2 PROJECT DESCRIPTION

2.1 INTRODUCTION

This Chapter of the EIAR provides a description of all elements of the proposed Tullaghmore Wind Farm (The Development). This includes all elements within the redline boundary, the wind turbines, 38kV Substation, Site Access Tracks, Turbine Hardstands and all site infrastructure. This Chapter also provides a description of the work required along the proposed grid connection and the Turbine Delivery Route which are outside the redline boundary and which together with the works within the redline boundary are defined as the Project which form the basis of the assessments presented within Chapters 5 to 15. This Chapter provides details of the construction, operational and decommissioning phases.

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

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

- Construction Environmental Management Plan (CEMP) in **Appendix 2.1**
- TLI Grid Report and accompanying drawings in **Appendix 2.2**
- ESB Minimum Standard Specifications in **Appendix 2.3**.

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

2.2 PROJECT DESCRIPTION

Planning Permission is being sought by the Developer for the construction of 6 wind turbines, permanent met mast, on-site 38kV substation and all ancillary works.

The Project will comprise of the following main components:

- Erection of 6 no. wind turbines with an overall ground to blade tip height of 185m. The candidate wind turbine will have a rotor diameter of 162m and a hub height of 104m
- Construction of site access roads, crane hardstand areas and turbine foundations.
- Improvement of existing site entrance with access onto the N59

- Construction of one no. temporary construction compound with associated temporary site offices, parking areas and security fencing
- Installation of 1 no. permanent meteorological mast with a height of 104m
- Construction of new internal site access tracks and upgrade of existing Site track, to include all associated drainage
- Development of a site drainage network
- Construction of one no. permanent 38kV substation
- All associated underground electrical and communications cabling connecting the wind turbines to the wind farm substation
- All works associated with the connection of the wind farm to the national electricity grid, which will be via 38kV underground cable connection approximately 18.65km in length to the existing ESB Screebe 110kV GIS Substation.
- Biodiversity enhancement measures
- Peat storage and restoration areas

A 10-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm is being sought.

The EIA also assesses the Works at 4 no. locations along the proposed turbine delivery haul route from Galway Port and the proposed underground grid connection from the Site to Screebe 110kV Substation.

2.3 SITE LOCATION AND ENVIRONS

2.3.1 Introduction / Existing Land Use

The Site, as shown in **Figure 1.1**, is located within an upland bogland landscape between Maam Cross and Oughterard, Co. Galway. The Site is located approximately 30km northwest of Galway City, and 9km west of Oughterard, Co. Galway.

The Site is located within the townlands of Tullaghmore, Tawnaghbeg, Tullaghaboy and Lurgan. The main proposed wind farm site is located in Tullaghmore, Tawnaghbeg, Tullaghaboy and the proposed spoil storage and peat restoration (habitat enhancement) areas are located in Lurgan.

The proposed grid connection is located in the townlands of Bunnakill, Derreennagusfoor, Lurgan, Ardderrynagleragh, Knockaphreaghaun, Derroogh North., Knockadav, Gleann Trasna, Illeny, Knockaphreaghaun, Derravonniff, and Glencoh.

Temporary works will be required to accommodate the delivery of the turbine components. These temporary works are not included as part of the planning application but are assessed a part of this EIAR and are located in the townlands of Derravonniff, Tullymore, and Knockaphreaghaun.

The main Site extends to 161.88ha, the majority of which is bogland used for grazing sheep and is in the ownership of three local landowners. The area designated for spoil storage and peat restoration (habitat enhancement) extends to 29.86ha. Therefore, the total site area is 191.74ha.

The closest inhabited dwelling (H7) is located 740m from the nearest turbine. There are 30 houses within 2km of the proposed turbines. All houses located within 2km of the proposed turbines are shown on **Figure 1.3**.

2.3.2 Wind Farms in the Area (Cumulative)

There are 7 operational, consented and proposed wind farms within 20km of the Site. **Figure 2.1** shows the location of proposed, permitted and operational wind farms within a 20km radius of the proposed turbines and **Table 2.1** below provides further information on these wind farms. The nearest operational wind farm is Galway Wind Park Phase 1 Wind Farm which is located approximately 6.8km to the north-west of the Site.

Table 2.1: Wind Farms within 20km of the Proposed Turbines

Wind Farm	Status	No. of Turbines	Approximate Distance to the Site Boundary	Direction from the Development
Knockranny	Consented	11	c. 15km	Southeast
Clochar na Lara	Operational	11	c. 19.8km	Southeast
Galway Wind Park Phase 1, Cloosh Valley/Seecon	Operational	36	c. 6.8km	Southeast
Galway Wind Park Phase 2, Ugool/Lettercraffoe	Operational	22	c. 10km	Southeast
Galway Wind Park Phase 3, Derradda, Seecon, Shannapheasteen, Uggool, Letter, Finnaun	Consented	9	8.5km	Southeast
Ardderroo	Consented	25	c. 13.5km	Southeast

2.3.3 Other Developments (Cumulative)

The only other development or proposed development (bigger than a one off house) within 10km is a permission to restore a disused railway station at Maam Cross and convert it into a railway heritage museum with re-laid railway track, rebuilding a signal cabin, refurbishment of goods store and loading bank, water tower and passenger platforms, car parking and portaloo toilet facilities. This proposed development is located approximately 3.8km to the west of the main site to the east of the R336. Other developments in the area are generally for one off housing developments. Developments more than 10km from the Site are not considered likely to have a significant cumulative impact given distance from the Site. One off houses are too small in scale to be included.

2.3.4 Land Ownership

The Site is located on lands under the ownership of third-party private landowners who have consented to the application and the Development.

2.4 WIND RESOURCE

Due to the location in the west of Ireland, and elevation, the Site experiences high average annual wind speeds. The Irish Wind Atlas produced by Sustainable Energy Ireland shows average wind speeds for the country and it shows that wind speeds on the Site are consistent with a windfarm development (7.1m/sec at 30m, 8.3m/sec at 75m, 8.8m/sec at 100m and 9.1m/sec at 150m).

2.5 SITE INFRASTRUCTURE AND CONSTRUCTION

2.5.1 Proposed Layout Design

The layout of the Development has been designed to minimise the potential environmental effects of the wind farm while utilising the maximum energy yield from the Site's wind resource. The layout design was informed by the following constraints and buffers:

- distance to watercourses of at least 50m
- distance to land drains of at least 20m
- distance to archaeological monuments and structures of at least 100m
- distance from turbines to inhabited houses of at least 740m
- distance of two rotor diameters (370m) from a turbine to the site boundary
- avoidance of ground slopes of greater than approximately 10 - 14%
- avoidance of existing telecommunications infrastructure
- Existing high voltage overhead powerlines on the south of the site where a 500m buffer is applied
- avoidance of sensitive habitats e.g. blanket bog

The overall layout of the Site is shown in **Figure 1.2**. This figure shows the proposed locations of the wind turbines and associated hardstanding areas, electrical substation, met mast, temporary construction compound, internal access tracks and the site entrance. The ITM coordinates of the turbines are listed in **Table 2.2**.

Table 2.2: Turbine ITM Coordinates

Turbine No.	ITM Easting (m)	ITM Northing (m)	ING Easting [m]	ING Northing [m]
T1	503286.55	746695.23	103314.87	246670.48
T2	503308.95	747272.7	103337.28	247248.08
T3	502859.2	747639.19	102887.43	247614.64
T4	502073.54	747423.91	102101.60	247399.31
T5	502555.03	747063.44	102583.20	247038.77
T6	502697.92	746581.21	102726.12	246556.43

2.5.2 Wind Turbine Generator

The proposed turbines will be of typical modern design and will be a three-bladed, rotor up wind of the tower, variable speed, pitched blade regulated machine. Turbine appearance will be a matt non-reflective finish in a white, off-white or grey colour. The foundation-to-tip height will be 185m consisting of a tower of 104m and a rotor diameter of 162m.

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

Each turbine will have a generator with a maximum capacity of 6.8MW giving an overall capacity of 40.8MW. The turbines may be direct drive machines or may contain a gearbox. The final turbine will be chosen in a competitive tendering process as part of the Project financing process, after all necessary consents have been secured but will adhere to the parameters set out in **Table 2.3**.

The final choice of turbine model is unknown at this stage, but the candidate turbine model used for assessments at this stage is a Vestas V162 has been identified for the purposes of EIA and planning approval. A schematic drawing of the candidate turbine is shown on **Figure 1.4**.

For the purposes of the assessments, the dimensions of the candidate turbine is presented in **Table 2.3**. These are the proposed dimensions of the turbines for which planning permission is being sought.

Table 2.3: Turbine Parameters

Turbine Parameter	Assessment Envelope
Turbine Blade Tip Height	185m
Rotor Diameter	162m
Hub Height	104m

2.5.3 Turbine Foundation and Turbine Hardstands

All turbine suppliers have a requirement for a Turbine Hardstand area to be constructed beside each turbine. The layout of the Turbine Hardstand is designed to accommodate the delivery, laydown, and assembly of turbine components (in particular rotor assembly) prior to turbine lifting and assembly and is shown in **Figure 2.2**. The Turbine Hardstands are needed to support the cranes during turbine construction, the operational and maintenance phase, and for decommissioning. The Turbine Hardstands will be constructed in advance of the Turbine Foundation and will be used to facilitate foundation construction, such as steel reinforcement delivery and pouring of concrete.

Construction of the turbine and met mast hardstands will require the excavation of overburden material to the noted area and depth, the laying of a geotextile material on the formation surface and placing engineered stone and a top dressing. The main Turbine Hardstands will be 3,395m^2 and will be 0.6m in depth depending on the local bedrock profile and the varying soil depth giving a surface area of 20,370m^2 for 6 turbines and a material volume requirement of approximately 12,222m^3.

The Turbine Foundations will be approximately 25.5m in diameter and have a depth of approximately 3m. The Turbine Foundation design will depend on the turbine type and will

be decided by the structural engineers at detailed design stage but will fall within the above dimensions. The central part of the foundation will be approximately 6m in diameter, will be raised from the main Turbine Foundation below ground level and will encompass cast-in bolts to connect to the bottom of the turbine tower and reinforced bar structural elements.

The volume of concrete and steel required for each Turbine Foundation will be 590m³ and 86 tonnes respectively. The area around and above the Turbine Foundation will be backfilled with compacted granular material and the only portion exposed in the long term will be the central foundation section. Material will be sourced from a local quarry such as one of those identified in **Table 2.4** below.

Table 2.4: Local Quarries and Concrete Suppliers

Quarry	ITM (Easting)	ITM (Northing)	Distance (km)	Direction	Comments
Rock Aggregates					
Maam Cross	497388	744878	4.7	SW	Rock aggregates
Recess	485245	747775	16.5	W	Rock aggregates
Mannions, Recess	473449	749314	28	W	Stone aggregates
Killola Quarries, Gortnagroagh	515758	739801	13.5	SE	Stone aggregates
Kyne's Sand and Gravel, Lahardane	519397	735806	18.8	SE	Sand and gravel only
Mairtín O Flatharta Teo, An Spideál	515151	723083	25.5	SE	Granite rock aggregates
KG Fuels Menlo, Galway	530381	728317	32	SE	Stone aggregates
Concrete					
Harrington Quarries	538145	740396	35	E	Stone aggregates and Concrete
Coshla Quarries, Athenry	542651	728567	42.7	SE	Stone aggregates and Concrete
Esker Readymix, Athenry	554460	726236	54.7	SE	Concrete
McGraths, Cong	514093	756055	13	NE	Concrete, limestone rock and aggregates

Site investigations are required post consent to facilitate detailed design. Depending on the results of these further confirmatory site investigations, the possibility of installing rock anchors will be explored as a means of reducing the footprint and material volumes of the Turbine Foundations. Traditional gravity foundations are considered for EIA purposes as this represents a worst-case scenario due to the amounts of concrete required (c.750-

800m^3 v c.300m^3 for rock anchors), but it should be noted that the predicted environmental effects, such as loss of habitats and/or impacts on water quality, could be reduced where rock anchor foundations could be used for some of the Turbine Foundations where there is solid competent rock at the foundation level.

Based on the results of peat probing and geotechnical assessments to date, peat depths are not deep enough to require piling of Turbine Hardstands. Therefore, the construction method for all the Turbine Hardstands will be via excavated approach.

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

The method of construction for gravity Turbine Foundation is described as follows:

- Set out turbine foundations and required finish levels etc.
- Construct formation and/or supporting structures e.g. piles.
- Construct drainage as required.
- Provide a minimum of 100mm concrete blinding.
- Place bottom mat of steel reinforcing.
- Place free issue turbine base insert or anchor cage.
- Fix cable ducting and foundation earthing.
- Complete reinforcing steel.
- Fix shuttering to base sidewalls.
- Fix ducts and earthing wires between insert and walls of base.
- Carry out any corrective works as directed by Engineer.
- Check weather conditions and schedule concrete deliveries.
- Place concrete and take quality control slumps and cubes.
- Concrete surface finishing.
- Apply curing and protection of concrete.
- Strip formwork.
- Placing of any earthing wires around and over the base.
- Backfill base sides and place overburden.
- Confirm that cube results are satisfactory[1].

[1] Concrete cubes made during the pouring of the base are crushed to confirm that the required concrete strength has been reached.

- Grout the top flange.

The method of construction for rock anchor Turbine Foundation is described as follows:

- Set out turbine foundations and required finish levels etc.
- Construct temporary coring drilling platform
- Drill cores for rock anchors to the required levels.
- Insert rock anchors and grout into position.
- Construct drainage as required.
- Provide a minimum of 100mm concrete blinding.
- Place bottom mat of steel reinforcing.
- Place free issue turbine base insert or anchor cage.
- Fix cable ducting and foundation earthing.
- Complete reinforcing steel.
- Fix shuttering to base sidewalls.
- Fix ducts and earthing wires between insert and walls of base.
- Carry out any corrective works as directed by Engineer.
- Check weather conditions and schedule concrete deliveries.
- Place concrete and take quality control slumps and cubes.
- Concrete surface finishing.
- Apply curing and protection of concrete.
- Strip formwork.
- Placing of any earthing wires around and over the base.
- Backfill base sides and place overburden.
- Confirm that cube results are satisfactory.
- Grout the top flange.

2.5.4 Access to the Site

The site access will be from the existing entrance on the N59 which will be upgraded to allow vehicles to turn in and out and to achieve the required sightlines. This entrance will be used for delivery of both turbine components and building materials such as rock and concrete. The site entrance is shown on **Figure 2.3**.

It is proposed that the turbine nacelles, tower hubs and rotor blades will be landed in Galway Port. From there, they will be transported to the Site via the R336 to Maam Cross and then the N59 east to the upgraded site entrance. The delivery of the turbines will require co-ordination with Galway County Council and An Garda Síochána. The process has been set

out in the Transport Management Plan contained in **Appendix 14.2** which will be implemented in full and will be further developed prior to the commencement of construction by the Contractor. The proposed haul route is shown on **Figure 2.4**.

There are four areas on the haul route that will require works in third party lands. These are shown on **Table 2.5**.

Table 2.5: Areas of Works on Haul Route in Third Party Lands

No.	Area	ITM (Easting)	ITM (Northing)	Description
1	R336	497440	743302	Third Party Lands to east of R336. Inside of the right bend will require a load bearing surface should be laid and one utility pole should be removed.
2	R336	497060	742884	Third Party Lands to east of R336. Loads will overrun on the outside of the junction where a load bearing surface should be laid and two road signs and trees should be removed.
3	R226/R340	496715	738300	Third Party Lands to the west of the R336 and north of R336. Loads will overrun the verge on the inside of the initial right bend where a load bearing surface should be laid.
4	Baile na hAbhann	499618	722390	Third Party Lands to the west of the R336. Loads will overrun the verge on the outside of the bend where a load bearing surface should be laid. Vegetation should be cleared.

2.5.5 Site Access Tracks

The Site Access Tracks are necessary to allow access for cranes and delivery trucks during construction of the Development and also during servicing/repairs to the wind turbines. The existing access track from the N59 will be upgraded and used to minimise additional land take. The Site Access Tracks will be upgraded and constructed so that the

width will be 5m, but will be wider at bends where a width of 5.5m is to be provided. The maximum gradient on the site will be approximately 15% with the exception of the access track to the Met Mast which has a gradient of approximately 22%. A stone layer will be provided so as to provide a good grip during wet weather. Gradients above 12-14% will usually require components to be towed by a specialist towing vehicle. The maximum gradient on site is 15.3% with a gradient of 21.94% leading to the Met Mast location, and therefore towing of delivery vehicles is likely to be required.

Approximately 1,450m of the existing Site Access Track length will be used for the Development. Site Access Tracks are shown on **Figure 1.2(a)**. The upgraded Site Access Tracks will be approximately 2,900m^2 in surface area and will require approximately 1,740m^3 of stone material.

There will also be 5,530m of new Site Access Tracks required for the Development. These will be constructed to provide a width of 5m and will cover an area of 27,650m^2 and require c.16,590m^3 of rock. These roads will be excavated to firm bearing strata and constructed using rock from the turbine foundation excavations or imported to Site from a nearby quarry as outlined in **Table 2.4**.

The Site Access Track layout follows the existing access track into the Site as far as possible, avoids environmental constraints, and follows the natural contours of the land. Every effort has been made to minimise the length of track necessary.

The Site Access Tracks will be upgraded to carry a minimum 12 tonne axle construction loading. The design will consist of 150mm of 50mm Down Quarried Rock / Gravel Pavement on an average of 400mm Down Crushed Run Rock. The proposed Site Access Track construction detail is shown in **Figure 2.5.**

Sections of the Site Access Tracks will need to be of a floated road design where areas of deeper peat (>1.5m depth with a crossfall of less than 1 in 10) are encountered. This means they will not be excavated but will be laid directly on the peat using geogrid and crushed stone. Pipes will be installed at intervals to allow the existing runoff regime on site to continue. Sections of the track that are proposed to be floated are from chainage 1200 on the access track from the N59 to T6 and from the junction on the access track between T1 and T6 and the junction with the access track to T2.

The surface of the Site Access Tracks will be maintained during the construction phase. Harmful constituents such as hydrocarbons pose a risk of environmental contamination and also a risk to human health if found in drinking water sources. All imported stone to the Site will have undergone appropriate quality testing to TII specifications.

There are four crossings of natural streams/flushes along the Site Access Tracks. The existing crossing over the Owenwee River on the main access Track from the N59 will be upgraded for the increased Site Access Track widths for the Development and to allow heavier vehicles to traverse it. The upgrade will involve the construction of a clear span bridge to the north of the existing bridge location. Further to consultation with Inland Fisheries Ireland (IFI) the crossings have been designed in accordance with detail shown in shown in **Figure 2.6 (a), (b), (c) and (d)**.

2.5.6 Met Mast

As part of the grid code[2] requirements, all wind farms with an installed capacity of greater than 10MW are required to supply continuous, real-time data for the wind farm location. The data required is the wind speed and wind direction at turbine hub height, air temperature and air pressure. The data required for the Development will be provided by a dedicated meteorological mast of 104m in height (location as detailed in **Figure 1.1**).

The Met Mast will be located on the west of the Site as detailed in **Figure 1.2** and will be a free-standing lattice type structure as shown in **Figure 2.7**. The Met Mast foundation will be approximately 12m by 12m, with a depth of 2.25m and will be designed and constructed similar to the turbine foundations. It will encompass a cast-in insert or bolts to connect to the bottom of the met mast and reinforced bar structural elements. The area around and above the foundation will be backfilled with compacted granular material. The Met Mast will be linked to the 38kV Substation via buried Internal Cabling for power and communication and will be required for the full operational duration of the Development.

2.5.7 Electrical Substation, Control Building and Associated Compound

It is proposed to construct a 38kV electricity substation on the Site, as shown on **Figure 1.2**. This will provide a connection point between the wind farm and the grid connection point at the existing Screebe 110kV substation. Electricity transmitted between the turbines and the substation on the Site will be at 38kV.

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

The substation will serve two main functions:

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

The construction and electrical components of the substation will be to ESB specifications within the parameters assessed. The substation compound will be c.837m^2 and will be 0.6m in depth and will be constructed from engineered stone material using similar construction techniques as for the crane hardstands. The overall compound will be enclosed by a 2.65m high fence and will contain a single building, ancillary equipment, including the transformers, switch gear, fault protection, metering, car parking and other ancillary elements necessary for the operation of the Development.

The substation building will contain control elements of the Development. The control components housed at the substation will include metering equipment, switchgear, the central computer system and electrical control panels. The control building will be a single story pitched roof structure with traditional rendered finishes and measure approximately 15.275m x 6.12m with a floor area of approximately 93.48m^2. Details of the substation building are shown on **Figure 2.8**. The appearance and finish of the substation building will be similar to an agricultural building with a slated roof and nap plaster finished proposed. It will have a suitably sized footpath around it and an adjacent parking area. The final finish of the control building will be an off-white or grey colour.

The control building will contain an ESB room, control room, switchgear room, small store, an office and toilet. There will be two lightning monopole protection masts which will be approximately 17m in heigh and associated site works. Warning / health & safety signage will be displayed as is normal practice for such installations. Motion sensitive lighting only will be used. It is proposed to install a rainwater harvesting system as the source of water for toilet and welfare facilities, a potable water being brought onsite in bottles. Wastewater from the staff welfare facilities in the control building will be collected in a sealed storage tank, fitted with a high-level alarm. This is a device installed in a fuel storage tank that is capable of sounding an alarm, during a filling operation, when the liquid level nears the top of the tank. All wastewater will be tankered off-site by a licensed waste collector to Oughterard wastewater treatment plant. There will be no onsite treatment of wastewater.

A telecommunication antenna will be fixed externally to the substation control building for communication and control purposes (e.g. for the Supervisory Control and Data Acquisition

(SCADA) System) for the Developer, turbine suppliers and ESB networks. There will be a small area outside the compound and adjacent to the access road that will be a hard-surfaced area for operation and maintenance for 4 parking spaces and will measure approximately 122m^2.

2.5.8 Transformers and Internal Cabling

The power generated by each wind turbine will be transmitted via underground Wind Farm Internal Cabling to the new electrical Substation, at either 20kV or 33kV, as will the communication signals whose cables will be installed in the same trench. The Wind Farm Internal Cabling network will be installed in trenches approximately 0.6m wide by 1m in depth and there will be approximately 5,530m of Wind Farm Internal Cable trenching (giving a surface area of approximately 3,152m²). The cable ducting will be installed to ESB Networks Limited requirements as per the design. A cross sectional drawing is shown in **Figure 2.9**.

The electrical and fibre-optic cables running from the turbines to the substation compound will be run within the Site Access Tracks and/or their verges. Where the cables are located in blanket bog habitat, they will be laid in the Site Access Tracks themselves to minimise land take in this habitat. This will be the case for the cables between T1 and T2 and from T6 to the site entrance at the N59.

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

Clay plugs or concrete cut offs will be installed at regular intervals in the cable ducting trenches where they are located on slopes to prevent the trenches from becoming preferential flow paths for runoff from the Site.

Transformers will be located inside each turbine.

Excavated material will be stored uphill of the trench excavations which will prevent any sediments from being washed downhill as they will be contained in the trench. Silt fences will be installed downgradient of the excavations on steeper slopes to prevent silt runoff.

2.5.9 Grid Connection

Connection will be sought from the grid system operators by application to ESB Networks Limited. Mullan Grid Limited assessed possible connection options for the Development and found that a 38kV connection to Screebe was the best option which would require the uprating of the existing 31.5MVA transformer to 63MVA. The substation will connect via underground 38kV cable to the ESB 110kV Screebe substation. The overall length of the grid connection between the substation and the existing Screebe 110kV substation is 18.65km, of which, approximately 3,295m is within the site of the Development with the remainder being located in the N59 and R336.The grid connection can be summarised as follows:

- UGC from Screebe SS to Tullaghmore WF utilising sections of UGC in public road, primarily regional roads, and private lands. [18.65km]

The route of the above grid connection is provided in **Figure 2.10.** The grid feasibility study carried out by TLI can be found in **Appendix 2.2**.

The Grid Connection will be constructed to the requirements and specifications of ESB Networks Limited. The three conductors will be laid in separate ducts which will be laid in accordance with the ESB functional specifications for 38kV Networks Ducting/Cabling (Minimum Standards as shown in **Appendix 2.3**). The width of a 38kV cable trench with a trefoil formation will be 600mm. The depth of the trench for 38kV cables is 1.22m. A separate duct will be provided within the trench for fibre optic communications. Refer to ESB Cable ducting Specifications in **Appendix 2.3**.

The following is a summary of the main activities for the installation of ducts:

- All relevant bodies i.e. ESB Networks Limited, Gas Networks Ireland, Eir, Galway County Council, Irish Water etc. will be contacted and up to date drawings for all existing services will be sought so that the grid connection ducting does not damage or interfere with existing services. This will be rechecked by the Contractor prior to excavations taking place.
- Immediately prior to construction taking place, the area where excavation is planned will be surveyed by CATSCAN (sub-surface survey technique to locate any below-

ground utilities) and all existing services will be verified. Temporary warning signs will be erected.

- Clear and visible temporary safety signage will be erected all around the perimeter of the live work area to visibly warn members of the public of the hazards of ongoing construction works.
- A silt fencing filtration system will be installed on all existing drainage channels for the duration of the cable construction to prevent contamination of any watercourse.
- A 13-tonne rubber tracked 360-degree excavator will be used to excavate the trench to the dimensions of 600mm wide by 1.22m deep.
- Once the trench is excavated, a 50mm depth base layer of sand (in road trench) or 15 Newton CBM4 concrete will be installed and compacted. All concrete will be offloaded directly from the concrete truck into the trench.
- uPVC ducts will be installed on top of the compacted base layer material in the trench.
- Once the ducts are installed, couplers (a device used for joining pipes) will be fitted and capped to prevent any dirt entering the unjointed open end of the duct.
- The as-built location of the installed ducts will be surveyed and recorded using a total station/GPS before the trench is backfilled to record the exact location of the ducts.
- The co-ordinates will be plotted on as-built record drawings for the grid connection cable operational phase.
- When ducts have been installed in the correct position on the trench base layer, sand (in road trench) or Lean-mix CBM4 (CL1093) (off road trench) will be carefully installed in the trench around the ducts so as not to displace the duct and will be compacted.
- Timer spacer templates will be used during installation so that the correct cover of duct surround material is achieved above, below and at the sides of the duct in the trench.
- A red cable protection strip will be installed above duct surround layer of material and for the full length of the cable route.
- A layer of Lean-mix CBM4 (CL1093) (in road) will be installed on top of the duct surround material to a level 300mm below the finished surface level.
- Yellow marker warning tape will be installed for the full width of the trench, and for the full length of the cable route, 300mm from the finished surface level.
- The finished surface of the road will then be reinstated on a temporary basis to the requirements of the Guidelines for Managing Openings in Public Roads, 2017[3].
- Precast concrete cable joint bays (junction boxes) will be installed within the excavated trench.

[3] https://www.gov.ie/en/publication/eda1ae-guidelines-for-managing-openings-in-public-roads-2017/

- The junction boxes will be backfilled and the finished surface above the junction box reinstated on a temporary basis as per the requirements of the Guidelines for Managing Openings in Public Roads, 2017. The cable junction boxes will be re-excavated a second time during cable pulling and jointing, after which the finished surface above the joint bays will be reinstated again to its original condition.
- When trenching and ducting is complete, the installation of the grid connection cable will commence between the substation and the existing 110kV substation at Screebe.
- The underground cable will be pulled through the installed ducts from a cable drum set up at one joint bay and using a winch system which is set up at the next joint bay, the cable will be pulled through.
- The cables will be jointed together within the precast concrete cable junction box (Joint Bay).
- The finished surface above each cable joint bay is reinstated on a permanent basis to the requirements of the Guidelines for Managing Openings in Public Roads, 2017.

2.5.9.1 Joint Bays

Joint Bays are pre-cast concrete chambers where individual lengths of cables will be joined to form one continuous cable. A joint bay is constructed in a pit. Each joint bay typically will be 6m long x 2.5m x 2.3m deep. A reinforced concreted slab will be constructed on top of the bay.

The joint bay locations have been dictated by suitable terrain and access to facilitate the operation of cable pulling equipment at any phase of the development and future operation of the installation in accordance with the ESB Networks Limited specifications.

Communication chambers, which are similar to small manholes, will be installed at the joint bay locations to facilitate connection of fibre-optic communication cables.

2.5.9.2 Trench Layout

The trench layout will be as per the appropriate ESB Networks Limited Specifications. The specification of Galway County Council will be followed for the excavation and reinstatement of the ducted cable trenches which is proposed to be in accordance with the requirements of the Guidelines for Managing Openings in Public Roads, 2017.

2.5.9.3 Joining Ducts

All joining ducts shall be laid in straight lines to even gradients. Once the ducts have been installed and backfilled with lean-mix concrete and with Clause 804 stone the duct run will

be thoroughly cleaned by pulling the appropriate size of ESB Networks Limited approved duct brush through the duct.

Details of the construction methodology are summarised below:

- Preparatory Works
  - Preparatory Trial Pit Survey along the cable route
  - Access to the start point and setting out
  - Access to joint bays
  - Silt Attenuation Features and watercourse set back buffer
  - Joint Bay Excavation
- Trenching Works
  - Storage of Materials
  - Trench Operations
  - Managing excess material from trench works

2.5.9.4 Directional Drilling Works

There are 22 no. watercourse crossings along the grid connection route. From the bridge survey carried out by JOD, the majority of the crossings have sufficient cover in the road to allow the excavation of the cable ducting within the roadway or bridge. However, five of the crossings will be constructed by means of directional drilling technology. Directional drilling is the practice of drilling holes in a non-vertical direction for the laying of ducts which contain cables beneath features such as watercourse. The directional drilling commences at the launch pit which is the entry point for pipes and ducts to be placed. Pipes and ducts are brought through the drilled hole to a receiving pit on the opposite side of the hole to the launch pit. The crossings will comprise 4 x 110mm High Performance Polyethylene (HPPE) pipes/ducts each directionally drilled. Two separate excavations will be made to a depth of 2 metres to accommodate the directional drilling launch and reception pits in the road on either side of the crossing (no third-party lands either side of the road are anticipated to be required). Spoil arisings will be loaded onto trucks for disposal off-site as soil is excavated. The excavation launch and reception pits will be reinstated using compacted layers of crushed stone on completion of drilling and jointing operations.

The Drill head will be placed in the open excavation (launch pit) and it will be guided in by the operator for the first 1-2 metres. A series of drill rods will be connected to the head as it travels further along the shaft.

The drill position is always known to the operator and the drill can be manoeuvred in 3 planes / axis. A surveyor will monitor drilling works to ensure that the modelled stresses and collapse pressures are not exceeded. A drilling lubricant will be required and this will be delivered directly to the drill head by hydraulics. The lubricant will be chemically inert bentonite slurry mixture which lubricate the drill head and remove the drilled earth and stone. Once the conduit is completed, the drill head is exposed at the reception pit and removed. Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit pit and will pull a drill pipe back through the bore to the entry side. The drill rods are connected to the duct pipe and the drill is reversed pulling the pipe back through the conduit.

A spoil volume of 5m³ will be excavated for each 100m run of 4 pipes. This spoil will be largely subsoil material. This material will exit the launch pit within the bentonite slurry mixture. A mobile bunded tank will be located next to the launch pit into which the material/slurry mixture will be pumped. This will be stored outside of the 25m watercourse buffer zone.

The following measures will be implemented during the directional drilling works:

- No in-stream works will be permitted
- Works shall not take place at periods of high rainfall, and shall be scaled back or suspended if heavy rain is forecast
- A floating hydrocarbon boom and spill kit will be employed
- Silt fencing will be erected at a setback distance of 5m during excavation
- Any excess construction material shall be removed from the works areas and disposed of in a fully licensed landfill
- No re-fuelling of machinery will take place on site or within 50 metres of any watercourse
- All construction workers will be given a toolbox talk addressing the environmental topics concerning the drilling prior to commencement of construction.

2.5.10 Borrow Pit

Due to the prevalence of bogland habitat on site, no borrow pits are proposed to minimise land take on site. While some, rock for the construction of Site Access Tracks and Turbine Hardstands will be sourced where rock is encountered during the excavations for Site Access Tracks and Turbine Hardstands or Turbine Foundations, the bulk is to be imported to the Site from a nearby quarry as shown on **Figure 14.1**.

2.5.11 Turbine Foundation Rock Breaking

Weaker rock will be extracted using a hydraulic excavator and a ripper. Upon the completion of further confirmatory site investigation, where stronger rock is encountered and cannot be extracted using an excavator, then rock breaking equipment will be employed. This will involve the use of a 40-60 tonne 360 degree hydraulic excavator with a rock breaker. The rock breaker is supported by a smaller 30-40 tonne rock breaker which breaks the rock down further for feeding into the rock crusher machine. The larger rock breaker breaks out the rock in a progressive manner from the turbine foundations and the smaller rock breaker breaks it down further.

The broken-down rock is loaded into mobile crusher using a wheeled loading shovel machine and crushed down into the correct grade for use in the civil construction of Site Access Tracks and Turbine Hardstands.

2.5.12 Onsite Drainage

The surface water runoff contained within natural and artificial drainage channels includes stream and river waterbodies, drainage ditches, and other minor natural and artificial manmade drainage features. Drainage measures will be provided to attenuate runoff, guard against soil erosion, soil compaction, and safeguard local water quality. Details of the drainage system are shown on **Figure 2.11-2.13** and outlined in detail in the Surface Water Management Plan, part of the CEMP attached as **Appendix 2.1** and full details are provided in **Chapter 9: Hydrology and Hydrogeology.**

There is one river, the Owenwee River, which runs along the boundary of the site and next to the exiting access track into the site from the N59. A buffer zone of at least 50m will be in place for the Owenwee River where possible, with the exception of the section of existing access track to be upgraded near the Owenwee River. There will be upgrade works on this access track which will take place inside the buffer zone. Other watercourses on site consist of manmade drainage channels and headwaters of the Owenwee and Owenree Rivers, some of which are ephemeral. Sustainable Urban Drainage System (SuDS) principles will be employed as follows:

Source controls for surface water

- Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sandbags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems

- Small working areas, covering stockpiles with geotextiles layering to protect against water erosion and runoff in rainy weather, and/or cessation of works in certain areas such as working on a high gradient during wet and windy weather.

In-line controls for surface water

- In line controls are controls which are directly applied to the surface water body, including interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sandbags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriates systems

Treatment systems for surface water:

- Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbusters and/or other similar/equivalent or appropriate systems.

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

Further details on drainage management and mitigation can be found in **Chapter 9: Hydrology and Hydrogeology** and the Surface Water Management Plan attached in the CEMP as **Appendix 2.1.**

2.5.13 Table of Key Development Infrastructure Metrics

The Key Development Infrastructure Metrics are contained in **Table 2.6**. This table is provided for ease of access to these metrics for reference by the personnel writing the other EIAR Chapters.

Table 2.6: Key Development Infrastructure Metrics

Description	Length [m]	Width [m]	Depth [m]	No.	Area [m^2]	Volume of Excavation [m^3]
Upgraded Site Access Track	1,450	2	0.6	1	2,900	1,740
New Site Access Track	5,530	5	0.6	1	27,650	16,590
Internal Cabling (power & communications)	5,530	0.57	1.05	1	3,152	3,310
Turbine Hardstands - cranes	-	-	0.6	6	20,370	12,222

Description	Length [m]	Width [m]	Depth [m]	No.	Area [m^2]	Volume of Excavation [m^3]
Turbine Foundations (25.5m diameter)	-	-	3	6	3,064	9,192
Met Mast foundation	12	12	2.25	1	144	324
Electrical Substation	-	-	0.6	1	837	502
Site Compound	30	45	0.3	1	1,350	405
38kV Cable Grid Connection (Option A)	18,650	0.6	1.220	1	11,190	13,652
Total					**70,657**	**57,937**

Taking the above figures into consideration, the permanent land take from the Development will be 54,965m^2 (5.9ha) which is the sum of the figures above which are to be retained following construction e.g. Site Access Tracks, Turbine Foundations, Met Mast Foundation, Turbine Hardstands, Met Mast Hardstand and 38kV Substation. Temporary land take on Site will be 4,502m^2. The grid connection will involve works on 11,190m^2 of area on the public roads to be reinstated following the laying of the ducts and so is classed as temporary land take. Therefore, the total land take required for the Development will be approximately 5.4ha.

2.5.14 Site Signage

Signs will be placed on the N59 showing directions to the Site. Additional signage will be placed on the road, warning of construction vehicles entering and egressing the Site for road safety measures. The Site entrance on the N59 will have a sign confirming that it is the entrance to the Site and the speed limit of 30 km/h. There will also be additional signs during the construction phase confirming that construction works are taking place and proper precautions must be taken by anyone entering the Site. There will be no entry to unauthorised persons or the general public during construction. Additional details can be found in **Section 13.6**.

2.5.15 Peat and Spoil Management

2.5.15.1 Spoil Quantities

The quantities of spoil likely to be generated at the Development have been calculated by Jennings O'Donovan & Partners. It is estimated that based on site surveys carried out by Andrew Garne Geotechnical Services using peat probes that the amount of peat spoil

predicted to be generated during construction of the wind farm is approximately 84,760m^3 of peat spoil.

The total amount of cut material below the peat layer estimated from the Development is approximately 218,635m^3 with the amount of fill being estimated at 174,526m^3. This leaves a surplus of 44,109m^3 that it is envisaged can be used as structural fill in Site Access Tracks, Turbine Hardstand and Turbine Foundation construction.

2.5.15.2 Landscaping & Reinstatement

Due to the nature of the peat habitats on site, berms or large designated storage areas for the storage of spoil will not be permitted. However, peat spoil will be used to reinstate exposed areas around infrastructure such as slopes/graded ground around Site Access Tracks and Turbine Hardstands and on the Turbine Foundations or where there is degraded bog that can be enhanced by depositing peat on it. Peat that cannot be used for reinstatement around the Site, will be taken off site to the designated spoil storage area to the east of Maam Cross, approximately 3.5km to the west of the wind farm site. The designated spoil area has an area of approximately 65,182m^2 (6.5ha) and a capacity of approximately 97,000m^3 assuming that the areas of cutover peat can be filled in and berm constructed in cells so that spoil can be stored up to a total height of approximately 1.5m. This will allow the total estimated amount of spoil to be stored taking into account a bulking factor of 10% (total of approximately 93,236m^3). These areas are shown on **Figure 1.2(b)** and the existing site conditions are shown in **Plates 2.1** and **2.2**.

Plate 2.1 – Site of Spoil Storage and Peat Restoration (Habitat Enhancement)

Plate 2.2 – Site of Spoil Storage and Peat Restoration (Habitat Enhancement)

European Communities (Waste Directive) Regulations 2011 presents a number of options to manage waste – Article 27 allows for material to be classed as a by-product and not a waste where the following conditions are met:

a) further use of the substance or object is certain;
b) the substance or object can be used directly without any further processing other than normal industrial practice;
c) the substance or object is produced as an integral part of a production process; and
d) further use is lawful in that the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.

It is considered that the spoil material is classed as a by-product under By-Product (Regulation 27) as the material will be used to restore areas of cutover bog at the Spoil Storage Areas without any further processing and will not lead to overall adverse environmental or human health impacts. The production of peat spoil from the wind farm is an integral part of the construction process as peat will need to be removed to allow construction of the wind farm.

The areas of cutover peat were historically used as turbary by local residents and were not used for large scale commercial peat harvesting purposes. Peat harvesting on site took place on site prior to 21st September 2011 in line with Point 9 of Table 2 of the The Regulatory Framework Applying to Peat Extraction - A Guidance Document. Point 9 states the following:

"Development commenced prior to 21 September 2011 and completed prior to 21 September 2012 unless, immediately before 21 September 2011 the development was being carried on in contravention of the Planning Act of 2000 or Regulations under that Act."

It is also likely that peat harvesting took place on the site prior to 1st October 1964 in accordance with Point 1 of Table 2 of the Guidance in which case planning permission is not required. Point 1 states the following:

"Extraction commenced prior to 1 October 1964 and no subsequent material change of use i.e., works are a continuation of works commenced prior to 1 October 1964."

Works at the spoil storage areas will involve the machinery similar to that used for peat excavation. A 40-60 tonne 360 degree long reach hydraulic excavator and tractors and trailers will be used to place the spoil in areas of cut away to create level surface. Where these areas are less than 1.5m deep (expected to be the majority), they will be filled with peat to the adjoining ground level and then a containment berm will be created to create cells. The cells will be bermed and will measure a maximum size of approximately 30m x 30m and have outfalls blocked and overflow management with the creation of drainage channels for excess water and sphagnum inoculation. Where the storage is on areas of non cutover peat, then the cells will be provided on the surface of the existing degraded/de-vegetation peat surface. The width of the cell, in an east to west orientation will be dictated by the width of the existing areas of cutover blanket bog either side of the degraded/de-vegetated area, but will not be wider that 45m in width. The length of the cells along their broadly north to south axis will not be longer than 60m in length. More information can be found in **Chapter 7: Biodiversity**.

2.5.15.3 Non Peat Spoil

Non peat spoil will consist of glacial till from granite bedrock / rock is present on site according to the PSRA report by EcoQuest Environmental Services contained in **Appendix 8.1.** It is envisaged in the design that all the non-peat material won on Site can be used as fill on site in the following places:

- Subsoil to be used around the blade laydown areas where load capacities required are less; and
- Rock won from excavations to be used within Site Access Track and Turbine Hardstand build up.

There will also be spoil generated from the grid connection works. This will be in the form of tarmacdam/asphalt, compacted rock fill material and subsoils. The total amount of spoil

material from the grid connection works is estimated to be 12,590m^3. This material will need to be taken off site and recycled/disposed of at Carrowbrowne Recycling Centre which is an appropriate licenced facility to deal with inert waste.

2.5.16 Ecological Enhancement

An area of land of approximately 296,625m^2 (29.6ha) has been designated around the peat spoil storage areas identified above that will be used as a habitat enhancement area. The land use restrictions that would be required for peatland restoration in this area will comprise:

- Cessation of turbary activity
- Cessation of drainage: Drain blocking with control of water levels
- Cessation of inappropriate livestock grazing levels and no grazing between 1st November and 28th February
- Active seeding with peat vegetation such as Sphagnum moss or heather brashing.

Further details on this can be found in **Chapter 7: Biodiversity**.

2.6 CONSTRUCTION

The first phase of the Development will comprise the construction phase. This phase will begin with site preparation works and will be complete when the turbines are built and ready for commissioning, and when all wastes have been removed from the site. For this Development, it is envisaged that the construction phase will last approximately 14-15 months. An indicated construction programme is set out at **Table 2.7**.

Table 2.7: Indicative Construction Programme

Activity	Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Site Establishment/ Fencing off	X														
Internal Access Road Upgrade & Construction		X	X	X	X										
Substation & Compound Construction				X	X	X	X								
Substation Electrical Works									X	X	X	X	X	X	
Substation Commissioning										X					
Excavation & Construction of Turbine Foundations & Hardstands		X	X	X	X	X	X	X	X						
Internal Cabling Installation								X	X	X					

Turbine Delivery and Erection										X	X				
Grid Connection									X	X	X	X	X		
Energisation														X	
Turbine Commissioning														X	X
Site Restoration														X	X

2.6.1 Construction and Environmental Management Plan (CEMP)

A CEMP is appended to the EIAR in **Appendix 2.1**. The CEMP includes all the mitigation measures proposed within the EIAR and the NIS. A Summary of the mitigation measures is included in **Appendix 16.1**. In the event planning is granted for the Development, the CEMP provides a commitment to mitigation and monitoring, and reduces the risk of pollution whilst improving the sustainable management of resources. The environmental commitments of the Development will be managed through the CEMP and will be secured in contract documentation and arrangements for construction and later phases, such that there will be a robust mechanism in place for their implementation. The CEMP addresses the construction phase, and will be continued through to the commissioning, operation and final decommissioning phases (refer to Decommissioning Plan as part of the CEMP in **Appendix 2.1**). An Ecological Clerk of Works (ECoW) with experience in overseeing wind farm construction projects will be appointed by the Developer for the duration of the construction phase so that the CEMP is effectively implemented. The Contractor will be required to appoint an Environmental Manager.

2.6.2 Refuelling

Vehicles will be refuelled off-site where possible. For vehicles that require being refuelled on-site, fuels will be stored in the temporary construction compound and bunded to at least 110% of the storage capacity of fuels to be stored. Refuelling will take place via a mobile double skinned fuel bowser. The bowser will be a double axle refuelling trailer which will be towed to the refuelling locations by a 4x4 vehicle. The 4x4 will carry, a drip tray, spill kit and absorbent mats in case of any accidental spillages. Only designated competent personnel will refuel plant and machinery on the Site.

2.6.3 Concrete

There will be no concrete batching on the Site. Rather, it will be transported to the Site as it is required. A dedicated, bunded area will be created to cater for concrete wash-out and this will be within the temporary construction compound located north of the site entrance.

This will be for the wash-out of the chutes only after the pour. Concrete trucks will then exit the Site and return to the supply plant to wash out the mixer itself.

The main concrete pours at the turbine locations will be planned in advance and proposed mitigation measures (are detailed in **Chapter 9: Hydrology and Hydrogeology**) will be as follows:

- Avoiding large concrete pours, for Turbine Foundations for example, on days when temperatures are not optimal as per (BS 8110) (EN1992-1-2) or when heavy or prolonged rainfall is forecast i.e., during a period in which a Met Éireann Status Red weather event will/has occurred
- Providing that all concrete pour areas are dewatered prior to pouring concrete and while the concrete is curing
- Making covers available so that areas can be covered if heavy rain arrives during the curing process which will prevent runoff of concrete which has a high pH

The chutes wash out on-site will require a small volume of water. This water will be directed to the concrete washout area which will be a temporary lined impermeable containment area or a siltbuster type washout unit[4] or similar. The unit catches solid concrete and filters and contains the washout liquid for pH adjustment and solid separation. The residual liquids and sediments will be disposed of at an appropriately licenced facility, namely Oughterard Wastewater Treatment Plant.

If a temporary lined impermeable containment area is used, these are usually constructed using straw bales and lined with an impermeable geotextile membrane. An example is shown on **Plate 2.3**. An alternative construction method would be to dig a hole in the ground and place an impermeable geotextile membrane in the hole so that no wastewater can penetrate the cover and seep into the soil and groundwater.

[4] https://www.siltbuster.co.uk/solutions/concrete-washwater/

Plate 2.3: Typical Temporary Concrete Washout Area

The washout area is covered when not in use during periods when wet weather is forecast to prevent ponding of rainwater. During periods of dry weather, the area can be left uncovered to allow evaporation of water. Once concrete pours have been completed, the remaining water will be tankered off site to a licenced facility for disposal. Solid concrete can be broken up and disposed of at a licenced facility along with other construction waste. It can be estimated that there will be approximately 1-2m^3 of solid concrete waste per Turbine Foundation pour that will need to be disposed of, or a maximum of 12m^3 in total.

It is expected that the Turbine Foundations will be left in-situ during decommissioning and so will not require breaking up and disposal.

Deliveries of concrete for Turbine Foundation construction are generally carried out outside of normal working hours to limit impacts on traffic and local road users. Each turbine pour can take place in a single day, so over 6 days in this case.

Further measures that will be used to mitigate the risk of pollution from concrete pours are as follows:

- The concrete trucks will not be washed out on site but will be washed out on return to the batching plant.
- Site Access Tracks will be constructed so that all concrete trucks will be able to access all areas of Site with ease and no concrete will be transported around the Site on open trailers or dumpers to avoid the risk of spillages.
- All concrete for the Turbine Foundations will be pumped directly into the shuttered formwork with rebars from the delivery vehicle. If this is not possible, the concrete

can be pumped into a hydraulic concrete pump or into an excavator bucket for transfer to the required location.

- The Transport Management Plan specifies the routes and arrangements for concrete delivery as well as outlining emergency measures to be taken. Refer to TMP in **Appendix 14.2**. Quarries and concrete suppliers in the area are shown on **Figure 14.1**.
- Signage will be erected near concrete pour areas to advise drivers that concrete washout on site is not permitted.

2.6.4 Waste Generation

During construction a number of types of waste will be generated from the Development. The types and estimated quantities are shown in **Table 2.8**.

Table 2.7: Types of Waste from Construction

Waste Type	Quantities
General (canteen, plastic, cardboard)	1 skip/month
Concrete	12m^3
Plastic (10kg/turbine blade)	180kg
Timber Pallets	20 - 30
Timber Cable Drums	30 - 40
Oils/Fluids	N/A
Metals	1 skip/month

The Contractor will avoid or minimise the volume of waste generated.

Waste will be stored a minimum of 65m from nearby watercourses or drains at the Site.

Waste storage and disposal will be carried out in a way which prevents pollution in compliance with legislation.

All waste to be transported off-site to a licensed disposal site. The nearest licenced waste facility is over 9km to the east of the Site in Oughterard (Civic Amenity Services). Excavated material along the Grid Connection Route will be removed to a licenced waste facility. Duty

of Care Waste Control dockets must be produced and filed on site with each load. These MUST detail:

- An adequate description of the waste
- Where the waste came from
- The appropriate code from the List of Wastes Regulations for the waste (commonly referred to as the European Waste Codes)[5]
- Information on the quantity and nature of the waste and how it is contained
- Names and addresses of the transferor at Tullaghmore Wind Farm (the person currently in control of the waste) and the transferee (usually either a registered waste carrier or a waste management licence holder (waste manager)
- The Standard Industry Classification code (2007 or 2003 for hazardous waste only) of the business from where the waste was received
- Where applicable, indicate that the Waste Hierarchy has been complied with
- The place, date and time of transfer of the waste. If using a season ticket, the period for which it is valid (i.e., valid from dd/mm/yyyy to dd/mm/yyyy)

All oil storage facilities will have secondary containment facilities of 110% storage capacity (e.g., bund, enclosure, drip tray). All of these will be regularly inspected for visual signs of leaks or something that would impact on their capacity – e.g., a drip tray full of rainwater. Waste storage areas will be clearly located and signed. Key waste streams will be separated.

All waste will be transported from site at appropriate frequency by a registered waste contractor to prevent over-filling of waste containers.

Frequency of Checks. The contractor will ensure that all storage facilities are checked on a weekly basis.
Only trained operatives will handle hazardous substances. All stored hazardous waste will be clearly labelled.

During operation it is not anticipated that significant quantities of waste will be generated from the Development. Should a turbine blade need to be replaced, then some plastic waste will be generated, which can be expected to be similar to the construction phase, that is approximately 10kg of plastic waste per blade.

[5] https://www.epa.ie/publications/monitoring--assessment/waste/2019--FULL-template.pdf

During decommissioning, it is expected that approximately 100 tonnes of steel will be removed from Turbine Foundations (if foundations are to be removed and not left in-situ).

2.6.5 Dust Suppression

During periods of dry and windy weather, there is potential for dust to become friable and cause nuisance to nearby residences and users of the local road network. Damping down (wetting of the surface) may be required to see that dust does not become friable. A wheel cleaning facility will be employed on-site where mud and debris will be removed from vehicles egressing the Site and reduce mud and debris from getting onto the local road network, in particular the N59, by which all traffic to the Development will access the Site, where it could dry out, become friable and potentially cause a nuisance. HGVs entering the Site carrying rock will be covered to prevent dust generation. A road sweeper will be available for use on the N59 in case of any mud or debris making it onto the public road network.

2.6.6 Construction Hours

It is estimated that the Development will have approximately 40 construction workers during the construction phase, rising to 63 at peak construction. Working hours for construction will be from 07:00 to 19:00 on weekdays, with reduced working hours at weekends, from 08:00 to 13:00 on a Saturday. No work will be carried out on Sundays or Public Holidays. It should be noted that during the turbine erection phase, operations will need to take place outside those hours to facilitate turbine foundation construction and so that lifting operations are completed safely. Hours of working for turbine foundation construction will be agreed with Galway County Council prior to the commencement of turbine foundation construction. A detailed Traffic Management Plan ("TMP") will be implemented for the construction phase, which shall be agreed during the planning compliance stage with the Planning Authority so that strict controls as described herein are in place with all suppliers coming to the Site.

2.6.7 Construction Compound and Temporary Works Area

The temporary construction compound will be set up upon commencement of the construction phase. The proposed location for the temporary construction compound is north of the site entrance as shown in **Figure 1.2(a)** and the layout is shown in **Figure 2.14**. The compound will be 45m by 30m and approximately 0.3m in depth [1,350m² / 405m³]. The compound will be used as a secure storage area for construction materials and to contain temporary site accommodation units for sealed type staff welfare facilities. The compound will contain cabins for offices space, meeting rooms, canteen area, a drying room, parking facilities, and similar personnel type facilities.

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

During the construction phase, water will be supplied by water bowser. The maximum wastewater production is estimated to be the same as the maximum water consumption (up to 2,000 litres per day). The project will include an enclosed wastewater management system at the temporary compound capable of handling the demand during the construction phase with 50 construction workers on site at peak. A holding tank is proposed for wastewater management. Wastewater which will be removed off-site and disposed of at Oughterard Wastewater treatment plant.

2.6.8 Construction of Crane Hardstands and Foundations

The construction method for all the crane hardstands will be via excavated approach. Each crane hardstand will be 97m by 35m. Foundations will be taken down to competent bearing strata by excavating through the soil, subsoil, and rock if necessary.

The method of construction for turbine foundation is also described below:

- Install temporary drainage around perimeter of excavation
- Excavate soil and rock
- Form a level working area to build foundation
- Install formwork and reinforcement
- Pour concrete
- Cure concrete
- Once the concrete has set and the earthing system is in place, backfill the foundation with rock
- Use soil to build up the area around the turbine base

2.6.9 Construction Turbine Assembly

Once on Site, the wind turbine components will follow a detailed route and plan to minimise manoeuvring. Components will be placed on turbine hardstands prior to assembly. It is proposed that a 'just in time' delivery strategy will be in place for turbine blades to reduce the need for temporary set down areas. Typically, one large crane (750-1,000 tonnes) will be required for erecting the turbines, assisted by a smaller crane (150-200 tonnes). Similar

cranes will also be required for maintenance during the operational phase. As with all other vehicles, refuelling of cranes will be carried out in accordance with site procedures to minimise the risk of spillage or pollution.

The towers will be delivered in sections, and work on assembly will not start until a suitable weather window is available, e.g., Wind Gust Speed Threshold of less than 6ms^{-1}. The bottom tower section will be bolted onto the concrete foundations. The mid tower section will then be lifted into position and bolted to the bottom tower section. Finally, the top tower section will be lifted into position and bolted to the mid tower section. One of the three following methods can be used to attach the blades:

1. The blades can be attached to the nacelle and hub on the ground. The hub and blades are then lifted as one.

2. The hub can be attached to the nacelle and the two blades attached to the hub while the nacelle is on the ground – the "bunny lift". The nacelle is then lifted into position and the third blade lifted into place separately. This requires manoeuvring of several components on the ground and usually the repositioning of cranes.

3. Lifting the nacelle and hub as one unit, as described above and then attaching the blades one at a time, rotating the hub between lifts. The blade lifting operations do not require repositioning of the crane.

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

2.6.10 Construction Traffic

It is estimated that during civil construction, approximately 9,014 loads will be delivered to Site or take spoil from the main wind farm site to the designated spoil storage areas east of Maam Cross. This breaks down to approximately 901 loads per month or an average of 36 to 37 loads per day excluding Sundays and bank holidays. The peak number of deliveries per day will occur during the concrete pour for turbine foundation construction. An estimated 75 (assuming a capacity of 8m^3) concrete truck deliveries will be required per Turbine Foundation (for at least 6 separate days in the construction programme when the turbine foundations will be poured).

Additionally, approximately 84,760m^3 of peat spoil will need to be stored at the designated spoil storage area to the east of Maam Cross. This will require approximately 7,065 loads

(from the total of 9,014). The spoil will be taken to the designated spoil storage location outlined on **Figure 1.2(b)** for storage. It is estimated that approximately 1,200m^3 of rock will require to be imported to site . This will require approximately 120 truck loads so there is a potential to reduce the amount of trucks to 6,945 if these trucks were to take spoil on their return trip. It is also likely that some of the spoil will be able to be reused on site. However, for the purposes of the EIAR assessments, the worst case of 7,065 loads for spoil transport has been assumed.

The total amount of spoil material from the grid connection works on the public road network (N59 and R336 and R340) is estimated to be 12,590m^3. This material will need to be taken off site and recycled/disposed of at an appropriate licenced facility, in this case Carrowbrowne Recycling Centre and this will lead to 1,011 HGVs travelling from the grid connection works to the disposal site.

Prior to construction commencing on site, the Traffic Management Plan (TMP) will be developed by the Contractor and submitted to Galway County Council for agreement. This Plan will contain details of all proposed signage on the N59 warning of the entrance to the construction site/wind farm. Please see **Appendix 14.2** for TMP. In the event planning permission is granted for the proposed development, the final TMP by the Contractor will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.

2.6.11 Construction and Management of Site Drainage

Drainage measures will be implemented to the Development to attenuate runoff, guard against soil erosion, soil compaction, and safeguard local water quality. Details of the proposed drainage system are shown on **Figure 2.11** to **2.13**. Please note that the drainage plan will be subject to a detailed design process at pre-construction phase but will conform to the parameters set out in the EIAR. Full details are provided in **Chapter 9: Hydrology and Hydrogeology**.

A buffer zone of 50m will be in place for natural streams where possible. The main watercourse is the Owenwee River which runs along the site boundary on the east of the Site. Best practice Sustainable Urban Drainage System (SuDS) principles will be employed as follows:

- Source controls for surface water:

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

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

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

Further details on drainage management and mitigation can be found in **Chapter 9: Hydrology and Hydrogeology**.

2.6.12 Watercourse Crossings

There are 3 no. watercourse crossings required on the proposed Site Access Tracks. There is one crossing of the Owenwee River on the access track north of the N59 and this will be a clear span bridge type construction just north of the existing bridge over the river to replace the existing bridge which is unsuitable. The remaining two no. crossings are of small streams on site and will be constructed using precast bottomless culverts. The Owenwee River crossing is shown on Figure 2.6(a) and the proposed bottomless culverts for the other 3 crossings are shown on Figure 2.6(b), (c) and (d).

2.6.13 Reinstatement and Monitoring

Following completion of construction, all plant and machinery will be removed from the Site. The temporary works areas needed for the construction period such as blade laydown areas, will be reinstated using the original spoil material removed and stockpiled close to the location from where it was excavated. Stockpiles will be restricted to less than 2m in height and located outside of the surface water buffer zones. All stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECoW).

The temporary will be reinstated to its previous land use. The grid route will be reinstated to its original condition. Joint bays will be reinstated as per the Forestry Road Manual (Guidelines for the design, construction and management of forest road).

All rubbish and waste/excess materials will be removed from Site to Carrowbrowne Recycling Centre which is an appropriate licenced facility from where it will be reused/recycled, where possible, or disposed of accordingly.

Peat and spoil materials excavated during construction of the infrastructure will be used to reinstate any areas of temporary infrastructure such as blade laydown areas and for landscaping around infrastructure such as Turbine Hardstands and Site Access Tracks. Peat turves will be removed in layers with the vegetated side up. The top vegetated turves will be placed on top of reinstated / restored areas so that the turves can 'knit' together effectively form areas of restored peatland habitat in accordance with the HMP in **Appendix 6.5**.

The on-site installed drainage network will be left in place. This will be periodically monitored to see that it is operating to its stated design purpose. Water monitoring on nearby natural watercourses will be undertaken during and post construction to determine if any pollution has migrated off-site, and if so, implement measures to rectify the impact which will be agreed with IFI:

- Various combinations/adaptations of the runoff control and drainage management measures during the operational phase will be employed at the site depending on the local conditions and topography: Natural vegetation filters will be used regularly across the site where the local drainage and topography allow attenuation of surface water runoff. Where possible, interceptor drains are installed up-gradient of infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It is now directed to areas where it can be re-distributed onto natural vegetation by buffered outfalls or level spreaders. Swales/trackside drains will be used to collect runoff from Site Access Tracks and Turbine Hardstands, likely to have entrained suspended solids and channelled it onto natural vegetation.
- The pre-existing and newly established drainage infrastructure will be sufficiently maintained for the discharge rates associated with all areas of the Site. Any and all blockages which may adversely impact upon the drainage regime at the Site will be immediately removed during the operational phase of the proposed Development.

2.6.14 Construction Supervision and Monitoring

The construction activities will be monitored by a Geotechnical Engineer, a qualified archaeologist and an ECoW. The Geotechnical Engineer will be contracted for the detailed design phase and their services retained throughout the construction and reinstatement phases. The Geotechnical Engineer will oversee all earthworks and excavation activities and monitor for issues such as ground stability, water ingress into excavations etc.

The ECoW will be employed prior to the commencement of the construction phase and will monitor the working corridor (the area inside which construction works and plant and equipment manoeuvring will take place) and review the pollution control measures and working practices during construction and have input into site remediation. The ECoW will have stop work authority if, for example, a sensitive habitat feature is encroached upon or there is the possibility of silt/pollution runoff to natural watercourses.

The potential exists for the presence of unrecorded, sub-surface archaeological features within green field locations in proposed construction areas within the Site. A series of pre-construction and construction phase archaeological investigations under licence by the National Monuments Service will be carried out by a suitably qualified archaeologist. The archaeologist will have responsibility for providing that potential archaeological features are protected should any be discovered during excavations. If any potential archaeological features are discovered, the archaeologist will inform the National Monuments Service (NMS). The site will be accessible to the appointed archaeologist at all times during working hours and the nominated archaeologist will monitor all invasive works.

In the event that any sub-surface archaeological remains are identified during site investigations, they will be cleaned, recorded and left to remain *in situ* within cordoned off areas while the National Monuments Service are notified and consulted in relation to appropriate future mitigation strategies, which may entail preservation *in situ* by avoidance or preservation by record by archaeological excavations.

Regular weekly inspections of the installed drainage system will be undertaken, especially after heavy rainfall events, to check blockages and see that there is no build-up of standing water in any part of the system where is it not designed to be. A report will be produced monthly during the consultation phase detailing the results of the water quality monitoring.

Excess build-up of silt will be removed at check dams, attenuation/settlement ponds or any other drainage feature by scraper or excavator and under the supervision of the ECoW.

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

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

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

The R336 and N59 near the Site used to transport construction materials will be monitored during construction, so that any damage caused by construction traffic associated with the Development can be identified and repaired, as soon as possible, depending on the level of damage / inconvenience, to avoid issues for other road users. It is envisaged that rock will be sourced from a local quarry and concrete may be sourced from further afield such as Athenry, depending on the supplier. This is assessed in **Chapter 14 Traffic and Transportation**.

2.6.15 Construction Sequencing

It is envisaged that the following will be the sequence of construction for the Development:

1. Contractor Compound and Welfare Facilities
2. Site Preparation
3. Site Roads
4. Crane hardstands
5. Turbine foundations
6. Internal cable ducting
7. Installation of the grid connection
8. Erection of wind turbines
9. Commissioning and Energisation

The 38kV substation will be constructed in parallel with Turbine Hardstands, Turbine Foundations and Internal Ducting. The first step will be to construct the Temporary Construction Compound and Welfare Facilities. Access to the area will be via the existing

site entrance off the N59. The next step will be to prepare the areas of the site where site infrastructure is to be located by marking out the construction works corridor and the relevant environmental buffer zones as required.

Following the site preparation, the Site Access Tracks and associated drainage will be constructed according to the Vestas specifications within the parameters of the EIAR. The next step will involve construction of the crane hard-standing areas for the 6 no. turbines according to the Vestas specifications. The 6 no. Turbine Foundations can then be excavated and foundations constructed using reinforcing bar (rebar) and imported concrete. No concrete batching will take place on site. Following the construction of the Turbine Foundations, internal cable ducting from the turbine locations to the on-site 38kV substation will be laid in trenches along or in the constructed Site Access Tracks. The grid connection will be constructed from the Site in the N59, R336 and R340 via underground cable duct for a length of 18.65km to Screebe 110kV ESB Substation as outlined in **Section 2.5.10**.

The last step will be to erect the 6 no. wind turbines on the foundations using two cranes. Commissioning and testing of the turbines can then proceed.

2.6.16 Construction Employment

It is estimated that approximately 40 construction workers will be employed on-site with this number rising to up to 63 during the peak period of Turbine Foundation construction.

2.7 COMMISSIONING

Wind farm commissioning can take in the region of 2 months to complete from the erection of the final turbine to the commercial exportation of power to the national grid. It involves commissioning engineers working through an entire schedule of SCADA (Supervisory Control and Data Acquisition) and electrical and mechanical testing and control measures to check that the wind farm will perform and export power to the national grid, as designed.

2.8 AERONAUTICAL LIGHTING

The IAA will be consulted and upon request, any specified turbine or obstacle 100m or greater will be installed with a warning light system under direct specification and in accordance with International Civil Aviation Organisation (ICAO) Annex 15 requirements.

It is proposed to fix a warning light to T3 and T4 as they are at the highest elevations. The following data will be supplied to the IAA:

- The WGS84 coordinates (In degrees, minutes and seconds) for each turbine.

- Height above ground level (to blade tip) and elevation above mean sea level (to blade tip) in both meters and feet.
- Horizontal extent (rotor diameter) of turbines and blade length where applicable in both meters and feet.
- Lighting of the wind farm, which turbine(s) is/are lit, and what type of lighting.

2.9 COMMUNITY BENEFIT

2.9.1 Financial Contributions

EMPower will set up a community benefit fund which will allocate funds from the wind farm to community groups in the area should the wind farm be granted planning and be successful under the Government's RESS support programme.

If consented, the proposed Tullaghmore Wind Farm will require a €39.6 million investment and will provide sustainable, low carbon energy generation infrastructure to meet Ireland's growing demand. The development benefits to the local community would include significant investment in local infrastructure and electrical systems, local job creation, and a contribution of approximately €8.6 million[6] in Galway County Council rates over the project lifetime.

If consented, the proposed Tullaghmore Wind Farm will also provide a community fund calculated in accordance with the Renewable Electricity Support Scheme (RESS) Terms and Conditions at €2 per MW h of electricity produced by the project. This is to be made available to the local community for the duration of the RESS (15 years). The average capacity factor of wind energy projects in Ireland is 28.3% (SEAI, 2019). Assuming this efficiency, and a capacity of around 40.8MW, the community benefit fund would amount to an average of €202,293 per annum. The actual fund will vary around this average from year to year, depending on each year's wind conditions. Wind measurements at the Study Area suggest that Tullaghmore could be capable of achieving an above average capacity factor, and therefore a larger community fund.

It is proposed that an annual minimum payment of €1,000 will be provided to each household within 1km of any proposed turbine. An annual minimum payment of €500 will be provided to each household located between 1km and 2km of a turbine. It is proposed that these payments will be fixed and will not fluctuate. 40% of the fund, amounting to

[6] Estimated €8,000 per mega watt installed for 30 year project lifespan

approximately €71,398 per year in this example, will be allocated to not-for-profit community enterprises, with an emphasis on low carbon initiatives. The remainder of the fund will be directed towards local clubs, societies and other initiatives. It is envisaged that the communities nearest the Development will benefit most from any Community Fund. It is envisaged that the Developer will engage directly with the local community to reach agreement on how the money can best be allocated.

2.9.2 Biodiversity Enhancements

There are two methods of blanket bog management which will be employed on the site, which are grazing control and water loss control. The grazing management recommendations from the Northern Ireland Countryside Management Scheme for 2007 to 2013 for blanket bog are as follows:

- No grazing - 1st November – 28th/29th February
- Grazing Period – 1st March – 31st October
- Livestock Type – Sheep only
- Livestock density – 0.075 livestock units (LU) per hectare. In terms of defining how many units 1 ewe represents more recent guidelines have been provided and the one I have to hand is also from NI which defines 1 ewe at 015 LU.

It is proposed that the area around the proposed spoil storage areas will be fenced off and closed to grazing farm animals and managed so that is allowed to develop into a wet heath habitat that can be used for breeding birds and other fauna. This area is shown on **Figure 6.9**. Further details on biodiversity enhancement can be found in **Chapter 6: Biodiversity**.

2.10 OPERATION AND MAINTENANCE

During the operation of the wind farm, the turbine manufacturer, the wind farm operator, or a service company will carry out regular maintenance of the turbines. In addition, operation and monitoring activities will be carried out remotely with the aid of computers connected via a telephone broadband link. Routine inspection and preventative maintenance visits will be necessary to provide for the smooth and efficient running of the wind farm and 38kV Substation.

2.11 DECOMMISSIONING

The Applicant is applying for a consent for a period of 35 years. Cranes of similar size to those used for construction will disassemble each turbine using the same crane hardstands. The towers, blades and all components will then be removed from site and reused, recycled,

or disposed of in a suitably licenced facility. The turbine transformers will also be removed from Site. There is potential to reuse turbine components, while others can be recycled.

Underground cables will be removed while the ducting will be left in-situ. The foundations will remain in-situ.

Hardstand areas will be remediated to match the existing landscape as closely as possible. Access Tracks will left for use by the future landowner if the land is sold on for other uses.

Any structural materials suitable for recycling will be disposed of in an appropriate manner. The financial costs of decommissioning, at current material values, will be more than met by the recycling value of the turbine components.

Prior to wind turbine removal, due consideration will be given to any potential impacts arising from these operations. Some of the potential issues could include:

- Potential disturbance by the presence of cranes, HGVs, and personnel on-site;
- On-site temporary compound would need to be located appropriately; and/or
- Time of year and timescale (to be outside sensitive periods.

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