasional maintenance and final decommissioning. Each hardstand area shall typically be 96m x 45m for the construction phase and will consist of levelled and compacted (unsealed) hardcore. The location and precise alignment of the hardstands may necessitate some immaterial deviations in accordance with the micro-siting tolerance threshold (see **Section 3.4.10** below).

The crane hardstands will be retained *in situ* during the operational phase of the project to accommodate any subsequent crane activities in the event of a major component replacement (e.g. replacing a turbine blade or gearbox/generator) and during the decommissioning phase.

Temporary set down areas, also comprising levelled and compacted (unsealed) hardcore, 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 project 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 6.8km of on-site access tracks will be required for the construction phase and for site access during the operation phase. The vast majority of these access tracks (c. 5.6km) shall be newly constructed; however, the alignment will generally follow routes which are regularly trafficked for ongoing agricultural and forestry operations at the proposed development site. Approximately 1.2km of existing agricultural/forestry access tracks shall also be upgraded (re-surfaced) to accommodate construction traffic.

The proposed access tracks will be predominantly of a 'floating' construction type which, given the ground conditions and type of terrain present, is deemed an appropriate construction approach to minimise the need for excavation (see **Section 3.4.9**). This typically relies on the use of a layer of geotextile, or geogrid, onto which aggregate is spread. Approximately 5.6km of the proposed on-site access tracks will be of a floating construction type.

Where shallow peat is present (<1m), conventional 'excavate and replace' ('founded') access track construction methods will be used. A geotextile layer may be needed at some locations to avoid any subsequent vehicle access problems.

The access tracks shall be similar to normal agricultural tracks but with a slightly wider typical running width of approximately 5m (wider at bends to accommodate turbine component delivery vehicles). Access tracks will be unsealed and constructed of crushed stone aggregate material to allow for drainage permeability. It is proposed that access track capping aggregates (CL804) will be imported from local quarries (see **Section 3.5.2** & **Chapter 13**).

Some cut/fill in the construction of the access tracks will be necessary to ensure that horizontal and vertical alignments are suitable to accommodate abnormal HGV loads and to provide 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 the 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 excavated material arises, it will be utilised in the construction of trackside berms or disposed of at the dedicated spoil deposition areas (see **Section 3.4.9.2**).

Following the construction phase, access tracks, passing bays and turning heads that are not required during the operational phase will be reinstated, wherever possible. It is likely, however, that the majority of the tracks will be required during the operational phase for maintenance operations and will also be used as part of ongoing agricultural activities within the subject site.

The Rapemills River runs along the southwestern fringes of the site and a section of proposed on-site access tracks, between turbines T4 and T2, spans/crosses this section of the river. It is proposed to install an abutment on either side of the river, which will allow for full clear span of the river, negating the need for any in-river culvert structures. This abutment type crossing is proposed for all crossings across the project site and details of watercourse crossing(s) are provided at **Annex 3.4.** All proposed new stream crossings will be clear span bridges (bottomless culverts) and the stream beds

will remain undisturbed. No in-stream excavation works at the crossing locations are proposed.

Within the project site there are 3 no. proposed (new) watercourse crossings (1 no. on Rapemills, 1 no. on West Galros and 1 no. on minor watercourse west of T7/T8). There is 1 no. existing crossing proposed for upgrade on the West Galros Stream just southeast of the main construction compound. Where it is necessary for access tracks to cross watercourses and drains, the relevant bodies (e.g. Inland Fisheries Ireland, Office for Public Works (OPW)) will be consulted prior to construction. As appropriate, a Section 50 Licence application will be made to the OPW prior to the installation of structures over relevant watercourses[4].

Figure 3.6: Typical On-Site Access Track

[4] 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.

3.4.5 Site Entrances

During the construction phase, 2 no. temporary site entrances will be required to facilitate temporary access to the project site (wind farm), directly opposite each other on either side of the N62. The existing agricultural/forestry entrances at these locations will be upgraded in order to provide the construction phase entrances to the project. Each entrance will be appropriately designed to ensure all visibility splays (sightlines) are provided[5].

Following the construction phase, the specifications of the temporary construction phase site entrances will no longer be needed to accommodate abnormal-sized loads. These entrances will be fenced off and will only be used in rare occasions in the event of a major turbine component replacement during the operational phase of development (e.g. replacing a turbine blade or gearbox/generator) (see also **Section 3.6.2** below).

A further 2 no. site entrances, located along the L30033 and L300321 respectively, will be created to facilitate operational phase traffic. The provision of these entrances will also involve the upgrade of 2 no. existing agricultural access points. Both operational phase site entrances will also be constructed in accordance with the requirements of the Planning Authority regarding the provision of appropriate site visibility splays to ensure traffic safety[6].

A Road Safety Audit (RSA) has been prepared for the project (see **Annex 13.1**). The RSA has been undertaken at the site entrances (construction phase and operation phase) and at the temporary haul route alteration works at the N52/N62 junction**.** The RSA demonstrates that there will be no likely adverse effect on road safety arising from the site entrances or temporary haul route alteration works. A total of 7 no. design 'problems' were identified, and subsequently addressed within the project design, in order to ensure road safety was not compromised. A series of mitigation measures have also been provided within the RSA and included within the embedded design mitigation measures of the project as described in this EIAR at **Chapter 13**.

3.4.6 Meteorological Mast

A temporary meteorological (anemometry) mast currently exists within the project site for measuring wind speed and meteorological conditions. This mast is 80m in height and was installed in accordance with the provisions of Class 20A of Schedule 2, Part 1 of the Planning Regulations.

Planning permission has been granted, pursuant to Offaly County Council Planning Register Reference PL2/22/444, for its extension to 100m in height.

It is proposed that this mast will be removed and replaced with the permanent (permanent as per the lifespan of the wind farm) mast; the details of which are provided at **Table 3.3** below.

[5] Visibility onto National Road to be provided in accordance with TII Publication *Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated and compact grade separated junctions)* – DN-GEO-03060.

[6] Visibility splays will be provided in accordance with Section 13.9.11 (Transport and Infrastructure) – DMS 97 & DMS 98 of the *Offaly County Development Plan 2021-2027*.

ID	Easting*	Northing*	Overall Height (m)	Approximate Ground Level (mAOD)
Permanent Meteorological Mast	608483	709506	30	52.5

Table 3.3: Meteorological Mast Coordinates

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

The permanent mast to be installed will be 30m in height and will consist of a guy-wired 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 project; while the recorded data will also be utilised in the forecasting of electricity generation. 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.

Some ground works, including the construction of a concrete foundation and anchors, will be required to erect the proposed permanent mast. Mast components will be brought to site utilising the proposed access tracks and site entrances referred to at **Section 3.4.4** and **Section 3.4.5** above.

3.4.7 Electrical/Communications Cabling & Wind Farm Control Building

All on-site electrical and communications 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 1m, with a width of 0.5m. The excavated material from the cable trenches will be side-cast alongside the trench and reinstated following the laying of cable ducts.

The wind farm control building will be constructed within the proposed development site. The purpose of this control building is to act as a 'node' to where the underground electrical (and communications) cabling circuits from each wind turbine will converge. The control building will contain electrical apparatus and will transfer electricity from each individual circuit to a single circuit for its onward transmission to the 110kV electricity substation (see **Section 3.5.3.1**, below).

The control building will measure 17.8m x 7.35m (gross floor area of 131m^2) and will have an overall height of c. 6m to ridge height. The control building will be constructed of blockwork and finished in sand and cement render, blue/black slate roof covering and galvanised steel doors and will contain a control room, switchgear room, storeroom and welfare facilities for staff during the operational phase of development. The control building will also include a dedicated mains water connection to provide for toilet facilities and hand washing. A water connection will be sought to connect the wind farm control building to the local water scheme (Rath Group Water Scheme), the closest point of which is located along the L30033 local road to the southwest of the site and is shown on the site layout plan at **Annex 3.2**. Wastewater from the control building will be stored in a sealed tank and will be periodically disposed of off-site, as required, by a local licensed waste collector. Water supply and wastewater management proposals of this nature are common practice for wind farm developments.

3.4.8 Temporary Construction Compounds

During the construction phase, 2 no. temporary construction compounds will be required. The compounds will be located along the proposed arterial access track, with 1 no. construction compound located on the eastern side of the N62 (c. 0.1ha) and 1 no. located on the western side (0.9ha). Each construction compound will comprise of the following:-

- Temporary cabins to be used for the contractor's 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, construction vehicles, and visitors;
- 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.

Topsoil will be removed from the required area and side-cast for temporary storage adjacent to the compound areas. The compound base will be made up of well graded aggregates, compacted as necessary.

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, and 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 compounds 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 reinstated. Reinstatement will involve removing crushed stone and underlying geotextile, covering with topsoil and reseeding.

The proposed temporary construction compounds will be located and designed such that all cabins, storage containers, waste management facilities and bunded areas will be located a minimum distance of 50m from all watercourses/drainage ditches in order to minimise the risk of pollution and the discharge of deleterious matter Stormwater which may arise from the roofs of cabins, containers or from sealed bunds will be passed through an oil interceptor prior to being discharged to the local environment.

3.4.9 Earthworks

3.4.9.1 Excavation

Earthworks will largely arise from the excavation of topsoil, subsoil, peat (including peaty topsoils) and rock (where present) at the locations of proposed infrastructure.

During construction, excavated topsoil, peat, subsoil and rock (if found) material will be side cast separately for re-use in the reinstatement and landscaping of the site or, in the case of rock, in the construction of access tracks and turbine hardstands. It is estimated that c. 129,815m^3 of material will be excavated to facilitate the construction of the project (wind farm).

During preliminary site investigations, it was identified that the soil profile of the project site was made up, predominantly, of peat/peaty topsoils and subsoils with a marl type clay underlayer. There was very little in the way of rock or rock outcrops identified during these preliminary investigations and, as such, it is not anticipated that significant volumes of rock will be available from on-site construction excavations.

A preliminary Spoil & Peat Management Plan (enclosed within the Preliminary Construction & Environmental Management Plan at **Annex 3.4**) has been prepared in respect of the project and incorporates measures regarding the appropriate management of material, including peat, which will arise from the construction of the project. Prior to the commencement of development at the site, an updated, detailed Spoil and Peat Management Plan will be prepared following the post-consent detailed design process and will address the re-use, reinstatement, storage and restoration of all material excavated during the construction phase, including detailed methods regarding the establishment and management of the spoil deposition areas for the project.

3.4.9.2 Spoil Deposition

In the first instance, surplus excavated material will, as described in the preceding sections, be utilised in the reinstatement and landscaping of the site, where practicable. Whilst it is estimated that the above reinstatement and landscaping processes will account for substantial volumes of surplus material; it is also proposed to develop 3 no. dedicated spoil deposition areas (see **Annex 3.2**) where excess material, which cannot be utilised for reinstatement or is unsuitable for landscaping purposes, will be stored permanently. The 3 no. spoil deposition areas will be made up of one main deposition area, located on the northwestern side of the site (north of turbines T1 & T3), and two smaller areas, located on the eastern side of the N62 (around the bases of turbines T5 and T6).

The locations of the spoil deposition areas have been selected due to the absence of any particular environmental constraints, separation distance to watercourses and generally flat or gently sloping gradient. Peat and spoil will be transported to the selected areas where it will be placed in a thin layer with an overall depth of (approximately 310mm) in accordance with best-practice methods. Appropriate drainage management measures will be implemented to ensure that the deposited spoil does not become waterlogged and to avoid any pollution of nearby surface water features.

Following the completion of construction, the deposition areas will be graded to match the profile of surrounding land, will include a silt fence around the perimeter and will be allowed to revegetate naturally to prevent soil loss to drains. Works at the spoil deposition areas will be monitored, on a weekly basis during the construction phase and monthly for a 6-month period thereafter, by an appropriately qualified geotechnical engineer.

In the event that material is generated which is unsuitable for storage within the deposition areas (e.g. tarmac cuttings from grid connection route construction), this shall be removed from site and disposed of at a licensed waste disposal facility.

3.4.10 Micrositing

The micrositing of elements of the project, following post-consent detailed site investigations and geotechnical analysis, also forms part of the project assessed in this EIAR i.e. minor, immaterial deviations to the elements of the project.

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*[7]. It is anticipated that the agreed micrositing distance will form a condition accompanying a grant of planning permission. It is also proposed that hardstands, access tracks, meteorological mast, and underground cables may be immaterially adjusted 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.

3.5 Off-Site & Secondary Developments

3.5.1 Turbine Component Haul Route

Whilst the final turbine component haul route has not been selected and will be dependent on the turbine supplier and the chosen port of entry, it has been determined that turbine components will, most likely, enter via the Port of Galway[8]. It is anticipated that, from here, the turbines will then be transported by specialised HGVs for the transport of turbine components along the N6, M6, N52 and N62 before accessing the project site via the proposed construction phase site entrances.

In order to facilitate the delivery of turbine components, however, some temporary works will be required at various locations along the above route. A total of 17 no. locations have been identified where works to the public road network will be required. Each of these 17 no. locations involve works of a temporary nature, including the temporary provision of hardcore surfacing, temporary road sign/traffic signal/street lighting removal, and/or the temporary removal, with replacement, of roadside/streetscape vegetation and trees as further particularised below.

3.5.1.1 Port of Galway to M6/N52 Junction

From the Port of Galway to the junction of the M6 and N52, the turbine component haul route follows Regional, national and motorway routes. It will 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 and emplacement of hardcore. Further details of the required temporary works are included in the Route Access Survey (see **Annex 3.5**).

The 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 Abnormal Load Permit application, as is the normal course.

[7] Flexibility regarding wind turbine positioning is also referred to at Section 7.5 of the *Draft Revised Wind Energy Development Guidelines 2019*.

[8] A number of other ports may be used to import turbine components including Dublin Port, Port of Waterford, and Shannon-Foynes Port. Turbine components travelling between any of the above-named ports and the project site will utilise a combination of regional and national (including motorway) routes which are regularly used in the transportation of turbine components and will not require extensive upgrade works.

3.5.1.2 M6/N52 Junction to N52/N62 Junction

From the junction of the M6 and N52, the haul route follows the N52 to its junction with the N62.

Along this section of the route, which passes around the town of Tullamore and through the small town of Kilcormac, temporary hardcore will be laid on roundabout central islands and road signs, street furniture and street lighting temporarily removed at a number of locations; however, the extent of works will be minimal and will be reinstated immediately following the delivery of turbine components.

It is proposed to remove up to 3 no small trees which make up part of the existing public realm works in Kilcormac. It is proposed to temporarily remove these trees and replant them immediately upon completion of components being delivered to the site, where possible. If this is not possible, the trees will be replaced on a like for like basis, including reinstatement with similar tree species and size. The street furniture which will be removed in Kilcormac will also be reinstated upon delivery of turbine components.

3.5.1.3 N52/N62 Junction to Wind Farm Site

Due to the existing alignment of the junction of the N52 and N62, turbine components; including blades; are assessed to be incapable to navigating the junction. Accordingly, it is proposed to undertake a reverse manoeuvre. The reverse manoeuvre involves reversing the abnormal load from the N62 onto private lands, controlled by the Developer, before making a forward movement along the N62 towards the construction phase site entrances. Within the private lands, an area will be hardcored to accommodate HGVs associated with the delivery of turbine components. The works necessary to undertake this manoeuvre will result in the temporary removal of road signs and street lighting and the removal and replacement of a small section of tree lined hedgerow and fence on the eastern side of the junction. In line with the other proposed temporary works along the haul route, the extent of works will be minimal and will be reinstated immediately following the delivery of turbine components.

It is important to note that the temporary reverse manoeuvre location, along the eastern side of the N52/N62 junction, will only be utilised by turbine component delivery vehicles travelling towards the project site. Once the delivery of components has been completed, the extendable blade/tower-section trailer will be retracted to a shorter overall length. Therefore, delivery vehicles leaving the site will not be required to utilise the temporary reverse point and will be able to negotiate the existing junction without the need for a reverse manoeuvre.

3.5.1.4 Summary

A full description of the necessary works at each location along the route between the Port of Galway and the project site is provided at **Annex 3.5**; while a summary of key locations, where more notable works are required, are provided at **Table 3.4** below.

As described, all temporary works will be fully reinstated to the satisfaction of the relevant local authority.

Location ID (per Route Access Survey)	Description of Temporary Haul Route Works
Location 7.2.3: Lough Atalia Road/R339 Junction	Temporary removal of road sign, bollard and traffic signals.
Location 7.2.6: R339/Connolly Avenue Junction	Temporary removal of traffic signals, street lighting and electric pole.
Location 7.2.7: Connolly Avenue/R336 Junction	Temporary hardcore on offside of junction and temporary removal of street lighting.
Location 7.2.8: R336/N6 Junction	Temporary removal of railings, traffic signals and street lighting.
Location 7.2.9: N6 Coolagh Roundabout	Temporary removal of road signs and street lighting.
Location 7.3.1: M6/N52 Roundabout	Temporary hardcore at roundabout and exit slip and temporary modifications to street furniture. Temporary removal of road signs and street lighting.
Location 7.3.2: N52/M6 Roundabout	Temporary hardcore, removal of road signs and modifications to street furniture. Temporary hardcore and removal of road signs on central island of roundabout.
Location 7.4.1: N52/R443 Ardan Roundabout	Temporary hardcore of roundabout central island.
Location 7.4.2: N52/L2025 Roundabout	Temporary hardcore on splitter and central island of roundabout and temporary removal of road signs.
Location 7.4.3: N52/R420 Roundabout	Temporary hardcore and road sign removal on central island of roundabout.
Location 7.4.4: N52/R443 Roundabout	Temporary hardcore and road sign removal on central island/splitter at roundabout.
Location 7.4.5: N52/Tullamore Distillery Roundabout	Temporary hardcore and road sign removal on central island of roundabout.
Location 7.4.6: N52/R421 Roundabout (East)	Temporary hardcore and road sign removal on central island of roundabout.
Location 7.4.7: N52/R421 Roundabout (West)	Temporary hardcore and on central island of roundabout and temporary removal of road sign.
Location 7.4.8: N52/L6009 Roundabout	Temporary hardcore and road sign removal on central island of roundabout.
Location 7.5.1: Right hand bend in Kilcormac	Temporary removal and replacement of small streetscape trees.
Location 7.5.3: N52/N62 Junction	Provision of temporary hardcore to east of junction to accommodate reverse manoeuvre onto N62. Temporary removal of fence, road signs and street lighting. Temporary removal and replacement of hedge and trees on eastern side of junction.

Table 3.4: Temporary Haul Route Alteration Works

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 it will be necessary to temporarily close junctions as the components pass through.

As part of the design process, it has been estimated that c. 1,600m^3, including a small amount (c. 10m^3 tarmacadam), of material will be excavated to complete the

temporary haul route alteration works. As all works are temporary, excavated material will be fully re-used in the reinstatement of each works location. Any waste tarmacadam will be transported to a licenced facility in accordance with the proposals set out within the Spoil and Peat Management Plan (**Annex 3.4**).

3.5.2 Aggregates Sources, Haul Routes & Quantities

As described at **Section 3.4.9**, preliminary site investigations have identified that there is little to no rock present within the project site which can be utilised in the construction of access tracks and crane hardstands. Accordingly, aggregates, including access track and crane hardstand topping material and concrete, will be imported from local 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.

Quarries, which may be selected to supply materials and following a competitive tendering process, are identified at **Annex 2.4** and the likely haul routes to the project site indicated. As part of the Traffic Management Plan, suppliers will be instructed to utilise the extensive national and regional road networks to access the site and to avoid local roads insofar as possible. Further details of the construction materials haul route and vehicle volumes are provided in **Chapter 13**.

On the basis of the design process undertaken to date, the estimated volumes of construction materials/aggregates (rock/stone and concrete) required in the construction of the project (wind farm) are detailed at **Table 3.5** below.

Infrastructure ID	Rock/Stone sourced from On-Site Excavations (m^3)	Rock/Stone sourced from Local Supplier (m^3)	Concrete sourced from Local Supplier (m^3)	Sand sourced from Local Supplier (m^3)	Tarmacadam/ Tar & Chips sourced from Local Supplier (m^3)
Wind Farm Site	-	101,810	9,040	2,170	-
Haul Route Alterations	-	1600	-	-	10

Table 3.5: Estimated Wind Farm Material (Aggregates) Volumes

3.5.3 Electricity Grid Connection Infrastructure

The point of connection to the national grid will ultimately be decided by EirGrid or ESB Networks, as the independent electricity system operators with statutory competent responsibility. The precise means of connection will be dependent on a range of factors and at the discretion of the system operators.

However, as set out in **Chapter 2**, on the basis of detailed analysis conducted to date, including an assessment of the existing grid network and grid capacity; it is assessed that the existing Dallow 110kV electricity substation is the most likely point of connection to the national network. It is further assessed that the most likely method of connecting to the Dallow 110kV substation is through the construction of a 110kV substation at the wind farm site and the installation of c. 5.6km of 110kV underground electricity cables.

Therefore, the construction and operation of a 110kV electricity substation and associated underground electricity cables to the Dallow 110kV substation has been cumulatively assessed throughout this EIAR as part of the project; however, the final selected grid connection will be subject to a separate future planning application and EIAR, as required. Site location plans of the electricity substation and underground electricity cables are enclosed at **Annex 3.6**, with further details provided below.

3.5.3.1 Electricity Substation

The 110kV substation, to be located in the townland of Boolinarig Big will comprise an electrical compound comprising 'tail fed' air-insulated switchgear. The footprint of the substation (overall compound area) will measure c. 8,235m^2 and will be surrounded by a palisade fence, with associated gates, of 2.6m in height for safety and security reasons. The proposed substation compound will contain 2 no. control buildings, a battery energy storage system and all necessary electrical equipment and apparatus to facilitate the export of electricity to the national grid. Ancillary infrastructure located within the footprint of the compound will include electrical apparatus, light posts, lightning mast and a battery energy storage system comprising of containerised energy storage modules, transformer and inverter units, heating, ventilation, air condition units and associated underground electricity cabling.

The layout of the proposed substation is illustrated at **Annex 3.7**. It is important to note that this layout has been designed fully in accordance with current EirGrid specifications; however, the Developer may be instructed by EirGrid to immaterially alter the precise siting and/or specification of control buildings and/or electrical equipment within the overall substation footprint. Any such immaterial deviations have been fully assessed and provided for within this EIAR.

The substation site is located in a relatively flat area of grassland and does not traverse any drains or watercourses. There will be a requirement to undertake minor modifications to ground levels in order to achieve the required levels for the buildings, structures and electrical equipment. As part of the design process, it is estimated that c. 6,710m^3 of material will be excavated to facilitate the construction of the electricity substation. Full details of excavated material volumes, and the management of same, are provided in the Spoil & Peat Management Plan enclosed at **Annex 3.4**.

The substation compound will be surfaced with free-draining crushed stone aggregates such that rainwater could percolate to ground. Rock and capping material will be sourced from local (appropriately/adequately licenced) quarries. On the basis of the design process undertaken to date, the estimated volumes of construction materials/aggregates required in the construction of the electricity substation are detailed at **Table 3.6** below.

Infrastructure ID	Rock/Stone sourced from On-Site Excavations (m^3)	Rock/Stone sourced from Local Supplier (m^3)	Concrete sourced from Local Supplier (m^3)	Sand sourced from Local Supplier (m^3)	Tarmacadam/ Tar & Chips sourced from Local Supplier (m^3)
Electricity Substation (Buildings & Compound)	-	4,980	220	-	-

Table 3.6: Estimated Electricity Substation Works Material (Aggregates) Volumes

The boundaries of the proposed substation are largely surrounded by open agricultural grassland, woodland and existing tree lined hedgerows, particularly towards the north and south. Whilst the substation site is not particularly prominent, it is likely that additional strengthening of existing hedgerows will be provided to further screen the substation from view.

The proposed substation will be connected to the proposed wind turbines via the proposed site control building and the associated underground electrical cabling, as described at **Section 3.4.7** above.

3.5.3.2 Substation Control Buildings

The proposed substation compound will contain 2 no. control buildings; one of which, the Independent Power Producer Building (the 'IPP) Building'), will be operated and maintained by the Developer, while the Transmission System Operator Control Building ('the EirGrid Building') will be operated and maintained by EirGrid.

The IPP Building will have a gross floor area of c. 90m^2. The building shall be constructed of blockwork and will be finished in sand and cement render, slate roof covering and steel doors and will house switchgear and associated electrical equipment and apparatus. The building will not require a dedicated water source.

The EirGrid Building will have a gross floor area of c. 375m^2. This building shall also be constructed of blockwork and will be finished in sand and cement render, slate roof covering and steel doors and will contain a control room to allow operatives monitor and manage the operation of the electrical apparatus and will also include storage and welfare facilities. A water connection will be sought, to the EirGrid Building, from the local water scheme, the closest point of which is located along the L30033 local road to the southwest of the site and is shown on the site layout plan at **Annex 3.2.**

Layout drawings of the control buildings are provided at **Annex 3.7**. The precise internal layout of the buildings may be subject to further immaterial alterations to reflect any future revisions to EirGrid specifications. As set out above, any immaterial deviations from the indicative layout illustrated at **Annex 3.7** are fully provided for within this EIAR.

3.5.3.3 Electrical Equipment & Apparatus

Electrical equipment; including, but not limited to, busbars, line bays and a transformer bay; will be located within the substation compound and will increase the low-voltage of the electricity generated by the proposed wind turbines to high-voltage before being transmitted onwards to the national grid. Electrical equipment

may also include underground cabling, as necessary, located within the substation compound.

3.5.3.4 Battery Electricity Storage System

The external electrical apparatus within the substation compound will also incorporate a battery energy storage system which will store electricity generated by the proposed wind turbines which cannot immediately be exported to the national electricity grid. Such a scenario may arise, for example, during times of reduced electricity demand on the electricity grid. The BESS will comprise approximately 48 no. energy storage modules containing battery modules; ancillary heating, ventilation and air conditioning units, and corresponding power conversion systems and transformers; and will be connected to the IPP Building by underground electricity cables.

The energy storage modules look similar to shipping containers and measure approximately 2.6m in height (inclusive of heating, ventilation and air conditioning unit and concrete plinth foundation), c. 6.1min length and c. 2.2m wide. Each module will have an external ventilation module/unit for the ventilation/heating system and will be placed on concrete plinths, each of which will be 0.5m above finished ground level.

The electricity substation will be accessed, during the construction phase, via the site entrance from the N62 and the associated proposed on-site access tracks. During the operational phase, the substation will be accessed via the proposed entrance from the L30033.

3.5.3.5 Underground Electricity Cables

The electricity substation will be connected to the Dallow 110kV substation via c. 5.6km of 110kV underground electricity cables. From the proposed substation, the cables will be located within the proposed access track to its junction with the L30033 local road and will then follow the L30033. The cables then run through private lands, to the north of Birr Golf Club, the R439 Regional Road (northward) for a short distance, before being placed within the L70151, L701521, and L70152 local roads to the existing Dallow 110kV substation.

The cables will be installed within ducting in excavated trenches of 1.2m deep and 0.5m wide (see **Plates 2** & **3**) and pulled through the ducting in sections of 650/750m in length or depending on the length of cable required. Cable lengths will be connected at designated 'joint bays' to be constructed along the proposed route.

Plates 2 & 3: Typical Trench Construction for Electricity Cables within the Public Road

Communication chambers are also required along the proposed cable route and will include an access cover to facilitate physical access, should it be required.

Following the installation of the electricity cable ducts, joint bays, and communication chambers; ground levels will then be made up using appropriate material (including excavated material) and finished/reinstated to the requirements of the relevant planning authority (public road) or landowner (private lands). As part of the design of the project, the trench will be reinstated in accordance with ESB Networks specification and to the satisfaction of the respective local (road) authorities. Further, all local roads within which it is proposed to install the cables will be subject to a full-carriageway reinstatement thus ensuring that there are no long-term effects on the public road network.

All trenching works will be undertaken to ensure that only short sections of trench are open at any one time. Excavated materials will be stored separately (subsoil, topsoil, and aggregates) for use during the reinstatement of the trench/joint bays/communication chambers or disposed of at an appropriate licensed facility as necessary. The sequence of works is typically as follows:-

- Identify existing underground services prior to excavation;
- Excavate the trench to the required dimensions;
- Place a blinding layer at the base of the trench;

- Place and joint the cable trefoil high-density polyethylene (HDPE) power ducts using cable ties at 3m intervals;
- Lay in and compact a layer of leanmix concrete around and above ducts; and place a red marker strip above;
- Install a single HDPE communications cable duct;
- Lay in and compact an additional layer of leanmix concrete, and place another red marker strip above;
- Final backfill layer (excavated material if suitable) to include yellow warning tape; and
- Appropriate reinstatement, as discussed above.

Prior to the commencement of construction, a detailed Method Statement will be prepared by the contractor appointed by the Developer outlining the precise methodology to be followed during the trenching phase. This Method Statement will be reviewed by the Environmental Manager (EM; to be appointed by the contractor) to ensure that the environmental protective measures to be implemented are suitable and to the required standard.

As part of the design process, it is estimated that c. 9,530m^3 of material will be excavated to accommodate the grid connection infrastructure. Of this, it is estimated that c. 150m^3 of excavated material will be re-used while c. 7,890m^3 of backfill material (stone and concrete) will be imported from a local quarry (or quarries) and c. 1,910m^3 of tar/chip will also be sourced locally. Full details of excavated material volumes, and the management of same, are provided in the Spoil & Peat Management Plan enclosed at **Annex 3.4**.

The estimated volumes of construction materials/aggregates required in the construction of the electricity substation are detailed at **Table 3.7** below.

Infrastructure ID	Rock/Stone sourced from Local Supplier (m^3)	Rock/Stone sourced from Local Supplier (m^3)	Concrete sourced from Local Supplier (m^3)	Sand sourced from Local Supplier (m^3)	Tarmacadam/ Tar & Chips sourced from Local Supplier (m^3)
Grid Connection	-	4,100	3,790	-	1,910

Table 3.7: Estimated Electricity Grid Connection Material (Aggregates) Volumes

3.5.4 Forestry Felling & Replanting

3.5.4.1 Forestry Felling

The project is located on lands which includes a patchwork of landcover types, including cutover bog, agricultural pasture and forestry, including; commercial/conifer plantation, broadleaved woodland, bog woodland (non-Annex I) and scrub[9]. It is proposed to permanently remove up to 23 hectares (ha) of forestry, in order to accommodate the construction of turbine foundations, access tracks, and

[9] Full details of the various types of habitats found within the project site are included at **Chapter 5.**

other ancillary infrastructure; and to facilitate the physical operation of the wind turbines.

A Felling Plan has been prepared for the project and is enclosed at **Annex 3.8**. The Felling Plan illustrates the areas where forestry will be permanently felled to accommodate the physical infrastructure of the project and to ensure the appropriate protection of any bat species present at the project site through the provision of appropriate setback distances. Further details on the felling requirements for bats are provided at **Chapter 5**.

It should also be noted that, following the post-consent detailed design process and consultation with the turbine manufacturer/supplier, further felling may be required to ensure the efficient and effective operation of the wind turbines. The areas illustrated at **Annex 3.8** are, therefore, the minimum felling requirements and additional areas of forestry; surrounding turbines T2, T4, T5, and T6; may also be subsequently felled.

All felling works, including any felling additional to that illustrated at **Annex 3.8**, will be undertaken entirely in accordance with the mitigation measures, where relevant, as set out in this EIAR; and, therefore, it is assessed that any such additional felling will have no likely significant impacts on the substantive conclusions of this EIAR.

All felling to be undertaken will be the subject of a formal Felling Licence application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017. In accordance with the Forest Service's policy on granting felling licenses for wind farm developments, a copy of the relevant planning consent is required to be submitted with the Felling Licence application which cannot be applied for until such time as planning permission is obtained for the project.

Some minor felling of native tree species will also be required through the project site to accommodate the construction of, in particular, access tracks.

3.5.4.2 Replanting

In accordance with the Forest Service's published policy on granting felling licences for wind farm developments, areas of forestry which have been felled to accommodate turbine bases, access roads and any other wind farm-related uses (i.e. permanent wind farm infrastructure) must be replaced by replanting at an alternative site, on a like for like basis.

As part of the Felling Licence application process, it will be necessary for the Developer to identify appropriate replant lands. These lands can be located anywhere within the Republic of Ireland and will be subject to a separate environmental assessment and technical approval process as part of the Felling Licence consenting process.

For the purpose of this EIAR, the Developer has identified potential replacement lands at Drumagelvin, Drumleek South, Lisdonny and Moy, County Monaghan (illustrated as Option RP2 at **Annex 2.5**) which have been assessed throughout this EIAR. Whilst it is highly likely that the identified lands will be progressed through the Felling Licence consenting process, it is important to note that an alternative parcel of land may also be selected in due course. Given, as described above, that the actual replacement lands will be subject to an environmental assessment and technical approval process as part of the normal course of the consenting process, it is assessed that the selection of alternate replacement lands will not affect the substantive conclusions of this EIAR.

The identified lands are located in rural County Monaghan; c. 2.5km east of Castleblayney. The lands comprise a network of small-to-medium sized fields which are predominately agricultural pasture. Access to the proposed replant lands will be provided by existing agricultural site entrances which will be upgraded, as may be necessary. All works to site entrances will be completed to ensure compliance with the requirements of Table 15.5 of the *Monaghan County Development Plan 2019-2025* regarding the provision of vehicle visibility splays (sightlines).

The Developer can confirm that no felling will take place within the project site until such time as a Felling Licence has been obtained incorporating the technical approval and environmental assessment of the identified replacement lands to be afforested.

The replanting process, to be completed in accordance with the *Forestry Standards Manual* (Department of Agriculture, Food and the Marine; 2015) and will follow best practice methods generally comprising the following:-

- Site Preparation & Installation of Drainage Infrastructure;
- Planting;
- Fencing: Installation of stockproof fencing (post-and-wire);
- Vegetation Control: Undertaken throughout the crop establishment period (generally 4-5 years);
- Replacement of Failures: Undertaken throughout the crop establishment period (generally 4-5 years); and,
- Monitoring: Undertaken throughout the crop establishment period (generally 4-5 years).

3.5.5 Landscaping

Outside of the forestry felling and replanting described above, some smaller areas of hedgerow removal will be required throughout the project site. The extent of hedgerow removal has, by design, been minimised and no vegetation will be unnecessarily removed.

Any treelines or hedgerows removed will be replaced in-situ elsewhere in the project site at appropriate locations (i.e. designed to maximise ecological connectivity and outside of bat mitigation buffers). All new treelines or hedgerows will be planted using native species and in a similar composition to treelines or hedgerows lost.

To compensate for the loss of linear hedgerow habitats (including matrices of same), 1,978.87m of hedgerows will be replaced in-situ. There will also be 914.47m more hedgerow planted than will be needed to replace any due to be lost. The placement of these replacement hedgerows will also be used to help enhance biodiversity (see **Chapter 6**).

The replacement of hedgerows will be conducted in accordance with the wider reinstatement and landscaping proposals for the site. The Ecological Clerk of Works (ECoW), to be appointed to monitor works during the construction phase, will select appropriate locations. The siting of this replacement hedegrow will be carefully selected to maintain or enhance the ecological connectivity of the site which will ensure that adverse effects do not arise as a consequence.

3.5.6 Construction Drainage Management & Disposal

Possible sources of 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 storage of stockpiled materials; contamination due to the leakage of oils/fuel from site vehicles; spillage during refuelling operations; and leakage from chemical, waste and fuel storage areas.

A series of embedded mitigation and best-practice measures have been incorporated within the project design. All surface water runoff from stockpiles (including the spoil deposition areas), excavations, or from dewatering operations will be passed through an appropriate attenuation train, including silt fences (also known as silt curtains) and silt traps (also known as silt/settlement/sediment/stilling ponds)[10]. Other surface water protection measures which may be implemented, as appropriate, include straw bales, silt bags and siltbusters.

Surface water control measures will be implemented as construction progresses through the site; however, prior to the commencement of earthworks, temporary silt/sediment control infrastructure (e.g. straw bales) will be placed in agricultural drains around the site until the full range of construction phase measures are installed.

The inclusion of these surface water runoff measures within the project design will avoid any discharge of silt or sediment laden waters directly to any surface water feature prior to being fully treated. At the point of discharge, buffered outfalls (or level spreaders) will be installed to ensure that erosion or scouring does not occur.

Further details of the proposed surface water protection measures are also presented in the relevant chapters of this EIAR. The precise implementation and siting of these measures will be determined, subject to planning permission being granted, following the further post-consent detailed design process and will be included within a detailed Construction Environmental Management Plan (CEMP) to be agreed with the Planning Authority prior to the commencement of construction.

A preliminary Surface Water Management Plan (SWMP) has been prepared in respect of the project (enclosed at **Annex 3.4**, **Volume II**). This SWMP will also be further developed prior to the commencement of development, following the post-consent detailed design process, and will incorporate the precise implementation and siting of surface water management infrastructure.

Following the completion of construction, and where appropriate to do so, surface water treatment infrastructure will be decommissioned and removed from site. Due to the permeable nature of the access tracks, hardstands and substation footing, the vast majority of surface water will percolate to ground. Stormwater drainage infrastructure will be installed around Buildings to capture any runoff from roofed or paved areas and will be passed through an oil interceptor before being discharged to an agricultural drain. Discharge rates have been designed to mimic greenfield runoff rates thus avoiding any long term alteration to the hydrological regime of the project site.

3.6 Construction Phase

The construction phase is likely to last for approximately 15-18 months from commencement through to the installation and commissioning of the turbines and ending with site reinstatement and landscaping.

[10] Please note that the nomenclature of this surface water protection infrastructure may be used interchangeably within this EIAR and accompanying documentation.

The construction phase of the proposed development will comprise a six day week with normal working hours from 07:00 to 19:00, Monday to Friday and 07:00 to 13:00 on Saturdays. In exceptional circumstances it may be necessary to undertake works outside of these normal 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, hardstands 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 for the project (wind farm) will consist of the following general sequence:-

- Traffic management and surface water protection measures to be implemented;
- Creation of the site entrances, to be commenced and completed, ensuring that adequate visibility splays are provided;
- Progressive installation of surface water protection measures;
- Establishment and continued management of spoil deposition areas;
- Progressive construction of internal on-site access tracks utilising material extracted from on-site, where possible, and imported from local quarries;
- Construction of the temporary construction compounds for offloading 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, tree felling will be completed and foundation excavations for the turbines will commence, and foundations poured. The hardstand areas will be constructed as track construction advances;
- Temporary alteration 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;
- Site preparatory and groundworks associated with the wind farm control building, construction of the building followed by the installation of electrical and ancillary equipment;
- 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 one 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 re-profiling of spoil deposition areas, removal of turbine storage areas; erection of post-and-wire fencing around turbines, access tracks and at site entrances; decommissioning of construction phase site entrances; establishment of operational site entrances; erection of gates and vegetation at site entrances; and decommissioning of the temporary construction compounds.

The construction method for the proposed substation and grid connection will consist of the following general sequence (to be completed concurrently with wind farm construction):-

- Site preparatory and groundworks associated with the substation compound footprint including control buildings;
- Construction of the IPP and EirGrid buildings;
- Construction of bases or plinths for electrical apparatus, including battery energy storage system containers;
- Erection of palisade fencing around substation;
- Installation of internal and external electrical apparatus in control buildings and within compound area;
- Installation of underground electricity cables (including joint bays and communication chambers,) between substation and Dallow 110kV electricity substation;
- Connection of underground electricity cables to the respective substations;
- Commissioning of electrical apparatus and underground electricity cables; and
- Progressive site reinstatement, restoration, landscaping and planting proposals including the installation of stockproof fencing and the erection of gates.

Once the wind turbines are installed and the substation 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 included in this EIAR. A preliminary Planning-Stage CEMP has been prepared and is provided at **Annex 3.4**.

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), and Geotechnical Clerk of Works (GCoW), among others; who will liaise closely with the Developer's appointed contractor's on-site Environmental Manager to monitor and to ensure that all mitigation measures included in this EIAR and all conditions of consent, subject to a grant of planning permission, 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 project site. The CEMP shall also provide additional details of embedded best 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 deposition areas;
- 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:
- 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 Construction Site Entrances

As discussed in **Section 3.4.5** above, the 2 no. proposed construction phase entrances will involve the upgrade of 2 no. existing agricultural/forestry entrances from the N62.

Following the delivery of turbine components, the construction phase site entrances will be fenced off but will be reinstated such that they remain capable of accommodating abnormal loads in the event of a major component replacement during the operational phase of development. The reinstatement of the site entrances will comprise the erection of post and rail fencing and the planting of hedgerows.

3.6.3 Hardstand Areas & Site Access Tracks

The hardstand areas 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;
- Rock/stone, will be laid on a geo-textile mat (where required) and compacted in layers to an appropriate depth. The sub-layers of the hardstanding areas and access tracks will be constructed of rock/stone, with the upper layer comprising capping material imported from a local quarry (quarries). All such areas of hardstanding will be permeable to avoid significant volumes of surface water run-off;
- Where access tracks are required to cross manmade drainage ditches, these will be piped or spanned with an appropriate bridging structure. Where access tracks cross a natural watercourse, bottomless culverts will be installed (where

possible) to prevent any interference with the hydraulic capacity of the watercourse. Crossing the Rapemills River will be fully clear span, negating the need for any in-river culvert structures; 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 hardstands 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 Chemical Storage & Refuelling

As described in the preceding sections of this chapter, storage areas for oils, chemicals and fuels will comprise bunded areas of hardstand of sufficient capacity within the temporary construction compounds. A hydrocarbon interceptor will be installed within the surface water drainage system during the construction phase to trap any hydrocarbons that may be present.

From the construction compounds, 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.

3.6.5 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, peat, topsoil, 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 (peat, topsoil, subsoil, etc.) will be re-used on-site in preference to importation of clean inert fill;
- While unlikely, 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.

A Waste Management Plan has been prepared for the project and is included within the Planning-Stage Construction & Environmental Management Plan at **Annex 3.4**.

3.6.6 Construction Employment

It is estimated that up to 100 no. people will be employed during the 15-18 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 appointed by the Developer, but it is likely that the workforce will include labour from the local area (see **Chapter 4**).

3.6.7 Construction Traffic

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

- Articulated trucks (HGVs), including abnormal load vehicles, 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.

Effects 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 Offaly County Council (and other relevant local authorities). This may include the installation of temporary road signage and traffic lights, as appropriate.

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.

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 (e.g. along the grid connection route);
- 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; and
- All temporary road alterations and public road upgrades to be carried out in full consultation with the relevant local authority.

3.7 Operation Phase

The proposed operational phase of the development is 35-years from the date of commissioning. 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 will continue as normal. On average, the project will be serviced

once/twice per week by a light commercial vehicle for maintenance purposes. In exceptional circumstances there may be an occasional need to replace some major turbine components, but these will be very infrequent.

Waste will be generated during the operation 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 operation phase are provided in each chapter of this EIAR as they relate to each environmental factor.

3.8 Decommissioning Phase

At the end of the operation phase, several options will exist:-

- Continued operation of the project;
- Refurbishment/replacement of the turbines and continued operation; and
- Decommissioning of the project.

Any further operation beyond 35-years operation phase would be subject to a further planning permission and EIA. In its scope, this EIAR assumes full decommissioning of the project will take place after 35-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 Planning Authority in advance of decommissioning works. Further details on the decommissioning phase are provided in each chapter of this EIAR as they relate to each environmental factor.

3.8.1 Wind Turbines

Wind turbines are comprised of the tower, nacelle and blades which are modular items that can be disassembled. Decommissioning the turbines 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 they will be sorted according to their material of construction. Turbine components are mainly inert steel/ferrous metals which can be reused or recycled.

The turbine blades are constructed of fibreglass which is not readily re-used or recyclable. Due to the large number of turbine blades currently being decommissioned globally, extensive research is being undertaken to find an alternative use for the fibreglass e.g. Re-Wind and SusWIND. There are a number of emerging innovations for fibreglass recycling including the repurposing of fibreglass for other civil engineering projects (e.g. as a component in concrete production, roofs for housing developments and incorporation to the construction of electrical powerline masts/structures.) Given the extensive research being undertaken to find a means of recycling decommissioned wind turbine blades, this EIAR assumes that, at the proposed date of decommissioning, all blades will be fully repurposed and that no disposal, to landfill, will be required.

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 0.5m 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, 200-300mm 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 method.

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 Electricity Grid Connection Infrastructure

The electricity substation compound, including control building (the Eirgrid building), and electrical equipment and apparatus along with the grid connection will be operated and maintained by Eirgrid, who will likely operate the infrastructure as part of the national electricity network. The IPP Building and the BESS will be operated and maintained by the Developer. As a result, the substation and grid connection do not have a specified operation period and may continue to be operated following the decommissioning of the proposed wind farm. However, for the purposes of this EIAR, full decommissioning of all of the electricity grid connection infrastructure, as described in detail at **Section 3.5.3**, above, has been assumed.

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 to demolition.

Demolition of the buildings shall take place using conventional 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 and BESS will involve the removal of the underground cables. 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 to an appropriate licensed facility for recycling; while the 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 the 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.

3.9 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 Planning Authority.